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Water Resources and the Nation's Health

By M. ALLEN POND, B. S., M. P. H.*

Water is one of the most important single natural resources upon which man depends for his existence. Arranging for its proper use presents problems of tremendous complexity. Besides the fundamental role water plays in life processes, water may be a vehicle of infection; agriculture and the industrial machine are dependent on abundant supplies; entire industries harvest and distribute edible marine products; inland navigation is a major factor in regional and national economy; recreational uses of natural water courses are not only big business but important to the mental and physical health of millions of Americans. In addition, water is a primary source of power, and lack of planning for the proper use of watershed areas has resulted in the loss of valuable soils through erosion, in the destruction of crops, and in tremendous economic losses from floods. Urbanization is dependent on availability of abundant supplies of potable water. Finally, natural water courses are the only feasible sites for the disposal of the liquid wastes from communities and industries.

The sanitary engineer cites this list of water uses and problems because of its health implications. For instance, the harnessing of hydraulic energy in the Tennessee, Columbia, and many other river valleys has obviously bettered the standard of living of hundreds of thousands of families, and their health has been measurably improved. Again, the irrigation of previously arid lands has not only raised the standard of living of thousands of farm families, but has also wrought a significant improvement in the diet of millions of city dwellers. Further, the control of flood waters in many river basins has decreased soil erosion, thereby preserving important grasslands threatened with destruction, and also has prevented the periodic flooding of homes. In addition, the recreational use of clean lakes and streams as well as salvaged bottom lands offers release from the tempo of modern community life.

*Senior sanitary engineer, Public Health Service. This article is condensed from a talk delivered at National Citizens Conference on Community Planning in Oklahoma City, Oklahoma, March 30, 1949.

It cannot be overemphasized that the health significance of water use programs goes far beyond physical, bacteriological or chemical standards for drinking water quality. In a sense health considerations are ubiquitous in every water use program. Those concerned with planning and developing controls for water resources must constantly be aware of all health implications of their work. This, however, does not preclude serious consideration of water use activities which produce direct or indirect health hazards. The classic example, of course, is the use of natural water courses as the receiving bodies for untreated sewage and industrial wastes.

Man in his proclivity for urbanization throughout the history of modern civilization has continued to despoil the waters with the result that serious obstacles have been put in the path of community growth and development. Although we all are aware of the bounty which is put on water by peoples of arid regions, it is not readily recognized that continued pollution of once clean and quantitatively abundant sources may result in acute shortages of potable water in areas where lack of water has been no problem.

Urban Water Requirements

The waterworks industry in the United States is large. There are now more than 14,000 public water supply systems in the country which provide about 8 billion gallons of water daily to about 85 million people (*1*, *2*). It is not uncommon for large cities to use the equivalent flow of a sizable river. The excellent quality of this water is a tribute to our waterworks operators.

The remaining third of our population obtains its water from individual wells and untreated sources, and it has recently been estimated that 6 to 7 million rural families need either new or improved water supplies (*1*).

In the more densely populated areas of the East and Middle West, two major developments are complicating the problem of maintaining good public water supplies. These are (1) a progressive depletion of ground water supplies as a result of overdrafts in underground reserves, and (2) a marked increase in pollution of surface sources of water by sewage and industrial wastes. Meanwhile, our needs for clean water are increasing because of industrial growth and more lavish domestic use of water.

Lowering of the water table in some coastal areas has resulted in salt water infiltration of the ground water, thereby impairing it for domestic and some industrial uses. In other parts of the country ground water depletion has proceeded at such an alarming rate as to create a threat in some communities of complete exhaustion of supplies. Recharging of subsurface water courses has become common practice in many areas.

In many instances, raw water pollution has necessitated extension and elaboration of existing water-purification facilities. In some areas, treatment alone is insufficient to cope with the problem. Boston, New York, San Francisco, Los Angeles, and Tulsa, among a number of large cities, have had to reach out at great expense to distant and essentially uninhabited watersheds.

While the need for water continues with the increase in population and industry, its absolute quantity remains the same, and in fact, in terms of usable water, is actually getting less. Unless the trend to more extensive pollution is reversed, drinking water, which is now "almost as free as the air," will command a premium in the not too distant future.

Availability of water is one of the principal considerations in the location of industries which use it directly as a commodity as well as in processing. Quality as well as quantity is important. The steadily growing canning industry, for example, could not exist without water. Three gallons of processing water are wasted in packing a No. 2 can of asparagus; a gallon for a can of corn or peas; 7 gallons per can of spinach; and as much as 10 gallons for a can of lima beans. The production of pulp and paper involves the use and wastage of tremendous quantities of water. To produce one ton of soda pulp, 85,000 gallons of water are needed; for one ton of paper, from 40,000 to 50,000 gallons.

