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AN IMPROVED METHOD OF PRODUCING SMALLPOX VACCINE OF LOW BACTERIAL CONTENT

PART I. GENERAL METHODS OF PRODUCTION—INCLUDING DESCRIPTION OF QUARTERS, EQUIPMENT AND PROCEDURES

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In the more than 147 years since Jenner described his method of preventive inoculation against smallpox, there has been no essential change in the preparation of smallpox vaccine derived from the calf. Such modifications of technique as have been introduced have been directed toward the production of a better and a safer vaccine. A survey of the literature reveals a widespread desire to obtain a vaccine free from extraneous organisms and yet of sufficient potency to produce satisfactory immunity in human beings.

Owing to the fact that the virus of vaccinia is cultivated on the open skin surface of the calf, it has been impossible to produce a vaccine entirely free of micro-organisms. In recognition of this limitation of calf-propagated smallpox vaccine, National Institute of Health regulations permit the finished vaccine to contain a maximum of 1,000 viable nonpathogenic organisms per milliliter.

This shortcoming of calf vaccine has led to the development of methods for cultivating bacteria-free vaccinia virus in tissue culture (*1*), and in the developing chick embryo. Woodruff and Goodpasture (*2*) reported that the chorio-allantoic membranes of chick embryos were susceptible to infection with fowlpox virus and later, in collaboration with Buddingh (*3*), described a method of cultivating vaccinia virus on the same membranes. Despite the claims made for such types of vaccine, calf-propagated smallpox vaccine remains the most widely used prophylactic agent against smallpox. It has behind it a long and successful record of millions of effective vaccinations and a reputation for dependability which cannot be ignored. It is the purpose of this paper to describe a method of producing calf-propa-

gated smallpox vaccine of unusually low bacterial count, together with a description of the physical plant and equipment used in production.

QUARTERS AND EQUIPMENT

The smallpox vaccine building is a complete and self-contained production unit (fig. 1). The type of building construction and room arrangement provides optimum facilities for the maintenance of strict hygienic conditions. The walls are constructed of double-faced glazed tile bricks, and the floors are of smooth sealed cement, providing excellent drainage.

Animal preparation room.—The animal preparation room is the receiving room in which incoming calves are prepared for quarantine. Facilities are provided for restraining, clipping, and bathing the animal.

Quarantine and incubation rooms.—The quarantine and incubation rooms are identical in construction. Each contains six stanchions, a concrete manger, and a device for automatically flushing the gutters at frequent intervals (fig. 2).

Operating room.—The operating room contains a "Blaxall" operating table, an instrument sterilizer, and cabinets for the storage of sterile supplies and instruments. Facilities are provided for furnishing tap water of any desired temperature as well as for sterile tap water (fig. 3).

Autopsy room.—The autopsy room contains an autoclave, tanks for sterilizing tap water, sanitary laundry sinks, and equipment for suspending the animal carcass during autopsy. Mechanical ventilation provides rapidly changing filtered air of constant temperature in all the above-mentioned rooms.

Feed storage rooms.—Two feed storage rooms are provided for convenience. The one serving the incubation room contains a large autoclave in which soiled floor gratings and materials used in the operating room are disinfected.

Processing laboratory.—The processing laboratory contains equipment for the processing, testing, and storage of vaccine, including a 37° C. incubator, a 2° C. refrigerator, and a −18° C. freezer.

Animal test room.—The animal test room is isolated from the rest of the unit by a permanent wall and has a separate entrance. It is equipped with cages for rabbits, cages for mice, and a work table upon which rabbits may be restrained.

VACCINE PRODUCTION PROCEDURES

Preparation of calves for quarantine.—Heifer calves with white abdomens, weighing from 300 to 400 pounds, are preferred in our work.

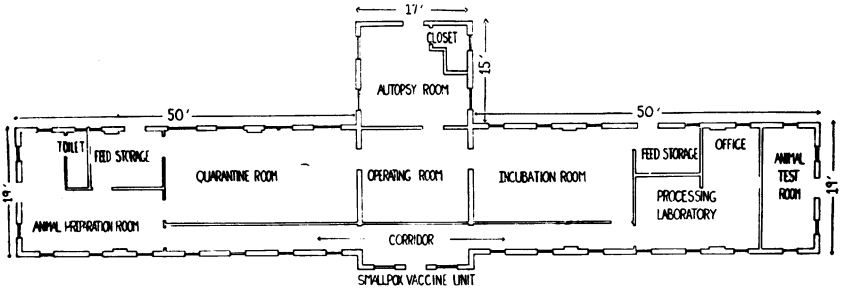

FIGURE 1.—Floor plan of building used for production of smallpox vaccine.

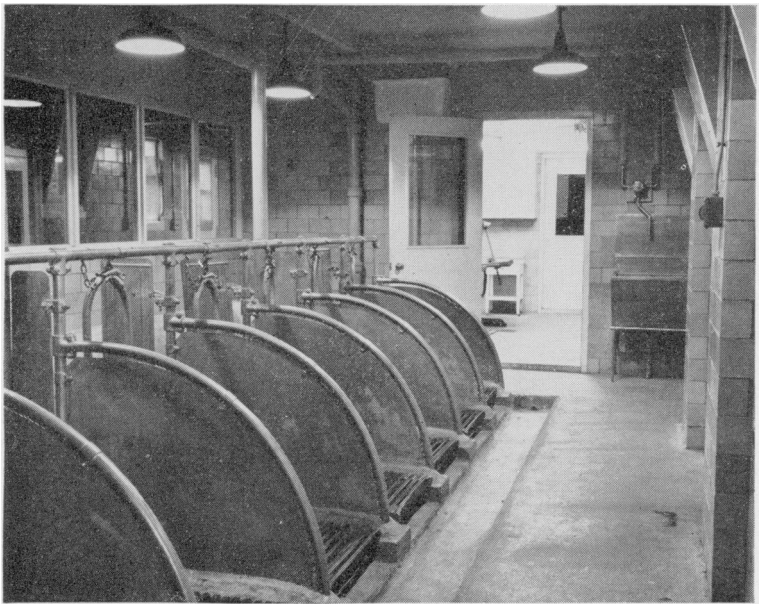

FIGURE 2.—Quarantine and isolation room.

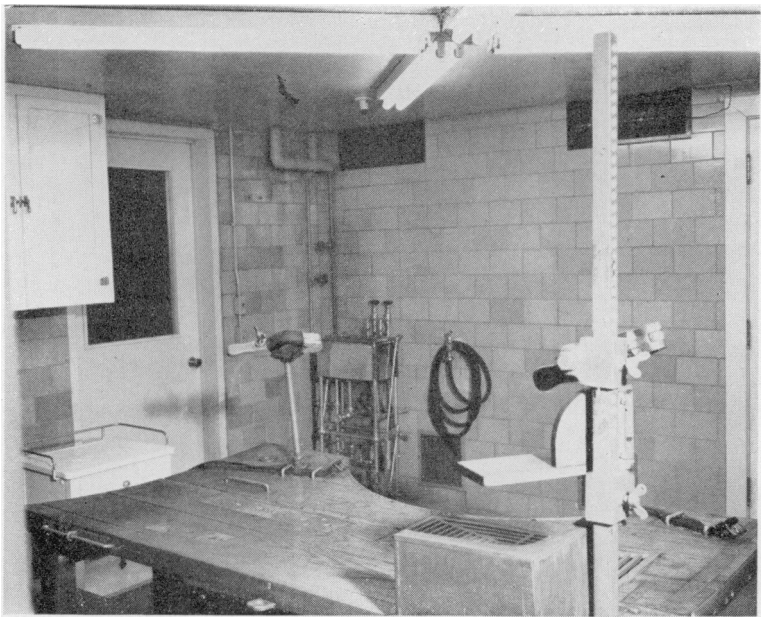

FIGURE 3.—Operating room.

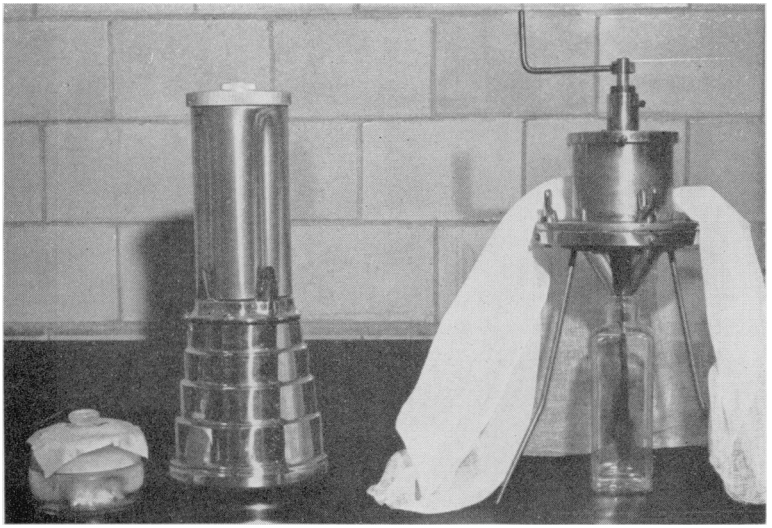

FIGURE 4.—Grinder and screener. Left to right: Frozen vaccinial pulp, Waring Blendor, and screener.

In the animal preparation room, the calf is closely clipped with electric hair clippers and bathed with soap and warm water. The hooves are trimmed and cleaned, and the animal is dried with towels before it is placed in the quarantine room.

Quarantine and care of calves.—The calves are kept in quarantine at least 1 week. During this period, rectal temperatures are taken and recorded twice daily. An intradermic tuberculin test is performed in the skin of the caudal fold, the reaction being judged on the third day. Positive tuberculin reactors and animals showing any evidence of disease during the quarantine period are rejected. In our experience, the most common ailment in calves has been respiratory in nature and varied in severity from a mild cold to pneumonia. These difficulties appear to be minimized if the room temperature is maintained constantly between 82° F. and 85° F. The calves are fed twice daily. The ration consists of 1½ quarts of rolled oats and a quantity of alfalfa hay which can be consumed by the animal at each feeding. A bucket of clean fresh water is kept before each animal at all times.