In cotton textile production, water is needed in every step. For 1,000 pounds of goods, 60 gallons of water are needed for sizing, 1,100 for desizing, from 1,700 to 3,400 for kiering and scouring, 1,200 for bleaching and 30,000 for mercerizing. The dye processes, depending on the particular process used, require another 5,000 to 20,000 gallons of water per 1,000 pounds of cloth. In total, 45,000 to 50,000 gallons of water are used in producing a half ton of dyed cotton cloth. An average of 770 gallons of water is used for every 42-gallon barrel of crude oil refined in the United States.

In comparison, the average domestic use is approximately 50 gallons per capita per day.

It sometimes is forgotten that the used water always produces liquid wastes. Untreated industrial wastes play havoc with streams when discharged in large quantities and often overburden existing sewage treatment plants. An example of one of the results of improper wastes disposal illustrates its indirect health significance. The causes of tastes and odors in water are complex, but often are related to chemical wastes. Otherwise safe but poor tasting or malodorous, public water supplies may be so unpalatable that citizens will turn to esthetically satisfactory but potentially unsafe springs and wells for their drinking water.

Water-Borne Disease

One of the singular achievements in public health history has been the development and successful use of methods for the purification of contaminated waters. Fifty years ago water-borne typhoid fever, dysentery, and diarrhea and enteritis annually claimed a tremendous toll of human life and caused a much greater amount of disabling illness and suffering. Records indicate that stream pollution was already serious. Yet in the intervening years, and despite a significant increase in the total amount of pollution from domestic sewage and industrial wastes, the health hazard of contaminated waters has been reduced decisively by the introduction of chlorination, the extension of filtration, and the general improvement in water plant operation. The waterworks profession has performed excellently in establishing barriers against water-borne disease, particularly in those communities which must obtain water from seriously polluted streams. Nevertheless, contaminated waters continue to be a source of explosive outbreaks of gastroenteritis.

Furthermore, additional research is needed to determine the role that water plays as a vehicle for the spread of other diseases. The need is especially acute in regard to virus infections. There is also a lack of precise knowledge concerning the health significance of many chemical elements found in water. Sanitary engineers and others familiar with the problems are convinced that reliance solely upon water treatment for the prevention of water-borne disease is not only unwise but potentially hazardous.

Management of Water Resources

Water-borne enteric disease is not the only health hazard associated with water use. An example of the intertwining of water conservation efforts and the creation of potential health hazards is to be found in the development of malaria mosquito breeding sites in impounding reservoirs. The success of the Tennessee Valley Authority in controlling—indeed, in practically eradicating—malaria in its sphere of operations is a classic example of the value of careful planning. If history had been permitted to repeat itself, the incidence of malaria along the banks of the Tennessee River and its tributaries would have skyrocketed during the late thirties and the present decade. Instead, the carrying out of well-conceived plans to control mosquito breeding in the basin has resulted in a dramatic decrease in the malaria morbidity rate among residents of the valley.

As the population of the United States has increased, and the Nation has assumed a larger role in world affairs, it has turned to an increasing extent to the irrigation of previously arid regions. Such reclamation activities have positive health significance, but health problems also may be created by irrigation projects. An illustration of the health hazards that may result from such projects is to be found in the increase in reported malaria during the 1930's among residents of farms proximate to new irrigation ditches in central California. Malaria literally accompanied the waters which transposed once arid lands into fertile fields. Subsequently, steps were taken to control the mosquito vectors. It is now common to develop mosquito abatement measures in connection with irrigation projects.

In some irrigated areas enteric disease has been a local problem. Farm workers, not realizing the hazards involved, have drunk from polluted irrigation ditches with dire results. There has been a hint also that improper control of irrigation waters used on truck farms has resulted in the serious and potentially hazardous contamination of leafy and other vegetables eaten raw. The large volume of interstate traffic in such foodstuffs takes this problem out of the realm of a purely local issue.

These illustrations point up a principle: improvements in water uses, unless carefully planned, may be accompanied by newly created health hazards.

Stream sanitation programs throughout the United States are planned to make the most effective possible use of available flows. In the comprehensive program now being developed jointly by the Public Health Service and State water pollution control authorities, streams will be studied to determine their most reasonable primary use. In this connection, close cooperation exists between the Service, the Corps of Engineers of the Army, the Bureau of Reclamation of the Department of the Interior, and the States. In many watersheds where major flood control projects are under way, the Public Health Service has been asked to make recommendations as to minimum flows necessary to prevent the creation of nuisances and health hazards. Planning for prevention is in accord with the highest ideals of health workers, and such joint planning will be effective in promoting the health of millions of Americans in years to come.

Accomplishments and Ambitions

It is unrealistic to describe the unsolved and complex water resources problems of the United States without noting at the same time some of the achievements in meeting them. From the public health standpoint, a new chapter in the history of accomplishment was written by the men and women who planned and developed the great Tennessee River valley. The harnessing of the energies of that stream has been accompanied by a rise in the standard of living for residents of the valley, an improvement in their general health indices, and the control of serious potential health hazards. Future coordinated efforts to develop a river basin will be well guided by the record of the Tennessee Valley Authority. Even now there are several Federal and State agencies planning the development of the Missouri River basin. In that great enterprise there is active collaboration of the technicians and administrators and citizens involved.

The pattern of growth of the United States during the past century has wrought fundamental changes in the water resources picture. When water demands were small, so too were the problems of liquid wastes disposal. Natural processes in the streams and coastal waters were adequate to stabilize the sewage and industrial wastes deposited in them. But the situation has changed; modern industrial and domestic water requirements are proportionately many times greater than the growth of population would indicate. The development of new industries which utilize vast quantities of water and discharge tremendous amounts of organic and inorganic wastes; and the greatly increased density of population in a relatively small number of places—the same localities, by and large, in which industry is concentrated—have resulted in the compounding of stream sanitation problems. No longer can streams be depended upon to recover by themselves from the uncontrolled dumping of liquid wastes. Man, who created these problems, now must work for their solution.

An important step in this direction was taken with the enactment of the Water Pollution Control Act of 1948 (P. L. 845, 80th Cong.) which authorizes the Public Health Service and the Federal Works Agency, together with the States, to develop a nation-wide program for the abatement of stream pollution. The language of the law is clearcut: ". . . it is hereby declared to be the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of the States in controlling water pollution, to support and aid technical research to devise and perfect methods of treatment of industrial wastes which are not susceptible to known effective methods of treatment, and to provide Federal technical services to State and interstate agencies and to industries, and financial aid to State and interstate agencies and municipalities in the formulation and execution of their stream pollution abatement programs." From a planning standpoint, and from the point of view of the health official, this legislation represents an important milestone in the national effort to conserve our water resources.

Pending the appropriation of funds to support this work, the regular staffs of the Public Health Service and the Federal Works Agency have been drafting rules and regulations for the program. Comprehensive plans for river basin work are being developed jointly by the Public Health Service and the several State water pollution authorities. The stage is being set for the start of this significant program.

During the past half-century, progress has been made in solving many of the technical problems in water pollution control. Research in this field is going ahead at an increasing tempo. The research of the Public Health Service itself is indicative of the range of scientific interests in the health aspects of our water resources. At the Environmental Health Center in Cincinnati, work is being done on the biology and chemistry of sewage and industrial waste treatment, and, recently, important progress has been made there relative to the treatment of wastes containing radioactive materials. At Woods Hole on Cape Cod, the Service is engaged in a long-term study of the effects of pollutants on waters in which shellfish are grown. Epidemiological studies have been in progress in the lower Lake Michigan area to determine what relationships exist between the health of bathers and the quality of the water in which they swim. These are but a few of the Public Health Service investigations. In scores of other laboratories, at universities and industrial establishments, there are significant research projects in the same field. Technical knowledge relative to water pollution is rapidly expanding.

Conclusion

In the years ahead, this country will be confronted with increasingly difficult problems in the conservation and use of water. It is imperative that all interests be brought into the planning process; that standards be set for legitimate uses of all major water courses; and that a realistic and effective program to conserve water be developed.

Planning for the conservation and proper use of water resources is not and cannot be the sole responsibility of a single professional or administrative group. The competencies and the interests involved are varied. Water conservation projects are not designed for irrigation alone, for wildlife protection, nor for flood control, nor only for the abatement of stream pollution. Rather, they are multipurpose jobs. Every water conservation program has health implications, and public health workers are always ready to participate in the planning and carrying out of such activities.

It has been the experience that professional planning and action without citizen participation tends to be not only naive but sterile. Water is such a precious natural resource that all must work together—citizens and professionals alike—to conserve it and plan for its best use.

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Isolation of *Histoplasma capsulatum* From Soil

By C. W. Emmons*

Several of the fungi pathogenic for man appear to have an independent saprophytic existence in the soil or in decaying vegetable matter. *Sporotrichum schenckii* was isolated from plants in 1908 by Gougerot and deBeurmann (*12*), and several later investigators have isolated it from soil or plant material (*1*). The author has isolated it from sphagnum moss (*10*) and from soil (*6*). *Aspergillus fumigatus* and *A. niger* grow on decaying vegetation at the surface of the soil. Medical histories of wounds and exposure preceding infection indicate that several of the fungi which cause various types of mycetoma are probably present in soil as saprophytes. The acid-fast actinomycete, *Nocardia asteroides*, has been isolated from soil (*11*, *6*). *Coccidioides immitis* is present in soil in the endemic area of coccidioidomycosis (*15*, *2*, *4*), and human infections can be best explained by inhalation of air-borne spores from the soil. The ecologic relationship of these pathogenic fungi to the soil is not known, but the existence of naturally acquired coccidioidomycosis in certain species of rodents peculiar to the desert has suggested in the case of Coccidioides that this fungus may be in soil contaminated by infected animal hosts (*5*). All these mycoses except coccidioidomycosis are widely distributed geographically.