Sanitation.—Each calf is placed in an individual stanchion equipped with a removable wooden floor grating. A minimum of two stanchions for each animal should be available. This permits changing the calves from soiled to clean stanchions at frequent intervals. The soiled floor gratings are removed daily, scrubbed in hot water, and sterilized in the autoclave. Each day the stanchions are cleaned thoroughly with hot water and disinfected with a reliable chlorine disinfectant. Twice daily the rooms are washed with running water, and chlorine disinfectant is applied to the walls and floors with a long-handled brush.

Preparation of the calf for vaccination.—The calf is strapped on the table and anesthetized with sodium pentobarbital solution. This is used as a 6.4-percent solution and is administered slowly through the jugular, allowing 1 ml. for each 15 lb. of body weight. Satisfactory relaxation is quickly produced with this dosage, which is the equivalent of 1 grain per 15 lb. Additional anesthetic may be given as the need arises. An electric clipper fitted with a fine cutting blade is used to clip the hair from the ventral surface of the body, the right side, and the inside surfaces of the thighs. The animal is given a preliminary bath followed by careful shaving of the freshly clipped area which is to be used for inoculation. The inoculation site, including a liberal area surrounding it, is then scrubbed with sterile soap solution [1] employing sterile hand brushes. The soap solution is rinsed from the animal with warm tap water. This procedure is repeated at least six times. A final rinsing is made with sterile tap water. The skin

[1] One part Ivory soap chips plus two parts water are put up in 16-oz. bottles and sterilized in the autoclave.

is dried with sterile towels, and 70-percent alcohol is applied and permitted to dry. The area is rinsed with sterile distilled water, dried, and draped with sterile towels, leaving only the inoculation site exposed.

Vaccination procedure.—With the four-point scarifying instrument (fig. 5) held perpendicular to the skin and with the application of slight pressure, parallel lines are drawn about 0.5 cm. apart following the long axis of the body. Sufficient pressure is used to break the skin without drawing blood. The seed suspension is applied and rubbed into the skin with a sterile spatula. When the animal has recovered from the anesthetic, it is removed to the incubation room for a period of 6 days.

Incubation.—The sanitation and care of the calves in the incubation room are, in general, the same as those employed in the quarantine room, with the exception that the inoculated area of each calf is sprayed twice daily with 1:1,000 aqueous solution of Roccal.[2] The hay and grain are steam treated in order to render them dust free. The windows of this room are of ruby glass in order to screen out direct sunlight. It has been reported that ultraviolet light has an inhibitory effect on the development of the pox lesion (*4*).

Collection of the vaccinial pulp.—The vaccinial pulp is collected from the calf on the sixth day of incubation. The animal is placed on the table and anesthetized as previously described. Aseptic procedure is followed in collecting the pulp. This includes the use of sterile gowns and sterile rubber gloves by the operator. The vaccinated area is cleansed by scrubbing it thoroughly with sterile soap solution and by rinsing with warm tap water. This is repeated 10 or 12 times using sterile hand brushes for each application. Extreme care is taken to cover the entire field of operation in a systematic progression, with the avoidance of injury to the vesicles. If after five or six scrubbings the vesicles appear to soften excessively, the brushes are discarded and the gloved hands alone are used to work up the lather. An assistant rinses off the soap between scrubbings while the operator soaks his gloved hands in a basin of 1:1,000 aqueous solution of Roccal. After the last washing the calf is rinsed with sterile tap water, which is followed by 95-percent alcohol to remove all traces of soap. The area is rinsed again with sterile tap water and dried with a sterile towel. By means of a hand-operated spray gun, the operative field is sprayed with a 1:100 aqueous solution of Roccal until it is thoroughly wet. It is then covered with a sterile towel for 15 minutes.

[2] Made by the Roccal-Winthrop Chemical Co. It is available as a 10-percent stock solution. Solutions of Roccal referred to in this report are in terms of the concentration of the active ingredient; to make one liter of 1:1,000 solution of Roccal, 10 ml. of Roccal stock solution are added to 990 ml. distilled water.

FIGURE 5.—Scarification and harvest instruments. Bottom row, left to right: Four-point scarifier, pricking instrument, spatula, curette (Volkmann spoon), and pick (used in removing pulp from curette). Top row, left to right: Seed-dispensing bottle, and vaccine-collecting jar.

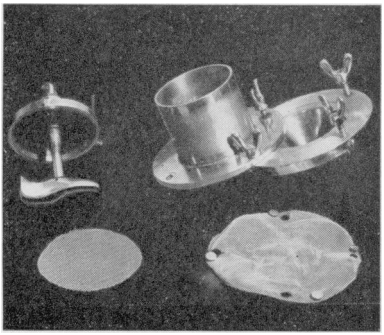

FIGURE 6.—Screening device taken apart to show its construction. In the lower row are shown the coarse mesh supporting screen and the 100-mesh monel wire screen which fits over it.

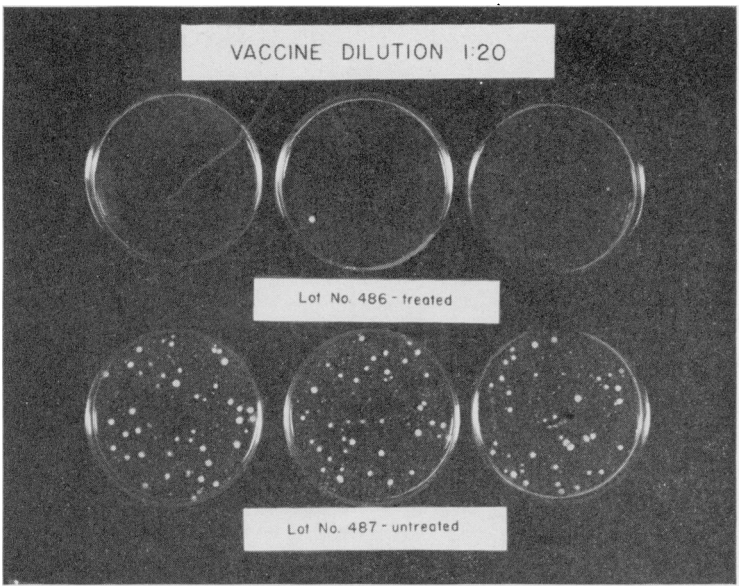

FIGURE 7.—Agar plate counts of vaccine prepared from Roccal-treated calves and untreated calves.

The calf is sacrificed at this time by trocarization of the carotid artery. The operative area is rinsed with sterile tap water followed by sterile distilled water. The surface is dried and then draped with sterile towels, leaving only the vaccinated site exposed. Vaccinial pulp is collected by scraping the vesicles with a Volkman spoon, and the material is placed in a sterile, tared, glass-covered dish. When collection is completed, the pulp is removed to the processing laboratory where it is weighed and stored in the freezer to await processing.

Autopsy.—Immediately after harvesting, a systematic gross inspection is made of the carcass and the viscera, including the regional lymph nodes. The vaccinial pulp of any animal showing evidence of sepsis or a communicable disease is discarded.

Preparation of the vaccine.—The frozen vaccinial pulp is transferred to a sterile "Waring Blendor" cup (fig. 4) and ground to a smooth consistency with the addition of 50 percent glycerine in distilled water. A sample of this material is removed for future testing, and to the remainder a quantity of glycerine-phenol solution is added to make a 1:4 suspension of vaccinial pulp. (One part pulp to three parts phenolized 50-percent glycerine in distilled water. The final concentration of phenol is 0.5 percent.) When the grinding is completed, the suspension is passed through a 100-mesh wire screen and collected in sterile 16-ounce bottles (fig. 6). This material, constituting the bulk vaccine, is stored at −18° C.

Safety and potency tests.—Before vaccine virus is released for filling, tests are conducted to show that the bacterial content is satisfactory, that it is free of *Clostridium tetani*, and that it is of sufficient potency.

Bacterial content.—For the determination of bacterial content, the nutrient agar plate-count method is used. A 1:20 dilution of the vaccine is made with saline and 1-ml. amounts are added to each of five plates. The average count multiplied by the dilution factor is used to obtain the number of organisms per milliliter. Plate counts are made on the fresh vaccine and repeated at monthly intervals, if necessary, until the bacterial count is acceptable. National Institute of Health regulations permit a maximum bacterial count of 1,000 organisms per milliliter of the finished vaccine. With the method herein described, the initial plate counts are usually less than 50 organisms per milliliter.

Test for Clostridium tetani.—The test for *Clostridium tetani* is made on the ground glycerinated pulp which was removed as a sample before the vaccine was phenolized. Samples from each calf are tested separately. Fermentation tubes containing media suitable for the growth of anaerobic bacteria are inoculated with 2-ml. amounts of vaccine. The inoculated tubes are incubated at 37° C. for 9

days, after which 1-ml. amounts of unfiltered broth from each tube are injected subcutaneously into mice. The mice are observed for symptoms of tetanus for a period of 6 days.

Determination of the potency of vaccine virus.—Potency tests are performed on the bulk vaccine and on the vaccine filled in capillary tubes. The technique used is that described by Force and Leake (*5*) in which the rabbit is employed as the test animal. Bulk vaccine is tested against a control vaccine of known potency using the following dilutions: 1:1,000, 1:3,000, 1:10,000, 1:30,000. Vaccine in capillaries is tested against a control vaccine in a dilution of 1:3,000. A vaccine is considered satisfactory for release if on the fifth day it produces 80-percent confluence of vesicles in a 1:3,000 dilution.

Seed virus.—Seed virus for the following year is prepared at the close of each production season. The seed virus is maintained at a high level of potency by alternate passage through a rabbit and a calf. Several large albino rabbits weighing from 7 to 10 pounds are used as vaccinifers. The entire surface of the back is plucked free of hair. Preparation of the skin and the technique used in vaccination of the rabbits is similar to that described for the calf. The skin over the back is scarified with an instrument containing four needles set 1 mm. apart. Calf vaccine diluted with an equal volume of 50-percent glycerine is then rubbed into the scarifications with a spatula. On the fifth day after inoculation, the vesicles are ready for harvesting. The rabbits are sacrificed by an intravenous injection of a lethal dose of a 6.4-percent solution of sodium pentobarbital. Usually 3 to 5 ml. is sufficient. Aseptic technique is observed in preparation of the erupted skin surface for collection of the pulp, which in general follows the procedure used when harvesting from the calf.