Another mycosis which appears to be noncontagious, sporadic, and world-wide in distribution is histoplasmosis. Whether one speaks of proved histoplasmosis which, so far as is definitely known, is relatively rare and almost always fatal, or of a hypothetic mild form of the disease associated with pulmonary calcification, the source of the infectious agent and the mode of human infection have been unknown. Histoplasmosis has been recently shown to occur in wild rats in Virginia (*Rattus norvegicus*) (*8*) and in Georgia (*R. norvegicus* and *R. rattus*) (*9*), and in the skunk (*Spilogale putorius*) (*9*). A total of 24 rats with histoplasmosis have now been collected in Virginia (*6*). No association between infected animals and histoplasmosis in man has been found in this area to date, and the relationship of rodent to human infection remains obscure. Indeed, the very limited extent of the lesions and the apparent chronicity of the disease in naturally infected rats in which histopathologic studies were made do not suggest any mode of transfer directly from rats to man (*7*). The characteristics of histoplasmosis in naturally infected rats seem to be similar to chronic histoplasmosis in experimentally infected guinea pigs which

*From Laboratory of Infectious Diseases, Microbiological Institute, National Institutes of Health, Bethesda, Md.

may harbor the fungus without evidence of illness for as long as 2½ years (*8*). A similar chronic disease occurs in experimentally infected rabbits, rats, and mice (*6*).

The possibility of an environmental source of infection common to man and animals has stimulated continued search for Histoplasma in the environment of rats with naturally acquired histoplasmosis. From December 18, 1946 to December 18, 1948, 387 samples of soil and various types of debris were collected from farm premises in Loudoun County, Va. *Histoplasma capsulatum* has been isolated from two of these soil samples.

Samples were collected in and around barns and other buildings from which infected animals have been taken. A few included a wide variety of materials such as moldy corn, chaff from hay mows, well-rotted manure from stables, soil with high humus content, and red clay. A large number of soil samples were selected from rat runs and the entrances to rat burrows, and many of these samples contained considerable amounts of rat droppings.

The sample was taken directly into a large sterile glass tube by scooping up the specimen with the lip of the tube. Appropriately labeled, it was kept in this tube. In the laboratory a portion of a specimen was placed in a 100-cc. sterile cylinder. Approximately 10 times the volume of sterile physiological sodium chloride solution was added, and the mixture was stirred vigorously. The soil suspension was allowed to stand from 30 minutes to 2 hours, and a 10-ml. sample was then withdrawn from the top of the column in an attempt to collect any spores which had floated to the surface of the suspension. One ml. of the sample was injected intraperitoneally into each of four mice and the remainder of the suspension was discarded. The mice were killed after 3 to 5 weeks and cultures were made from livers and spleens. After September 1947, all mice used in these tests were kept in a room in which no animals with experimental histoplasmosis had ever been housed.

Histoplasmosis developed in mice inoculated with suspensions made from two soil samples (Nos. 334 and 335) collected October 4, 1948. Two repetitions of the above experiment resulted in the isolation of Histoplasma twice more from sample No. 334 and once more from No. 335. These samples were from adjacent sites within a radius of 1 foot under the edge of an out-building on a farm where histoplasmosis had been proved in 7 of 43 rats trapped.

These samples were similar in character. They were red clay loam containing very little humus. They were collected from mounds of earth presumably removed from rat burrows. No rat droppings were observed in the specimens, but there were a few hairs, probably rat hairs, and a few fragments of feathers and insects.

It was determined experimentally that Histoplasma grows in the laboratory on sterilized soil with a high humus content. When sterile and moistened soil, containing such organic materials as decayed vegetation and dung, was inoculated with *H. capsulatum*, the fungus sporulated freely, producing characteristic macroconidia.[1] It had been assumed that Histoplasma, if it occurred saprophytically in soil, would be most abundant and easily found in soil with a high humus content, and most samples had been taken from such soil types. From an examination of these two soil specimens alone it is not possible to judge whether the conditions which favor good growth in soil in the laboratory are or are not required under natural conditions.

Attempts to isolate Histoplasma directly by culture from these samples were not successful either by streaking some of the dry soil on Sabouraud agar or by simply incubating the wet soil after the sample for animal inoculation had been withdrawn. All such cultures were heavily overgrown by other microorganisms.

In an effort to demonstrate Histoplasma visually in the specimens, portions of the suspension from different levels were examined microscopically. Search revealed several structures of various types resembling more or less the typical macroconidia of Histoplasma. Some structures observed were obviously pollen grains, others were rough-walled fungus spores apparently belonging to species of Scopulariopsis, Aspergillus, etc. Certain structures appeared to be entirely typical of the macroconidia of Histoplasma (figs. 1–9). There was more variation in the appearance of these macroconidia found in the soil samples than one usually sees in a laboratory culture. Some of the spores were roughened but lacked well-developed appendages which characterize Histoplasma (fig. 2). However, the macroconidia produced in a laboratory culture on Sabauraud agar showed great variation in the size and shape of these appendages (figs. 10–12). It is probable that many of the appendages had been broken off and the spores otherwise damaged by the abrasive action of the dry soil particles. A few typical macroconidia with well-developed and preserved appendages were found (figs. 4–8). In a few cases fragments of hyphae or conidiophores were observed attached to spores, but these were rare. The Histoplasma spores were not numerous in the two specimens, and considerable search was necessary to find them.

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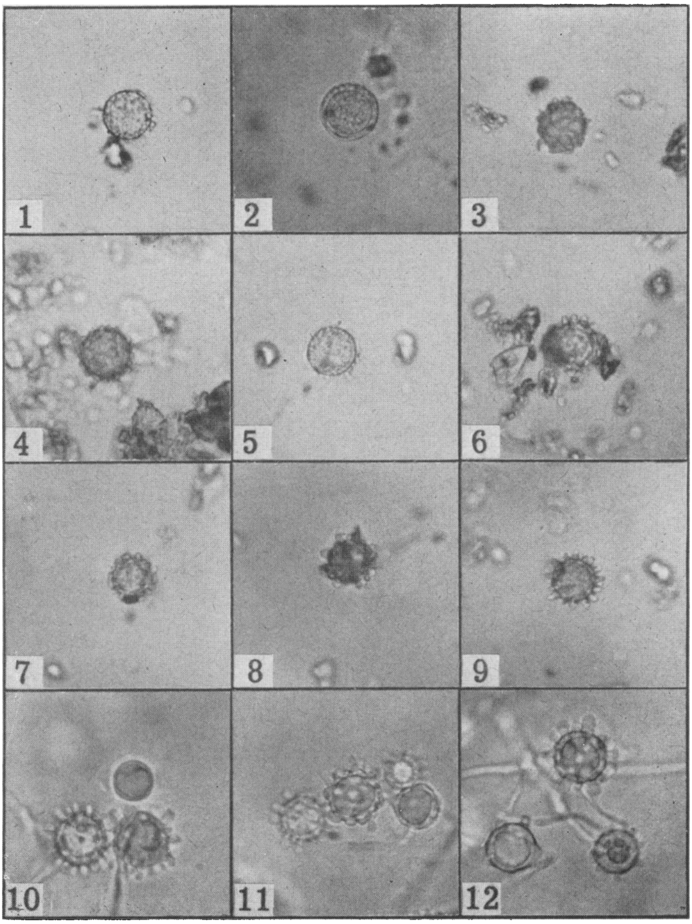
[1] There is a lack of uniformity in the designations applied to the large tuberculate spores of Histoplasma. They have been called frequently but incorrectly "chlamydospores." Howell (*13*) used Vuillemin's terminology of "aleuriospores," Negroni (*14*) called them "hypnospores," while Ciferri and Redaelli (*3*) proposed the name "stalagmospores." These spores are large counterparts of the small spores produced by Histoplasma. The walls of small spores are smooth, pitted, or distinctly spiny, whereas the large spores typically are covered with long finger-like projections, although there is great variation in the size, shape, and spacing of these structures. The small spores can be designated properly and most conveniently as "microconidia" and the large spores as "macroconidia." If one wishes to recognize different types of conidia and accepts the validity of Vuillemin's classification of types of conidia both small and large spores may be called aleuriospores.



Figures 1–12. ***Histoplasma capsulatum.*** **1–9, macroconidia of *H. capsulatum* found in soil; 10–12, macroconidia from a pure culture of one of the isolates from soil.**

The strains of *H. capsulatum* isolated by animal inoculation from the two soil samples were similar to each other and quite typical of the species in colony appearance, microscopic morphology and pathogenicity for animals. The macroconidia shown in figs. 10–12 were taken from a culture of one of these strains and were selected to illustrate the variation in size of spores and in the arrangement and shape of the appendages which can be found in these strains as well as in other typical strains of *H. capsulatum.*

This demonstration of macroconidia of *Histoplasma capsulatum* in soil seems to indicate that Histoplasma has an independent saprophytic existence in nature. Although it is possible that its presence in this sample was due to contamination by an infected rat, it is significant that macroconidia, which have not been found in animal tissue, were found in the soil sample. It has been shown experimentally that *H. capsulatum* does complete a saprophytic cycle in soil in the laboratory. The experimental data and the actual demonstration of macroconidia in soil in nature make it seem highly probable that *H. capsulatum* goes through a developmental cycle as a saprophyte in soil in nature.