The vaccinial pulp is processed in the same manner as previously described for calf vaccine, except that the dilution of the suspension is 1:8 rather than 1:4. If the quantity of pulp is small, the grinding may be performed in a mortar with pestle. Tests are performed for bacterial content, *Clostridium tetani*, and for potency, following which the lapine virus is used to vaccinate a calf. The vaccine resulting from the vaccination of the calf is set aside as seed virus. The processing, testing, and standards are the same as for regular smallpox vaccine.

Storage of vaccine.—Optimum conditions of storage for smallpox vaccine are not clearly established. We have stored vaccine for 3 years at or below −10° C. with only slight loss of potency. For the past 2 years we have stored vaccine at −18° C. The hydrogen ion concentration of our smallpox vaccine ranges from 6.6 to 7.2 tending toward the lower value after prolonged storage.

DISCUSSION

There are several features of the construction of the smallpox unit which deserve additional comment. In the manufacture of calf-propagated smallpox vaccine, the prevention of heavy contamination of the final product with extraneous micro-organisms has always been a great problem. The usual source of this contamination is, of course, the skin of the animal. Therefore, any effort made to keep to a minimum the contamination of the animal's skin prior to collection of the vaccinial pulp will result in fewer organisms in the final vaccine. Complete elimination of all micro-organisms from the surface of the skin is probably impossible. By having fewer organisms to cope with, however, the operator can more nearly attain the goal of complete skin disinfection at the time of harvest. By providing easily cleaned quarters with reserve stanchion capacity, the animals can be alternated daily in freshly cleaned stanchions while others are sanitized. This is of great importance when attempting to control such bacterial contaminants as *Pseudomonas pyocyaneous*. Another important feature in the animal quarters is the installation of a flushing device for washing the gutters at frequent intervals. Such an arrangement helps to prevent the accumulation of feces and urine in the stanchion behind the animal and reduces the chance for fecal soilage of the skin surfaces. Animal attendants must be on the alert constantly to maintain the most rigid kind of sanitation.

Of the many steps employed in the production of vaccine, the techniques used in the operating room are perhaps of most importance. Good operating room procedure demands attention to small detail as well as to the obvious. The task of preparing for operation an animal as large and vigorous as a 350-pound calf is subject to many difficulties. Animals object to restraint, and their cooperation may only be obtained through the use of some relaxing agent. Although it is the practice of some vaccine laboratories to vaccinate an unanesthetized animal, it is felt that the advantages of using an anesthetic greatly outweigh any disadvantages. There are a number of safe anesthetics such as sodium pentobarbital which are easy to administer and require little attention on the part of the operator. In addition to humane considerations, an anesthetized animal makes possible the use of good aseptic technique.

One of the details which must be kept in mind when preparing an animal for either inoculation or harvest is prevention of contamination of the operative field from some object which has been in contact with an unclean surface. This, of course, is fundamental to any aseptic procedure, but it is surprising how many opportunities exist for breaking the chain of asepsis. To minimize the chances for contami-

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nation of the field, scrubbings are begun centrally in the operative area and progress outwardly in ever-increasing circles. Brushes that have been in contact with the outer limits of the operative field are never brought back again to the central area but are discarded. The same principle is followed when rinsing the area. The direction of water flow is from the center of the operative area out to the edges, care being taken to prevent backflow over the clean surface.

The uniform incubation period of vaccinia in the calf makes the production procedure adaptable to easy scheduling. A staff consisting of the following classes of personnel is recommended: One veterinarian, one laboratory technician, one operating room assistant, and one animal technician. A production unit such as is described in this report is capable of producing from 1 to 3 million capillaries in a 40-week period, depending on whether two or six calves are harvested each week. To obtain the larger volume of production would necessitate a slight increase in the size of the quarantine, operating, and incubation rooms, and the addition of extra personnel.

SUMMARY OF PART I

An improved method for the manufacture of smallpox vaccine of low bacterial content is described. Rigid attention to the details of sanitation during the quarantine and handling of animals, together with the treatment of operative surfaces with Roccal solution, constitute the improvements. With these improvements, it is possible to eliminate the long storage period otherwise required for the destruction of bacterial contaminants in the vaccine.

PART II. COMPARISON OF A QUATERNARY AMMONIUM COMPOUND (ROCCAL)[3] WITH BRILLIANT GREEN IN THE PREPARATION OF SMALLPOX VACCINE

The present study was undertaken in an effort to discover some means for overcoming the main criticism of calf vaccine, namely, that of massive contamination of the product with extraneous micro-organisms. Such contamination makes necessary a more or less long "ripening" process in the manufacturer's cold storage rooms before the vaccine may be released for use.

Many agents have been tried in the past to reduce the number of viable micro-organisms appearing in smallpox vaccine. Among these may be mentioned chloroform, ether, phenol, eucopintoxin hydrochloride, trypaflavine, malachite green, brilliant green (*6*), oil of cloves, and heat.

[3] Made by the Roccal-Winthrop Chemical Co., New York. It is prepared as a 10-percent stock solution of the active ingredient. Dilutions herein referred to indicate concentration of active ingredient rather than dilution of Roccal solution. To make one liter of 1:100 solution of Roccal, 100 ml. of Roccal stock solution are added to 900 ml. of distilled water.

None of these agents has been effective in reducing the bacterial content of smallpox vaccine without at the same time causing injury to the virus. Glycerine, the most commonly used suspending medium for vaccine virus, is a feeble germicide at low temperatures and requires a rather long period to produce a sufficient reduction in contaminating bacteria. At room temperature (20° C.) or higher, the rate of bacterial destruction is accelerated, but unfortunately there is rapid destruction of the virus at that temperature.

Brilliant green in concentrations of 1:500 to 1:1,000 has been used widely as a spray applied to the inoculated skin surface of the calf during the incubation of vaccinia. Its purpose was to control the number of organisms occurring on the skin of the animal.

Our own experience with the use of brilliant green in the above manner indicated that it was not an effective agent. Initial bacterial counts on individual lots of vaccine averaged more than 12,000 organisms per milliliter. Such vaccine frequently required a year or more of storage in the freezer at −15° C. to −18° C. before the bacterial count was lowered sufficiently for safe usage. A lot of vaccine is considered satisfactory if its bacterial count does not exceed 1,000 organisms per milliliter.

The need for producing a vaccine on the skin surface of an animal with the avoidance of undue bacterial contamination of the product is very great. An agent which could be applied to the animal's skin and which could effectively control the numbers of micro-organisms would be of value in the manufacture of high-quality smallpox vaccine. Such an agent should have the following properties:

1. High germicidal activity.
2. Low toxicity for the virus.
3. Low surface tension to ensure good skin contact.
4. Low toxicity for skin tissue.
5. Ease of application.

The compound employed in this study (Roccal)[3] possesses the above properties. Roccal is a quaternary ammonium compound derived from coconut oil. It is a mixture of high-molecular-weight alkyl-dimethyl-benzyl-ammonium chlorides The aqueous solution is a stable, colorless, saponaceous, alkaline solution which has an acrid taste. When diluted for topical application, the aqueous solution possesses wetting, detergent, keratolytic, emulsifying, and emollient properties.

Critical toxicity tests (7) have shown this compound to have no harmful effect upon the skin and mucous membranes when used in proper dilution.

METHODS

Part I discussed in detail the procedures employed in the manufacture of smallpox vaccine. The germicides compared in this study were brilliant green 1:500 solution, Roccal 1:1,000 solution, and Roccal 1:100 solution. These agents were sprayed on the skin of the calf during the incubation of vaccinia. In the case of Roccal solution, an additional spraying was made just prior to harvesting the vaccinial pulp. The resultant effect on the bacterial content, potency, and yield of vaccine was studied.

RESULTS

Prior to the use of Roccal, an aqueous solution of brilliant green in a concentration of 1:500 had been used in the form of a spray. This was applied twice a day to the inoculation site during the incubation period of vaccinia. It is obvious that the care and technique of the operator at the time of harvest will greatly influence the bacterial content of the vaccinial pulp. In the tables presented, the separate lots of vaccine were prepared by or under the direction of one individual, thereby minimizing an important variable.

TABLE 1.—*Comparison of vaccine from calves treated with brilliant green 1:500 and with Roccal 1:1,000*

Method of treatment of calves	Lot number	Time between harvest and first bacterial count (in days)	Bacterial count (number per milliliter)	Method of treatment of calves	Lot number	Time between harvest and first bacterial count (in days)	Bacterial count (number per milliliter)
Brilliant green 1:500	413	9	3,000	Roccal 1:1,000	424	54	1,000
Brilliant green 1:500	414	6	14,500	Brilliant green 1:500	425	53	[1]>20,000
Brilliant green 1:500	416	69	1,900	Brilliant green 1:500	426	50	6,000
Brilliant green 1:500	417	65	17,600	Roccal 1:1,000	427	47	1,150
Brilliant green 1:500	418	62	1,000	Roccal 1:1,000	428	56	500
Brilliant green 1:500	419	58	7,500	Brilliant green 1:500	429	53	18,000
Brilliant green 1:500	420	5	[1]>20,000	Brilliant green 1:500	430	49	[1]>20,000
Roccal 1:1,000	421	1	300	Brilliant green 1:500	Average	43.5	>12,000
Roccal 1:1,000	422	68	150	Roccal 1:1,000	Average	47.3	566
Roccal 1:1,000	423	58	300				

[1] No attempt was made to determine the number of micro-organisms in vaccine showing counts in excess of 20,000 per milliliter. Such vaccine is recorded in the table as having counts of 20,000 per milliliter in order to arrive at an approximate average figure for the series. Actually the average figure is higher than that indicated.

The data summarized in table 1 are from a series of lots of vaccine produced both by the old method of treatment of the calves with brilliant green 1:500 solution and by the method employing Roccal 1:1,000 aqueous solution. The data obtained in 17 consecutive lots of vaccine are presented. Eleven calves were treated with brilliant green, and six with Roccal. The lower bacterial content in the case

of Roccal-treated vaccine [4] is apparent when compared with the brilliant-green-treated vaccine.[4] Lot 415 is omitted because it was produced by another individual.

The average initial bacterial count in the 11 lots of vaccine treated with brilliant green 1:500 was 12,000 per milliliter. The average initial count in the 6 lots of vaccine treated with Roccal 1:1,000 was 566 per milliliter. The average time interval between preparation of the vaccine and making the bacterial counts was 43.5 days for the brilliant-green-treated vaccine, and 47.3 days for the Roccal-treated vaccine. All vaccine was kept in continuous cold storage at −10° C. to −18° C.