Summary

Histoplasma capsulatum was isolated from 2 of 387 soil samples collected in Virginia. The samples were collected on a farm where 7 of 43 rats trapped had proved histoplasmosis and were taken from soil at the entrance to rat burrows. The strains of fungi are typical of those isolated from human, canine and murine histoplasmosis. Macroconidia, typical of those seen in Histoplasma cultures, were found by direct microscopic examination of saline suspension of the two soil samples.

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A Method of Supplying Cellulose Tape to Physicians for Diagnosis of Enterobiasis

By M. M. Brooke,* A. W. Donaldson,* and R. B. Mitchell**

Numerous workers have pointed out that, because of the egg-laying habits of the female worm, the examination of stool specimens is not a satisfactory technique for the demonstration of infections of the pin worm, *Enterobius vermicularis*. The National Institutes of Health anal swab was developed by Hall (*1*) in order to recover the eggs deposited by the female worm in the perianal region. Some consider the cellulose tape technique proposed later by Graham (*2*) to be more effective (*3*). Because of its simplicity, certain public health laboratories would like to adopt the Graham technique, but they have not had a method of making it available to the physicians wishing to submit specimens. Although the physician may be acquainted with the technique and may wish to comply with the recommendation of the laboratory, he may not have the cellulose tape available when needed and may also lack a suitable container for shipping the preparations to the laboratory. The following is a simple modification of the Graham technique which makes it possible to supply the necessary materials to physicians.

Materials

Clear, transparent cellulose tape (¾ inch wide) is used.[1] A piece of paper ¾ by ½ inch is stuck to one end of a strip of tape approximately 4 inches long. The tape is pressed to the surface of a clean 1-by 3-inch slide and looped over the end so that a small portion adheres to the undersurface of the slide (fig. 1*a*).[2] The end with the attached paper serves as a tab for lifting the tape. A tab also can be made by folding the tape back on itself for approximately one-half inch. The cellulose tape slide preparation can then be placed in a slide container for shipment by the laboratory to the physician (fig. 1*b*).

*Scientists, Laboratory Division, Communicable Disease Center, Atlanta, Ga.

**Bacteriologist, School of Aviation Medicine, Randolph Field, Tex.; formerly assistant director, Bureau of Laboratories, Florida State Board of Health.

[1] The authors used Scotch Brand Cellulose Tape made by the Minnesota Mining & Manufacturing Co., St. Paul, Minn. This, however, does not represent an endorsement of this product by the Public Health Service.

[2] The authors wish to express their appreciation to Raymond Bishop for his valuable assistance in the preparation of the drawings.

Procedure for Using Cellulose Tape Slide

The longer strip of cellulose tape is lifted from the slide by pulling on the paper tab (fig. 1*c*). The short portion of tape on the reverse side of the slide remains attached. The freed section of the cellulose tape is looped over, thus exposing the gummed side (fig. 1*d* and 1*e*). To obtain the specimen, the adhesive side of the tape is touched several times to the exposed perianal region (fig. 1*f*). The tape is then replaced on the surface of the slide (fig. 1*g* and 1*h*). If desired, the name or number of the patient can be written on the paper tab. The cellulose tape slide preparation can be examined or placed in the slide mailing container for shipment to the laboratory.

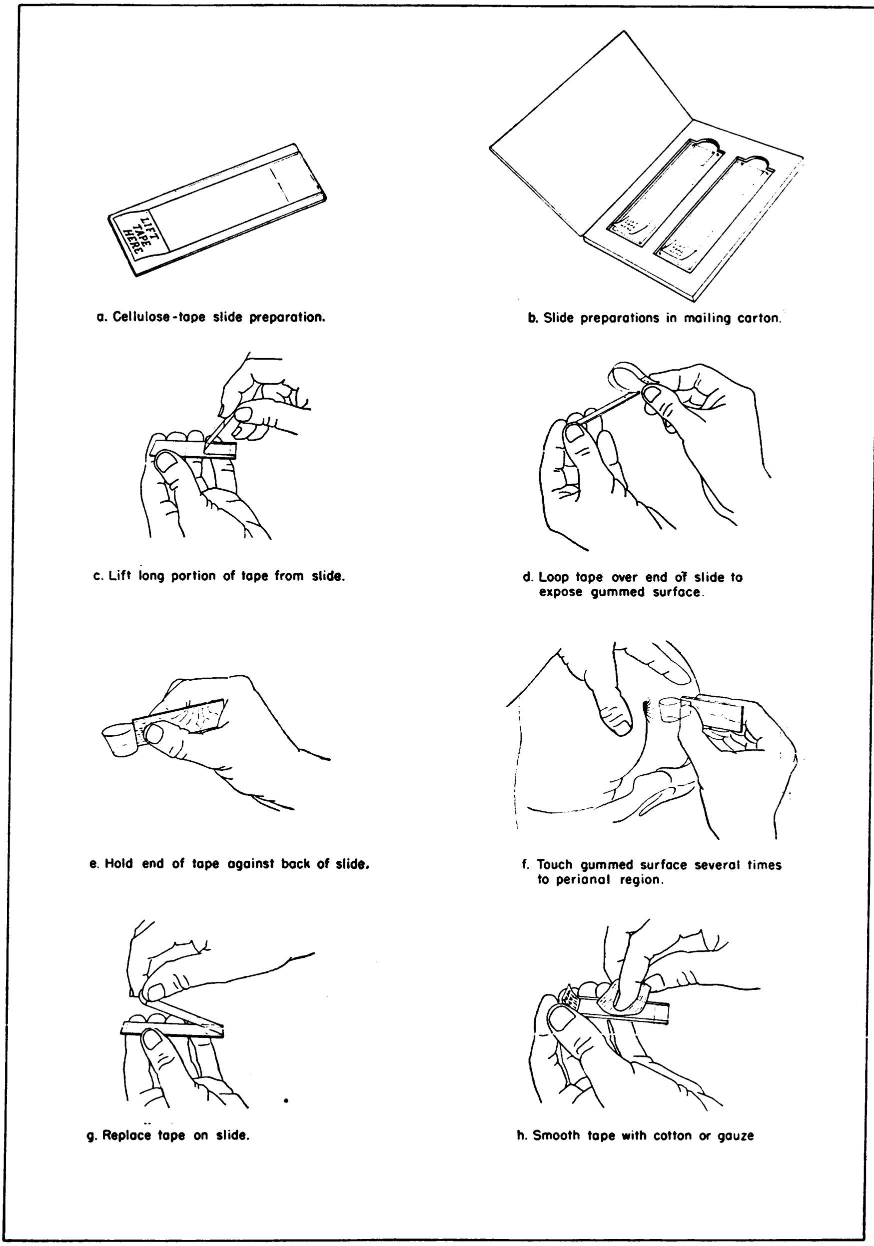
Alternative procedures can be employed utilizing a test tube (Von Hofe, *4*) or a tongue depressor (Jacobs, *5*). In these the cellulose tape is looped over the end of the tongue depressor (figs. 2*a*, 2*b*, 2*c*, and 2*d*) or of the test tube, which is then used to press the adhesive side of the tape against the perianal region.

In the laboratory the preparation can be examined directly with the 16-mm. objective. Only the portion of the tape that touched the patient needs to be examined. This usually constitutes less than the middle half of the strip of tape and requires less than 10 minutes to cover completely. After the preparation has been examined it can be discarded in a disinfectant solution (e. g., cresol) which will remove the tape and permit the cleaning of the slide.

Discussion

In order for cellulose tape slide preparations to be suitable for public health organizations, it is imperative that the cellulose tape does not deteriorate before it is used by the physician. To test its permanence, a number of cellulose tape slides were stored under various conditions and examined at intervals. Some of the preparations were placed in slide containers and stored at 22° to 25° C. (room temperature), at 37° C. (incubator), and at 5° C. (refrigerator). Other cellulose tape slides were exposed directly to sunlight while at room temperature. The tape preparations which were covered and stored at room temperature or in the incubator have maintained their adhesiveness and clear transparency for over 7 months. Those kept in the refrigerator became slightly milky and less adhesive, while those exposed to direct sunlight became dry and they tore when used.

Since the cellulose tape slide preparations can be stored conveniently at room temperature for long periods, large quantities can be prepared in simple inexpensive kits by public health organizations for future distribution to physicians. These kits might consist of two cellulose tape slide preparations in a double slide container, directions for the



a. Cellulose-tape slide preparation.

b. Slide preparations in mailing carton.

c. Lift long portion of tape from slide.

d. Loop tape over end of slide to expose gummed surface.

e. Hold end of tape against back of slide.

f. Touch gummed surface several times to perianal region.

g. Replace tape on slide.

h. Smooth tape with cotton or gauze

Figure 1. Use of the cellulose tape slide preparation for the diagnosis of enterobiasis.

technique, and a label and container for mailing the preparation to the laboratory. If desired, a tongue depressor can be included for the convenience of the physician.