Effect of Roccal 1:1,000 solution on the potency of vaccinia virus.—Some chemical agents, although effective bactericides, carry with them the concurrent danger either of immediately diminishing the potency of the virus or of shortening its period of usefulness.

To determine whether or not Roccal, in the dilution used, had any destructive action on the virus, the Roccal-treated vaccine was tested for potency after varying periods and conditions of storage.

Lot No. 423 Roccal-treated vaccine was compared with lot No. 426 brilliant-green-treated vaccine after 8 months of continuous storage at −10° C. to −18° C. The results are shown in table 2.

After 18 months of continuous storage at −10° C. to −18° C., lot No. 424 Roccal-treated vaccine was compared with lot No. 425 brilliant-green-treated vaccine.

TABLE 2.—*Comparison of the potency of vaccine from Roccal-treated and brilliant-green-treated calves after 8 months of cold storage*

Dilution of vaccine	Percentage confluence [1]		Dilution of vaccine	Percentage confluence [1]	
	Lot No. 423 Roccal-treated	Lot No. 426 brilliant-green-treated		Lot No. 423 Roccal-treated	Lot No. 426 brilliant-green-treated
1:1,000	100	100	1:10,000	100	100
1:3,000	100	100	1:30,000	100	100

[1] Percentage confluence refers to percentage of inoculated area covered with a confluent eruption of vesicles, using the rabbit as the test animal. The technique of testing was that described by Force and Leake (*5*).

TABLE 3.—*Comparison of the potency of vaccine from Roccal-treated and brilliant-green-treated calves after 18 months of cold storage*

Dilution of vaccine	Percentage confluence		Dilution of vaccine	Percentage confluence	
	Lot No. 424 Roccal-treated	Lot No. 425 brilliant-green-treated		Lot No. 424 Roccal-treated	Lot No. 425 brilliant-green-treated
1:1,000	100	100	1:10,000	75	60
1:3,000	100	95	1:30,000	40	40

[4] The terms Roccal-treated vaccine and brilliant-green-treated vaccine imply treatment of the operative surfaces of the calves rather than direct treatment of the vaccinial material after its removal from the animals.

From the above tables, it would appear that after 8 and after 18 months of storage at a temperature below −10° C., there is no appreciable difference in virus potency exhibited by the Roccal-treated and the brilliant-green-treated vaccines.

Effect of room temperature on vaccine from Roccal-treated calves.—To ascertain if storage at room temperature would reveal any latent effect of Roccal on vaccinia virus, the following experiment was conducted.

A calf was prepared for harvest in the usual manner. Just prior to collection of the pulp, one-half of the erupted area was covered with a sterile sheet, and the other half was sprayed with 1:1,000 aqueous solution of Roccal. After 10 minutes, this area was rinsed with sterile distilled water and dried with a sterile towel. The vaccinial pulp was collected separately from the treated and untreated areas. The untreated vaccine, lot No. 454A, was processed separately from the Roccal-treated vaccine, lot No. 454C.

The potencies of lots No. 454A and No. 454C, after varying periods of storage at room temperature, were determined by animal titration (table 4). It was interesting to observe that 11 days after preparation of the vaccines, the bacterial count of lot No. 454A (untreated vaccine) was more than 20,000 per milliliter, whereas the count of lot No. 454C. (Roccal-treated) was 640 organisms per milliliter.

TABLE 4.—*Comparative titrations of Roccal-treated and untreated vaccine stored at room temperature*

Length and method of test	Dilution of vaccine	Percentage confluence		Length and method of test	Dilution of vaccine	Percentage confluence	
		Lot 454A untreated	Lot 454C treated			No. 454A untreated	No. 454C treated
(a) Freezer storage at −18° C. Mar. 24, 1944. Rabbit H526	1:1,000	100	100	(d) 15 days at room temperature.[1] May 24, 1944 Rabbit H570	1:1,000	95	95
	1:3,000	100	100		1:3,000	85	90
	1:10,000	100	100		1:10,000	50	50
	1:30,000	80	95		1:30,000	25	25
(b) 3 days at room temperature.[1] Apr. 7, 1944. Rabbit H595	1:1,000	100	100	(e) 22 days at room temperature.[1] Apr. 27, 1944. Rabbit H598	1:1,000	0	0
	1:3,000	95	95		1:3,000	0	0
	1:10,000	50	50		1:10,000	0	0
	1:30,000	20	30		1:30,000	0	0
(c) 9 days at room temperature.[1] Apr. 14, 1944. Rabbit H582	1:1,000	95	95				
	1:3,000	85	80				
	1:10,000	50	65				
	1:30,000	30	30				

[1] Room temperature ranged between 85° F. and 88° F. (29.4° C. to 31.1° C.).

The results presented in table 4 show that there was no significant difference in the animal titrations between Roccal-treated and untreated vaccine which could be attributed to an effect of the germicide on the virus. Tests were carried out on vacccine (a) fresh from freezer storage at −18° C., vaccine (b) after 3 days at room temperature,

vaccine (c) after 9 days at room temperature, vaccine (d) after 15 days at room temperature, and vaccine (e) after 22 days at room temperature. After 22 days at room temperature, both vaccines failed to exhibit any potency. It should be noted that the room temperature was high, ranging between 85° F. and 88° F. (29. 4° C. to 31.1° C.) daily.

Further experiments have shown that vaccinia virus may withstand the presence of Roccal solution in a relatively high concentration (1:300) without being materially weakened. Vaccinial pulp was ground and suspended in a 1:300 solution of Roccal in the proportion of one part of pulp to two parts of Roccal 1:300 solution. This material was stored at 3° C. for 29 days and then tested for potency. The two dilutions used, 1:100 and 1:1,000, each resulted in 100-percent confluence of vesicles.

In view of the results obtained with 1:1,000 solution of Roccal, an effort was made to increase further the germicidal activity of the agent by increasing the concentration.

A consecutive series of calves were used in this experiment, They were treated in the usual manner except that, just prior to harvest of the vaccinial pulp, the operative field was sprayed with 1:100 solution of Roccal instead of the usual 1:1,000 solution. An exception was lot No. 487 which did not receive Roccal treatment. The results obtained are shown in table 5.

TABLE 5.—*Bacterial counts obtained with Roccal 1:100 solution*

Method of treatment of calves	Lot number	Time between preparation and 1st bacterial count (in days)	Bacterial count (number per milliliter)	Method of treatment of calves	Lot number	Time between preparation and 1st bacterial count (in days)	Bacterial count (number per milliliter)
Roccal 1:100	473	9	0	Roccal 1:100	483	7	16
Roccal 1:100	474	8	5	Roccal 1:100	484	2	72
Roccal 1:100	475	2	5	Roccal 1:100	485	21	12
Roccal 1:100	[1] 476	Same day	>20,000	Roccal 1:100	486	16	32
Roccal 1:100	477	15	5	Not treated with Roccal	[1] 487	15	>20,000
Roccal 1:100	478	12	8	Roccal 1:100	488	10	0
Roccal 1:100	479	7	18	Roccal 1:100	[1] 489	8	1,680
Roccal 1:100	480	1	0	Roccal 1:100	Average	8.8	15.5
Roccal 1:100	481	5	45				
Roccal 1:100	482	9	0				

[1] Lots No. 476, No. 487, No. 489 are not included in calculations of averages. Lots No. 476 and No. 489 were prepared by other operators, and lot No. 487 did not receive Roccal treatment.

An examination of the results presented in table 5 brings up an interesting point which should be stressed concerning the use of a germicide. The germicide reported on is not, and should not be used as, a substitute for cleanliness and care. In fact, in several instances in which an individual lacking in experience and with insufficient regard for asepsis has made vaccine, Roccal failed almost completely

to control the numbers of contaminating bacteria. This is illustrated by lots No. 476 and No. 489 in table 5. Only by the judicious application of good sanitation and good operating-room procedures, coupled with the use of an efficient germicide, will the operator succeed in producing calf-propagated vaccine of low bacterial content. Perhaps in the future a simple method of direct treatment of the vaccinial pulp after harvest with a suitable agent will result in bacterial sterilization of the vaccine without injury to the virus. This line of treatment would be analogous to pasteurization of milk and would simplify greatly the establishment of standards governing the production of vaccine under many varying conditions of manufacture. Preliminary work indicates that there are chemical agents sufficiently selective in their action to be used in this manner.

In one experiment (*8*) the author has succeeded in rendering vaccinia virus free of viable bacteria, after harvest, by the use of 1:300 solution of Roccal. No conclusions can be drawn from this preliminary work. However, the indication is that direct treatment of the vaccinial pulp with Roccal or another suitable agent may offer a satisfactory method of controlling bacterial contamination of the product.

Test for presence of residual amounts of active germicide in vaccine from Roccal-treated calves.—The low bacterial counts obtained by spraying the calf with Roccal solution were very encouraging. However, it was necessary to determine if this was simply a result of some of the germicide being carried over into the vaccine and exerting there a bactericidal or bacteriostatic effect. If such were the case, the presence of germicide in the vaccine could easily be determined by adding definite quantities of a standardized suspension of bacteria to samples of both treated and untreated vaccine. Subsequent bacterial counts would then be expected to be lower in the vaccine samples containing the germicide.

The following experiment was conducted:

Four samples of vaccine, two of which had been treated with 1:100 solution of Roccal, one with 1:1,000 solution of Roccal, and one which had received no germicidal treatment, were all "ripened" in the 37° C. incubator until rendered bacteriologically sterile by the action of glycerine. Sterility was determined by plating on agar and by inoculation of thioglycollate fluid media. A standardized suspension of staphylococci was added to each sample of vaccine. Each milliliter of vaccine contained approximately 1,450 viable staphylococci. Two tests were made. The first was conducted on the samples immediately after the addition of the standardized bacterial suspension, and the second, 1 hour after the addition of the bacterial suspension. The latter samples were incubated 1 hour at 37° C. before plating.

TABLE 6.—*Test to determine presence of germicide in vaccine from Roccal-treated calves, approximately 1,450 staphylococci introduced in each milliliter of vaccine*

Method of treatment	Number of colonies on individual plates containing 1 ml. of 1:20 dilution of vaccine					Average number of colonies per plate	Average number of bacteria per milliliter	Percentage reduction in incubated samples
A. Samples plated immediately after addition of bacterial suspension								
Lot No. 485, Roccal 1:100	77	64	73	79	89	76.4	1,528	
Lot No. 486, Roccal 1:1,000	66	83	74	67	80	74.0	1,480	
Lot No. 487, untreated	54	79	74	78	70	71.0	1,420	
Lot No. 488, Roccal 1:100	68	79	59	83	63	71.6	1,432	
B. Samples incubated 1 hour at 37° C. after addition of bacterial suspension								
Lot No. 485, Roccal 1:100	48	41	30	60	49	45.6	912	40
Lot No. 486, Roccal 1:1,000	60	46	44	61	46	51.4	1,028	30
Lot No. 487, untreated	40	51	44	50	49	46.8	936	34
Lot No. 488, Roccal 1:100	36	37	43	66	48	46.0	920	35

One-milliliter amounts from each sample were diluted 1:20 with physiological saline. Nutrient agar pour plates were made, using five plates for each sample. Each plate received 1 ml. of the 1:20 dilution of vaccine. The results appear in table 6. The results as shown in table 6 clearly indicate that there is no appreciable amount of active germicide present in the Roccal-treated vaccines. There is close agreement in the results obtained with both the Roccal-treated and untreated vaccines. The reduction in viable bacteria obtained in the incubated samples is approximately equal in all four samples.

Test to determine if Roccal is inactivated by glycerinated vaccine at 37° C.—A final experiment was conducted to determine if Roccal is free to act in the presence of glycerinated vaccine, and to compare such action with its effect in the presence of physiological saline. The following procedure was employed:

Five samples of sterile vaccine and five samples of sterile physiological saline were prepared containing varying quantities of Roccal ranging in concentration from 1:100 to 1:1,000,000. One vaccine sample and one saline sample received no Roccal. All samples were incubated at 37° C. for 4 days. After 4 days, 1 ml. of a standardized suspension of staphylococci was added so that each milliliter of vaccine and saline samples then contained approximately 1,180 viable staphylococci. The vaccine and saline samples were incubated 1 hour at 37° C., and 1:20 dilutions in saline were made of each sample. Five plates were poured for each sample, each plate receiving 1 ml. of a 1:20 dilution ~~(see fig. 7)~~.

The results obtained are summarized in tables 7 and 8 from which the following conclusions are drawn:

1) Roccal is effective against staphylococci in glycerinated vaccine containing up to 1:1,000 concentration of Roccal. It is only partially effective in 1:10,000 concentration and ineffective in concentrations less than 1:10,000.

TABLE 7.—*Effect of Roccal at 37° C. in presence of glycerinated vaccine (approximately 1,180 staphylococci introduced in each milliliter of vaccine samples)*

Concentration of Roccal in vaccine samples	Number of colonies on individual plates containing 1 ml. of 1:20 dilution of vaccine samples					Average number of colonies per plate	Average number of bacteria per milliliter
Roccal 1:100	0	0	0	0	0	0	0
Roccal 1:1,000	0	0	0	0	0	0	0
Roccal 1:10,000	31	48	38	33	39	37.8	756
Roccal 1:100,000	54	52	41	50	50	49.4	988
Roccal 1:1,000,000	34	48	52	55	49	47.6	952
No Roccal	42	42	55	56	56	50.2	1,004

TABLE 8.—*Effect of Roccal at 37° C. in presence of saline (approximately 1,180 staphylococci introduced in each milliliter of saline samples)*

Concentration of Roccal in vaccine samples	Number of colonies on individual plates containing 1 ml. of 1:20 dilution of vaccine samples					Average number of colonies per plate	Average number of bacteria per milliliter
Roccal 1:100	0	0	0	0	0	0	0
Roccal 1:1,000	0	0	0	0	0	0	0
Roccal 1:10,000	0	0	0	0	0	0	0
Roccal 1:100,000	0	0	2	1	0	0.6	12
Roccal 1:1,000,000	14	6	6	32	25	16.6	332.0
No Roccal	46	52	45	38	42	44.6	892.0

2) Roccal is effective in varying degree up to 1:1,000,000 concentration in saline. It is almost 100 times more active against staphylococci in saline than in glycerinated vaccine.

3) Roccal must exert its influence on the skin of the animal at the time of application rather than in vitro in the vaccine. This conclusion is borne out by the previous experiment in which a suspension of staphylococci was added to vaccine samples which had been treated with 1:100 solution of Roccal at the time of harvest. There was no influence on the number of organisms recovered that could be attributed to the action of residual amounts of Roccal in the vaccine.

4) The present experiment shows that Roccal in low concentration (1:10,000 and less) is practically ineffective in controlling the growth of staphylococci in the presence of glycerinated vaccine. The amount of Roccal which is carried over into the vaccine at the time of harvest is much less than that represented by a 1:10,000 concentration of Roccal.

SUMMARY OF PART II

A quaternary ammonium compound, Roccal, is compared with brilliant green as a germicide to be used in the production of smallpox vaccine. These germicides are applied to the skin surface of the operative field. Roccal was found to be a more efficient germicide with no demonstrable effect upon the virus.

The use of Roccal solution together with rigid sanitation during the quarantine and handling of animals make possible the production of vaccine containing extremely low numbers of viable organisms.

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ANNOUNCEMENT

DIRECTORY OF FULL-TIME LOCAL HEALTH OFFICERS, 1946

The 1946 revision of the DIRECTORY OF FULL-TIME LOCAL HEALTH OFFICERS is being issued as Supplement 194 to the Public Health Reports and will be available for distribution this month. In addition to listing the full-time local health officers of each State according to the local health jurisdictions which they serve, the tabulation includes the classification of each jurisdiction, the incorporated places of 10,000 or more covered by the county organizations described, and the post office address and title of each health officer.

INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

February 23–March 22, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are

published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended March 22, 1947, the number reported for the corresponding period in 1946, and the median number for the years 1942–46.

DISEASES ABOVE MEDIAN INCIDENCE

Influenza.—The number of reported cases of influenza rose from 15,907 during the 4 weeks ended February 22 to 125,077 during the 4 weeks ended March 22. The number of cases was more than seven times the normal median expectancy. Of the total cases Texas reported 53,874, Arkansas 13,493, Kansas 11,927, Oklahoma 9,041, Colorado 5,457, West Virginia 5,044, South Carolina 4,464, Virginia 3,601, and Iowa 3,496. More than 85 percent of the total reported cases occurred in those 9 States.[1] The current rise of this disease has appeared in States in all sections of the country except the North Atlantic sections. However, the rise on the West Coast has not yet reached as large proportions as in other sections.

During the 4 weeks of the current period the cases rose from about 8,000 to 52,000 per week. Figures available for the next week (ended March 29) indicate 49,000 cases or slightly less than the preceding week.

The epidemic-like wave of influenza appeared rather late this season. The peak incidence in preceding years has usually been reached during February, with the number of cases dropping rapidly during March. In January and February of 1947 the incidence was below the median expectancy, but during the current period (mostly in March) it was the highest in the 19 years for which data are available in this form. While it appears that there are localized epidemics of respiratory infection of varying degrees of severity, most reports indicate a mild type. It is realized that reporting of influenza is extremely erratic but these extensive reports can leave no doubt that an epidemic is in progress.

While there are no data available on deaths from influenza and pneumonia, it may be assumed that at least part of the increased death rate from all causes which was reported for 93 large cities during the month of March was due to these causes. The reports released by the National Office of Vital Statistics showed an excess of 6 percent over the median for the same period in the three preceding years.

Diphtheria.—While the number of cases (1,068) of diphtheria reported for the current 4 weeks was only about 75 percent of the 1946 figure for these same weeks, it was very slightly above the 1942–46

[1] Special surveys show widespread prevalence of upper respiratory infections in Kentucky, but since the reports indicated an accumulation of cases they were not included in the total for the 4 weeks ended March 22.

median. For the second consecutive 4-week period since the week ended August 10, 1946 the current incidence was higher than the preceding 5-year median for a corresponding 4-week period. The very small excesses were largely due to the incidence in the New England section, the reported cases (85) being 3 times the median. Excesses of 3, 4, 13, and 14 cases were reported from 4 other sections. In the other 4 of the 9 sections the incidence was the same as or less than the 5-year median for this period.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 185 during the preceding 4 weeks to 156 for the week ended March 22. The number reported was slightly above the incidence for the corresponding period in 1946 and 1.7 times the 1942–46 median. Each section except the Middle Atlantic reported some increase over the median expectancy, but in the Pacific section the number of cases (49) was 2.7 times the 1942–46 median. For the past 3 years this disease has been unusually prevalent, and it is significant that for the 3 consecutive 4-week periods of 1947 the incidence has been the highest for these periods in the 19 years for which data are available in this form.

Whooping cough.—The incidence of whooping cough (10,709 cases) was about 45 percent above that for the corresponding 4 weeks in 1946, but it was only slightly above the 1942–46 median. In the West South Central section the number of cases (2,006) was 2.4 times the median and in the East North Central section the incidence was 1.6 times the normal seasonal median. In all other sections the incidence was relatively low.

DISEASES BELOW MEDIAN INCIDENCE

Measles.—For the 4 weeks ended March 22 there were 27,030 cases of measles reported, as compared with 117,342 for the corresponding 4-week period in 1946, and a 5-year (1942–46) median of 87,789 cases. The current incidence was below the normal seasonal expectancy in all sections except the New England where the number of cases was about 10 percent above the preceding 5-year median. With the exception of 1945 when approximately 14,000 cases were recorded during these same weeks, the current incidence is the lowest in the 19 years for which these data are available.

Meningococcus meningitis.—The number of cases (372) of meningococcus meningitis reported for the current 4 weeks was about one-half of the number reported for the corresponding period in 1946, and less than 40 percent of the 1942–46 median (1,018 cases). Each section of the country reported a relatively low incidence and for the country as a whole the current incidence was the lowest during this period

since 1942 when 339 cases were reported. While the number of cases of this disease has been gradually declining after a period of unusually high incidence, the number of cases being reported is still considerably above the median of nonepidemic years (approximately 260 cases).

Scarlet fever.—The scarlet fever incidence continued at a relatively low level, the number of cases reported (12,272) being about 75 percent of the incidence during the corresponding period in 1946 and less than 70 percent of the 1942–46 median. The number of cases reported from each section of the country was below the preceding 5-year median. For the country as a whole the current incidence was the lowest in the 19 years for which data are available in this form.

Smallpox.—For the 4 weeks ended March 22 there were 19 cases of smallpox reported. For the corresponding weeks in 1946 there were 41 cases and the 1942–46 median was represented by that figure. The current incidence was the lowest on record for this period, the incidence (19 cases) comparing with such figures as 6,502 for the corresponding weeks in 1930 and 2,056 in 1938, the 2 years reporting the highest numbers of cases in the 19 years for which these data are available. Since 1939 this disease has declined rapidly; prior to 1935 it had been on the decline, but for a period of 5 years (1935–39) minor epidemics appeared in various sections of the country.

Typhoid and paratyphoid fever.—For the 4 weeks ended March 22 there were 189 cases of typhoid fever reported. The 1942–46 median for these same weeks was 229 cases. Increases over the median expectancy were reported from the New England and Pacific sections. In all other parts of the country the numbers of cases were the same as the medians or fell considerably below them. For these diseases also the current incidence was the lowest in the 19 years for which data are available in this form.

MORTALITY, ALL CAUSES

For the 4 weeks ended March 22 there were 40,907 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The median number reported for the same weeks in 1944–46 was 38,586. For each week of the current period the number of deaths exceeded the 1942–46 median and for the entire period the number of deaths was 6 percent above the preceding 3-year median for the corresponding 4 weeks. While the cases occurring in the epidemic-like rise of respiratory diseases which has been in progress during the month of March appeared to be of a mild type, presumably part of the increase in the number of deaths was due to mortality from influenza and pneumonia.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period Feb. 23–Mar. 22, 1947, the number for the corresponding period in 1946, and the median number of cases reported for the corresponding period, 1942–46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,068	1,399	1,062	125,077	18,400	17,615	27,030	117,342	87,789
New England	85	44	29	52	94	83	6,787	3,099	6,153
Middle Atlantic	131	148	140	90	71	95	4,608	35,849	21,783
East North Central	145	328	142	2,620	710	533	4,568	29,382	13,993
West North Central	111	111	111	17,063	134	183	639	7,371	7,699
South Atlantic	138	200	156	15,939	4,299	4,540	4,492	9,193	9,193
East South Central	121	128	108	3,933	1,391	1,391	1,195	4,305	3,863
West South Central	164	260	230	76,571	9,939	6,921	2,161	7,343	7,343
Mountain	55	50	51	7,751	1,144	1,144	1,398	4,969	4,969
Pacific	118	130	104	1,058	618	553	1,182	15,831	9,085
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	372	756	1,018	156	141	92	12,272	16,020	18,079
New England	11	37	50	6	9	5	879	1,364	2,361
Middle Atlantic	70	147	239	12	15	12	3,112	4,844	5,269
East North Central	52	148	188	18	13	9	4,085	4,413	5,420
West North Central	42	55	70	16	2	7	1,082	1,386	2,005
South Atlantic	44	121	158	14	34	10	818	1,522	1,522
East South Central	39	72	93	12	8	8	553	455	722
West South Central	64	86	101	22	18	16	313	465	465
Mountain	8	12	13	7	10	6	498	517	848
Pacific	42	78	111	49	32	18	932	1,054	1,054
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	19	41	41	189	198	229	10,709	7,406	10,667
New England	0	0	0	15	19	8	1,002	1,168	1,445
Middle Atlantic	0	0	0	20	25	43	1,984	1,778	2,137
East North Central	5	6	13	29	24	29	2,451	1,467	1,569
West North Central	8	5	10	10	7	10	345	252	433
South Atlantic	1	2	2	30	38	54	1,384	863	1,570
East South Central	1	5	5	15	16	17	427	220	485
West South Central	2	11	13	30	39	39	2,006	747	838
Mountain	2	0	3	8	12	9	237	353	437
Pacific	0	12	2	32	18	20	873	558	1,434

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

DEATHS DURING WEEK ENDED MAR. 22, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 22, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,225	9,569
Median for 3 prior years	9,605	
Total deaths, first 12 weeks of year	120,684	123,115
Deaths under 1 year of age	721	573
Median for 3 prior years	603	
Deaths under 1 year of age, first 12 weeks of year	9,731	7,244
Data from industrial insurance companies:		
Policies in force	67,330,226	67,186,575
Number of death claims	12,969	14,344
Death claims per 1,000 policies in force, annual rate	10.0	11.1
Death claims per 1,000 policies, first 12 weeks of year, annual rate	9.8	11.4

INCIDENCE 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 MAR. 29, 1947

Summary

A slight net decrease was reported in the incidence of influenza. The total reported for the week was 48,968 cases, as compared with 52,115 last week and a 5-year (1942–46) median of 2,770. Decreases were recorded in only 2 of the 9 geographic divisions—the East and West South Central areas, where an increase in Tennessee was more than offset by a decline in Alabama, and sharp declines were reported in Arkansas, Oklahoma, and Texas. Net increases of 1,251, 2,265, and 2,767 cases, respectively, occurred in the East and West North Central and South Atlantic areas. Of 22 States reporting currently 220 or more cases each and an aggregate of 47,896 (last week 50,937), 11 showed a decrease of 12,679. The 14 States reporting currently 428 or more cases each are as follows (last week's figures in parentheses): *Increases*—Wisconsin 1,853 (537), Iowa 6,036 (2,321), Virginia 3,986 (1,439), South Carolina 2,305 (1,814), Tennessee 1,125 (550), Montana 851 (565), Washington 428 (353); *decreases*—Kansas 926 (1,947), West Virginia 2,474 (2,589), Georgia 805 (1,019), Alabama 1,085 (1,847), Arkansas 4,576 (6,859), Alabama 6,891 (7,624), Texas 12,332 (19,087). During the 5 weeks ended March 29, 174,045 cases were reported or 84 percent of the total for the year to date (206,662, last year 175,984). In the years 1946, 1945, and 1944 the percentages in the respective corresponding 5-week periods were 12, 31, and 6 percent. The total to date since the average seasonal low week (last week of July) is 239,637, as compared with 538,232 for the corresponding period of 1945–46.

Of 81 cases of amebic dysentry reported currently, 36 occurred in Louisiana and 10 each in New York and Texas; of 12 cases of smallpox, 9 occurred in Texas (only 1 case previously this year), 2 in Tennessee, and 1 in Iowa; and of 167 cases of undulant fever (last week 93), 54 occurred in Colorado, 19 in Iowa, and 16 in Texas.

Deaths recorded for the week in 93 large cities of the United States totaled 10,820, as compared with 10,186 last week, 9,461 and 9,140, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,461. The total for the year to date in these cities is 131,459, as compared with 132,576 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 29, 1947, and comparison with corresponding week of 1946 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.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 29, 1947	Mar. 30, 1946		Mar. 29, 1947	Mar. 30, 1946		Mar. 29, 1947	Mar. 30, 1946		Mar. 29, 1947	Mar. 30, 1946	
NEW ENGLAND												
Maine	1	2	0	------	------	------	195	27	27	0	0	3
New Hampshire	0	0	0	1	3	3	5	13	8	0	0	0
Vermont	0	1	0	107	------	------	275	5	70	0	0	0
Massachusetts	10	4	4	------	------	------	404	1,149	1,149	0	1	9
Rhode Island	0	1	1	------	1	1	165	5	11	0	3	3
Connecticut	2	2	1	------	5	3	573	163	365	0	2	5
MIDDLE ATLANTIC												
New York	20	27	17	[1] 9	[1] 2	[1] 6	383	5,011	2,799	4	24	30
New Jersey	1	4	3	23	4	7	390	2,971	1,653	1	5	5
Pennsylvania	22	24	12	------	2	2	291	3,790	1,424	9	7	11
EAST NORTH CENTRAL												
Ohio	13	21	10	141	4	9	647	635	635	7	12	12
Indiana	10	6	6	259	8	15	90	1,045	294	1	1	2
Illinois	6	25	15	189	8	14	77	1,620	1,271	10	17	17
Michigan [2]	7	7	7	78	2	2	41	2,410	1,295	4	2	7
Wisconsin	8	0	1	1,853	22	46	289	2,548	1,563	1	2	2
WEST NORTH CENTRAL												
Minnesota	2	5	3	13	------	------	73	32	126	1	5	4
Iowa	0	4	2	6,036	------	------	107	118	165	1	0	2
Missouri	1	5	4	230	1	2	4	434	369	3	5	6
North Dakota	0	1	0	20	10	3	16	16	56	0	1	0
South Dakota	0	5	3	------	------	------	13	19	19	0	0	0
Nebraska	2	3	3	9	------	9	4	194	190	0	1	0
Kansas	5	2	2	926	1	3	11	1,077	646	3	1	2
SOUTH ATLANTIC												
Delaware	0	1	0	------	------	------	2	26	22	0	0	1
Maryland [2]	6	18	11	20	7	7	23	582	582	1	2	5
District of Columbia	0	0	0	4	------	1	31	350	91	0	1	2
Virginia	9	4	4	3,986	180	259	437	628	621	2	4	5
West Virginia	3	1	2	2,474	3	7	95	130	130	1	3	4
North Carolina	7	9	8	------	------	26	265	470	470	3	3	3
South Carolina	7	5	5	2,305	482	473	127	584	347	1	1	2
Georgia	3	4	4	805	7	35	87	267	264	1	2	4
Florida	5	4	3	135	3	3	21	231	231	0	3	2
EAST SOUTH CENTRAL												
Kentucky	10	7	5	------	69	9	4	342	111	4	2	5
Tennessee	4	7	4	1,125	22	44	80	297	297	3	3	7
Alabama	12	8	7	1,085	93	93	145	164	257	4	6	6
Mississippi [2]	6	5	5	255	------	------	19	------	------	1	3	3
WEST SOUTH CENTRAL												
Arkansas	5	10	4	4,576	98	87	117	222	222	0	3	2
Louisiana	1	5	3	315	109	8	119	310	240	1	5	5
Oklahoma	3	5	4	6,891	73	131	8	213	107	2	0	1
Texas	28	19	33	12,332	1,105	1,129	289	1,923	1,923	2	4	16
MOUNTAIN												
Montana	1	3	0	851	2	13	137	45	150	1	1	1
Idaho	1	2	1	242	25	------	4	103	29	0	0	0
Wyoming	0	3	1	53	------	12	15	27	77	0	0	0
Colorado	4	9	7	393	35	35	40	639	354	0	0	2
New Mexico	3	0	0	22	4	3	88	21	21	0	1	1
Arizona	3	5	2	119	111	98	------	136	136	1	0	0
Utah [2]	0	0	0	309	13	13	15	658	235	0	0	0
Nevada	0	0	0	------	------	------	------	2	2	0	0	0
PACIFIC												
Washington	10	7	7	428	------	1	52	625	286	0	2	3
Oregon	1	8	5	220	2	22	31	352	135	2	2	2
California	8	29	21	129	55	70	261	3,047	2,705	3	9	23
Total	250	327	242	48,968	2,571	2,770	6,565	35,676	26,183	78	149	216
13 weeks	3,760	4,938	4,020	206,662	175,984	61,452	69,066	222,217	210,408	1,117	2,548	3,232
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	11,326	16,582	12,751	239,637	538,232	97,314	91,953	248,341	248,341	2,089	4,052	5,684

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 29, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median	Week ended		Median	Week ended—		Median	Week ended—		Median
	Mar. 29, 1947	Mar. 30, 1946	1942–46	Mar. 29, 1947	Mar. 30, 1946	1942–46	Mar. 29, 1947	Mar. 30, 1946	1942–46	Mar. 29, 1947 [4]	Mar. 30, 1946	1942–46
NEW ENGLAND												
Maine	0	0	0	25	32	32	0	0	0	0	0	0
New Hampshire	0	0	0	3	6	14	0	0	0	0	0	0
Vermont	0	0	0	8	11	11	0	0	0	0	1	0
Massachusetts	0	0	0	146	222	431	0	0	0	7	0	0
Rhode Island	0	0	0	10	7	17	0	0	0	0	0	0
Connecticut	0	1	0	63	70	70	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	3	3	2	406	895	749	0	0	0	1	2	3
New Jersey	0	0	0	150	167	167	0	0	0	0	0	1
Pennsylvania	0	0	0	256	472	494	0	0	0	4	1	1
EAST NORTH CENTRAL												
Ohio	0	1	1	398	409	414	0	3	0	0	3	2
Indiana	0	0	0	85	97	125	0	0	0	1	1	0
Illinois	0	0	0	132	246	271	0	0	1	0	4	3
Michigan [3]	2	0	0	205	111	219	0	0	0	1	3	2
Wisconsin	0	0	0	57	152	317	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	40	49	89	0	0	0	2	0	0
Iowa	0	0	0	34	60	60	1	1	1	1	0	0
Missouri	0	0	0	42	55	80	0	0	0	3	1	1
North Dakota	1	0	0	24	16	21	0	0	0	2	3	0
South Dakota	0	0	0	8	8	11	0	0	0	0	0	0
Nebraska	2	0	0	16	41	43	0	0	0	0	0	0
Kansas	0	0	0	52	71	81	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	14	9	11	0	0	0	0	0	0
Maryland [2]	0	0	0	37	85	146	0	0	0	2	0	0
District of Columbia	0	0	0	14	25	25	0	0	0	0	0	0
Virginia	0	1	0	41	104	104	0	0	0	1	1	1
West Virginia	0	0	0	19	50	39	0	0	0	3	0	1
North Carolina	0	2	0	36	39	32	0	0	0	0	1	0
South Carolina	0	0	0	19	18	5	0	0	0	1	0	1
Georgia	0	0	0	12	12	15	0	0	0	1	2	2
Florida	0	3	0	10	9	8	0	0	0	1	0	1
EAST SOUTH CENTRAL												
Kentucky	0	0	1	70	31	68	0	0	0	2	1	1
Tennessee	0	0	0	51	35	45	2	0	0	0	2	2
Alabama	2	1	0	26	44	16	0	1	0	2	5	2
Mississippi [2]	1	0	0	9	6	9	0	0	1	0	0	1
WEST SOUTH CENTRAL												
Arkansas	0	2	1	9	11	10	0	0	1	1	2	1
Louisiana	1	0	0	6	13	13	0	1	0	1	2	2
Oklahoma	0	0	0	14	8	15	0	0	1	1	0	1
Texas	2	2	2	36	53	118	9	0	1	4	13	7
MOUNTAIN												
Montana	0	0	0	7	6	16	0	0	0	0	0	0
Idaho	0	0	0	4	8	8	0	0	0	0	0	0
Wyoming	0	0	0	6	5	12	0	0	0	0	0	0
Colorado	0	1	1	50	27	39	0	0	0	0	0	0
New Mexico	0	4	0	21	7	7	0	0	0	0	2	1
Arizona	0	0	0	8	13	19	0	0	0	0	1	0
Utah [2]	0	0	0	19	25	49	0	0	0	0	0	0
Nevada	0	0	0	0	0	1	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	22	41	41	0	19	1	2	0	0
Oregon	0	0	0	20	29	29	0	0	0	1	0	0
California	9	4	3	152	229	229	0	0	0	4	2	3
Total	24	25	20	2,892	4,139	4,336	12	25	25	49	55	55
13 weeks	680	518	340	35,869	44,541	52,173	61	124	162	570	573	719
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	55	52	38	62,555	83,112	91,269	115	200	279	85	98	107

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 7 (salmonella infection); New York 1; Michigan 1; Georgia 1; Kentucky 1; Louisiana 1; Texas 1; Washington 2; California 2.

Telegraphic morbidity reports from State health officers for the week ended Mar. 29, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Mar. 29, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Mar. 29, 1947	Mar. 30, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	10	12	19								1
New Hampshire	5	2	11								
Vermont	11	50	37								
Massachusetts	130	150	179	1	2						
Rhode Island	4	21	21				1				
Connecticut	42	60	51								8
MIDDLE ATLANTIC											
New York	160	200	231	10			1			1	6
New Jersey	110	141	141	2							
Pennsylvania	197	117	122								1
EAST NORTH CENTRAL											
Ohio	121	70	157	1							4
Indiana	15	26	26				3		1		4
Illinois	56	78	78	1			1				8
Michigan [2]	212	101	121								1
Wisconsin	107	81	81								10
WEST NORTH CENTRAL											
Minnesota	8	7	23	3							2
Iowa	9	8	11	1							19
Missouri	15	4	8								
North Dakota			1								
South Dakota											
Nebraska	15		7			2					
Kansas	16	25	47				1				8
SOUTH ATLANTIC											
Delaware	3	1	6								
Maryland [2]	46	20	39	1							1
District of Columbia	6	5	5								
Virginia	81	14	53			116					2
West Virginia		15	16								
North Carolina	75	98	112							1	
South Carolina	45	67	72	1	6						
Georgia	2	22	28	1		2			1	3	1
Florida	25	22	22	1		1					
EAST SOUTH CENTRAL											
Kentucky	51	24	28								
Tennessee	72	18	18								1
Alabama	66	18	31	2						5	1
Mississippi [2]	8										2
WEST SOUTH CENTRAL											
Arkansas	33	4	13								1
Louisiana	3	2	5	36					1	1	
Oklahoma	30	4	9	4					1		3
Texas	568	132	260	10	201	25			1	7	16
MOUNTAIN											
Montana	8	1	10								
Idaho		7	5				1				4
Wyoming		1	3								
Colorado	13	22	22								54
New Mexico	23	7	10				1				
Arizona	16	15	29	1		24					1
Utah [2]	3	24	32								
Nevada											
PACIFIC											
Washington	38	31	31								
Oregon	17	7	28	1							1
California	164	83	283	4	4		2				7
Total	2,639	1,817	2,551	81	213	170	11	0	5	18	167
Same week, 1946	1,817			24	208	74	9	1	16	33	95
Median, 1942–46	2,551			38	208	71	7	1	16	33	[3] 90
13 weeks: 1947	33,138			627	4,267	2,849	92	12	473	561	1,372
1946	23,619			483	3,667	1,386	106	6	267	609	972
Median, 1942–46	31,641			370	2,602	856	106	4	246	609	[3] 1,036

[2] Period ended earlier than Saturday.
[3] 2-year average, 1945–46.

Anthrax: New York 1 case; Pennsylvania 1 case.
Leprosy: Louisiana 1 case; Texas 3 cases.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Mar. 22, 1947

This table lists the reports from 85 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

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	1	0	------	0	54	0	0	0	2	0	0	6
New Hampshire:												
Concord	0	0	------	0	-------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	11	0	0	0	0	0	0	3
Massachusetts:												
Boston	11	0	------	1	39	0	13	0	25	0	0	26
Fall River	0	0	------	1	5	0	1	0	2	0	0	2
Springfield	3	0	------	0	7	0	0	0	7	0	0	------
Worcester	0	0	------	0	6	0	5	0	4	0	0	27
Rhode Island:												
Providence	1	0	------	0	143	0	2	0	4	0	0	13
Connecticut:												
Bridgeport	0	0	------	0	15	0	0	0	3	0	0	------
Hartford	0	0	------	0	30	0	1	0	2	0	0	3
New Haven	0	0	------	0	41	0	1	0	5	0	0	8
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	-------	0	6	0	4	0	0	------
New York	18	0	10	0	180	4	79	0	181	0	2	40
Rochester	0	0	------	0	1	1	4	0	19	0	0	4
Syracuse	0	0	------	0	-------	0	2	0	10	0	0	11
New Jersey:												
Camden	7	0	------	0	1	0	0	0	2	0	0	------
Newark	0	0	1	0	13	1	6	0	10	0	0	29
Trenton	0	0	12	0	29	0	2	0	2	0	0	2
Pennsylvania:												
Philadelphia	5	0	3	1	12	3	23	0	56	0	0	47
Pittsburgh	1	0	6	2	38	2	11	0	19	0	0	15
Reading	0	0	------	0	2	0	3	0	0	0	0	------
EAST NORTH CENTRAL												
Ohio:												
Cleveland	0	0	56	0	305	2	12	0	48	0	1	20
Columbus	0	0	3	3	14	0	2	0	19	0	0	10
Indiana:												
Fort Wayne	0	0	------	1	13	0	3	0	1	0	0	------
Indianapolis	1	1	------	8	4	0	11	0	27	0	0	28
South Bend	0	0	------	0	9	0	0	0	1	0	0	------
Terre Haute	0	0	------	0	-------	0	6	0	0	0	0	1
Illinois:												
Chicago	1	0	32	1	13	6	48	0	50	0	1	33
Michigan:												
Detroit	4	1	23	0	10	0	11	0	69	0	0	92
Flint	0	0	------	0	1	0	3	0	13	0	0	3
Grand Rapids	0	0	2	0	1	0	3	0	10	0	0	6
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	0	0	0	6
Milwaukee	0	0	1	1	-------	0	5	0	17	0	2	34
Racine	0	0	1	1	-------	0	0	0	5	0	0	3
Superior	0	0	8	0	-------	0	0	0	1	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	2	-------	0	0	0	4	0	0	1
Minneapolis	3	0	------	0	5	3	4	0	12	0	0	4
Missouri:												
Kansas City	1	0	25	1	1	0	18	0	17	0	0	2
St. Joseph	0	0	------	0	-------	1	0	1	0	0	0	2
St. Louis	2	0	56	2	7	3	35	0	7	0	0	8

[1] In some instances the figures include nonresident cases.

City reports for week ended Mar. 22, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	3	1	0	5	2	4	0	0	------
Kansas:												
Wichita	0	0	------	0	2	1	6	0	1	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	4	0	0	1
Maryland:												
Baltimore	6	0	13	0	1	1	13	0	26	0	0	53
Cumberland	0	0	------	0	2	0	2	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	5	0	27	1	8	0	6	0	0	4
Virginia:												
Lynchburg	0	0	------	0	1	0	1	0	4	0	0	------
Richmond	1	0	1	1	80	0	2	0	0	0	0	2
Roanoke	0	0	------	0	4	0	0	0	6	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	0	0	0	------
Wheeling	0	0	141	0	------	0	1	0	0	0	0	1
North Carolina:												
Raleigh	0	0	------	0	6	0	2	0	0	0	0	6
Wilmington	1	0	------	0	5	0	2	0	1	0	0	------
Winston Salem	0	0	------	0	9	0	4	0	0	0	0	1
South Carolina:												
Charleston	0	0	37	0	13	0	1	0	0	0	0	------
Georgia:												
Atlanta	0	0	143	1	12	0	4	0	5	0	0	------
Brunswick	0	0	------	0	------	0	1	0	0	0	0	------
Savannah	0	0	21	0	29	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	5	2	1	0	0	0	2	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	1	1	1	4	0	7	0	6	0	0	4
Nashville	1	0	------	1	------	0	5	0	15	0	0	6
Alabama:												
Birmingham	0	0	66	0	27	0	9	0	2	0	0	------
Mobile	0	0	4	2	15	1	2	0	0	0	0	10
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	2	0	375	0	4	0	0	0	0	0	0	2
Louisiana:												
New Orleans	1	0	30	3	52	0	8	1	0	0	1	1
Shreveport	0	0	------	0	------	0	9	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	1	1,296	0	------		6	0	2	0	0	------
Texas:												
Dallas	0	0	------	1	20	0	2	0	0	0	0	20
Galveston	1	0	------	0	------	0	0	0	0	0	0	------
Houston	0	0	4	0	------	0	8	0	1	0	0	------
San Antonio	2	0	14	10	7	0	10	0	2	0	0	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	1	0	0	0	0	------
Great Falls	0	0	------	1	95	0	1	0	0	0	0	------
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	0	0	------	0	3	0	0	0	0	0	0	------
Colorado:												
Denver	0	0	10	2	26	0	5	0	20	0	0	5
Pueblo	0	0	------	0	------	0	2	0	4	0	0	------
Utah:												
Salt Lake City	0	0	------	0	3	0	2	0	1	0	0	1

City reports for week ended Mar. 22, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	3	0	5	0	6	0	1	1
Spokane	0	0	4	0	13	0	1	0	3	0	1	1
Tacoma	0	0	------	0	1	0	0	0	2	0	0	2
California:												
Los Angeles	7	0	3	1	8	1	3	8	31	0	0	27
Sacramento	1	0	------	0	------	0	4	0	1	0	0	------
San Francisco	1	0	2	0	6	0	2	0	20	0	0	------
Total	86	4	2,414	54	1,492	36	465	12	833	0	9	638
Corresponding week, 1946*	61	------	49	20	12,508	------	357	------	1,199	3	13	480
Average 1942-46*	66	------	129	[2] 30	[3] 6,589	------	[2] 407	------	1,707	1	12	692

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: Boston 1; New York 11; Los Angeles 3.
Dysentery, bacillary.—Cases: Worcester 1; Los Angeles 2.
Dysentery, unspecified.—Cases: San Antonio, 4.
Tularemia.—Cases: Terre Haute 1; St. Louis 1.
Typhus fever, endemic.—Cases: Chicago 1; Savannah 1; Tampa 1; Birmingham 1; New Orleans 2; Shreveport 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (latest available estimated population, 33,693,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	41.8	0.0	0.0	5.2	917	0.0	60.1	0.0	141	0.0	0.0	230
Middle Atlantic	14.8	0.0	14.8	1.4	128	5.1	62.9	0.0	140	0.0	0.9	69
East North Central	3.9	1.3	81.8	9.7	241	5.2	67.5	0.0	169	0.0	2.6	153
West North Central	13.9	0.0	187.6	18.5	37	30.1	157.5	6.9	104	0.0	0.0	39
South Atlantic	14.7	0.0	598.2	6.5	311	3.3	68.6	0.0	88	0.0	0.0	113
East South Central	5.9	5.9	419.0	23.6	271	5.9	135.7	0.0	136	0.0	0.0	118
West South Central	15.2	2.5	4,366.5	35.6	211	0.0	109.2	2.5	13	0.0	2.5	58
Mountain	0.0	0.0	82.6	24.8	1,057	0.0	90.9	0.0	206	0.0	0.0	50
Pacific	15.8	0.0	14.2	1.6	49	1.6	23.7	12.7	100	0.0	3.2	49
Total	13.3	0.6	374.7	8.4	232	5.6	72.2	1.9	129	0.0	1.4	99

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 8, 1947.—During the week ended March 8, 1947, 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	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		32	1	305	442	20	30	85	115	1,030
Diphtheria			1	16	7	2	1		3	30
Dysentery:										
Amebic					6	6				12
Bacillary				3						3
German measles				6	51	1	1	10	5	74
Influenza		94			42				90	226
Measles		147	2	167	109	264	119	201	534	1,543
Meningitis, meningococcus				1	1	1		1	1	5
Mumps		8		51	786	76	201	29	196	1,347
Poliomyelitis		1					1			2
Scarlet fever		6	1	87	90	4	5	1	10	204
Tuberculosis (all forms)		1	22	102	28	25	16	31	55	280
Typhoid and paratyphoid fever				8	2			1		11
Undulant fever				6			1		2	9
Venereal diseases:										
Gonorrhea		16	7	104	94	42	23	53	70	409
Syphilis	1	5	5	91	109	11	6	7	47	282
Other forms									2	2
Whooping cough			4	35	93	31	1	3	32	199

FINLAND

Notifiable diseases—January 1947.—During the month of January 1947, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	20	Poliomyelitis	4
Diphtheria	1,016	Scarlet fever	263
Dysentery	6	Syphilis	552
Gonorrhea	1,429	Typhoid fever	37
Paratyphoid fever	161		

NORWAY

Notifiable diseases—December 1946.—During the month of December 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	6	Mumps	322
Diphtheria	285	Paratyphoid fever	12
Dysentery, unspecified	4	Pneumonia (all forms)	2,273
Encephalitis, epidemic	3	Poliomyelitis	29
Erysipelas	459	Rheumatic fever	165
Gastroenteritis	2,650	Scabies	4,791
Gonorrhea	818	Scarlet fever	628
Hepatitis, epidemic	356	Syphilis	142
Impetigo contagiosa	4,461	Tuberculosis (all forms)	366
Influenza	2,765	Typhoid fever	2
Lymphogranuloma inguinale	1	Weil's disease	1
Measles	101	Whooping cough	2,233

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Weeks ended—March 8, 1947, 77 cases, 45 deaths; March 15, 1947, 139 cases, 48 deaths.

Plague

British East Africa—Uganda—Mengo District.—For the week ended March 1, 1947, 1 case of plague was reported in Mengo District, Uganda, British East Africa.

Peru.—For the month of January 1947, plague was reported in Peru, by Departments, as follows: Libertad, 4 cases, including 1 case reported in the city of Trujillo; Piura, 36 cases, 2 deaths.

Turkey (in Asia)—Urfa Province—Akcakale.—On March 14, 1947, 3 cases of plague with 3 deaths, were reported in Akcakale, Urfa Province, Turkey.

Smallpox

China—Shanghai.—For the week ended March 15, 1947, 103 cases of smallpox were reported in Shanghai, China.

India—Calcutta.—Smallpox has been reported in Calcutta, India, as follows: Weeks ended—March 8, 1947, 83 cases, 58 deaths; March 15, 1947, 142 cases, 125 deaths.

Indochina (French)—Cochinchina, Saigon.—For the week ended March 8, 1947, 50 cases of smallpox were reported in Saigon, Cochinchina, French Indochina.

Tunisia.—For the month of January 1947, 211 cases of smallpox were reported in Tunisia.

Typhus Fever

Ecuador.—For the month of February 1947, 66 cases of typhus fever with 2 deaths were reported in Ecuador, including 25 cases with 1 death reported in Quito, and 5 cases reported in Manta, Ecuador.

Eritrea.—For the week ended March 1, 1947, 65 cases of typhus fever with 5 deaths were reported in Eritrea.

Guatemala.—For the month of January 1947, 49 cases of typhus fever with 9 deaths were reported in Guatemala, including 4 cases with 1 death reported in the city of Guatemala.

Tunisia.—For the month of January 1947, 40 cases of typhus fever were reported in Tunisia, by regions as follows: Bizerte, 2 cases, Gabes, 11 cases, Le Kef, 3 cases, Sfax, 2 cases, Sousse, 13 cases, Tunis, 9 cases.

Yellow Fever

Colombia—Antioquia Department—Pavarandocito (region of).—According to information dated March 27, 1947, 3 cases of yellow fever with 1 fatality (the last reported case occurring on March 14, 1947) were reported in the Pan American Highway camp, about 95 air miles northwest of Medellin in the region of Pavarandocito, Antioquia Department, Colombia. Precautionary measures were stated to have been taken.

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