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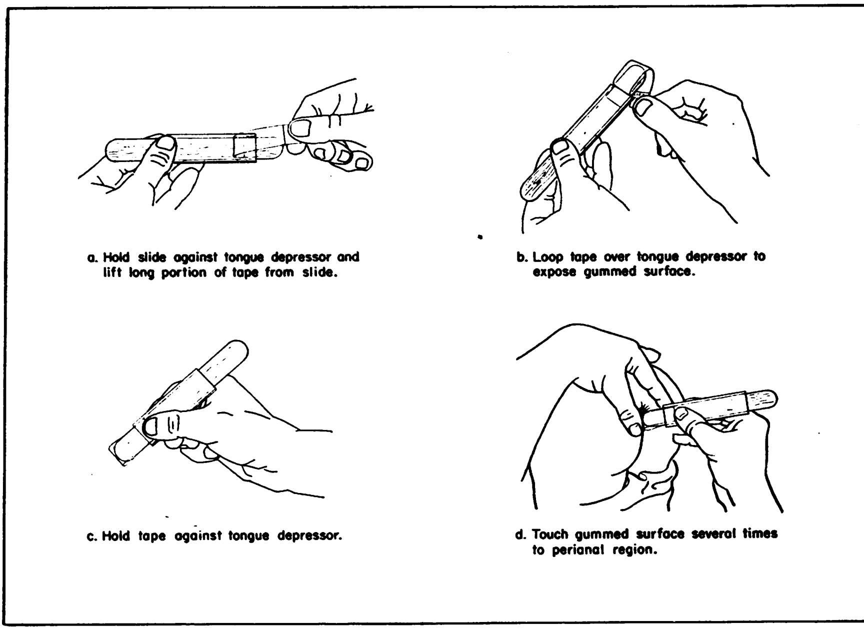

Figure 2. Alternative procedure utilizing tongue depressor to support cellulose tape.

By employing the cellulose tape slide preparation, the physician or a member of the family can obtain the specimen from the patient. Inasmuch as the female worm usually deposits her eggs at night and since children are usually washed thoroughly before being taken to the doctor, specimens obtained in the doctor's office may frequently fail to reveal any eggs. On the other hand, the simplicity of the technique may enable a member of the patient's family to obtain specimens at more favorable times. The mother or father should be given explicit instructions on how to obtain specimens and should be supplied with several of the cellulose tape slide preparations. Since pinworm infections spread easily within a family, it is advisable to obtain specimens from each member of the family, both children and adults. The specimen should be obtained after the individual has retired, perhaps around 10 or 11 p. m., or the first thing in the morning before there has been a bowel movement or a bath.

Summary

A method is described for supplying cellulose tape on microscope slides to physicians for the diagnosis of enterobiasis by the Graham technique. The cellulose tape slide preparation will not deteriorate for several months at room temperature, and therefore can be included

in inexpensive kits suitable for distribution by public health laboratories. Upon instructions from the physician, the parent of the patient can perform the simple technique of taking the specimen in the home at the most favorable time for recovering the eggs.

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(*3*) Mazzotti, L. and Osorio, M. T.: The diagnosis of enterobiasis. Comparative study of the Graham and Hall techniques in the diagnosis of enterobiasis. J. Lab. and Clin. Med. **30:** 1046–1048 (1945).
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DEATHS DURING WEEK ENDED JUNE 18, 1949

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

	Week ended June 18, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,851	8,632
Median for 3 prior years	8,632	
Total deaths, first 24 weeks of year	228,920	232,605
Deaths under 1 year of age	652	669
Median for 3 prior years	646	
Deaths under 1 year of age, first 24 weeks of year	15,584	16,379
Data from industrial insurance companies:		
Policies in force	70,361,365	71,052,571
Number of death claims	12,379	12,237
Death claims per 1,000 policies in force, annual rate	9.2	9.0
Death claims per 1,000 policies first 24 weeks of year, annual rate	9.6	10.0

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 JUNE 25, 1949

The reported incidence of poliomyelitis increased during the week from a total of 278 cases last week to 409 currently, as compared with an increase for the corresponding week last year from 252 to 309. The 5-year (1944–48) median is 125. Increases occurred in each of the 18 States reporting more than 4 cases each. Reports of the 9 States showing increases of more than 5 cases are as follows (last week's figures in parentheses): Michigan 8 (2), Minnesota 16 (3), Florida 12 (2), Tennessee 10 (3), Alabama 11 (3), Arkansas 42 (14), Oklahoma 47 (29), Texas 113 (106), California 30 (23). No other State reported currently more than nine cases. Of the total of 1,794 cases (last year 1,658, 5-year median 718) reported since March 19 (average seasonal low week), 972 have been reported in 4 States, as follows: Texas 577, California 169, Oklahoma 139, and Arkansas 87.

The incidence of measles declined in all sections of the country except the Mountain area. A total of 10,678 cases was reported, as compared with 14,073 last week and a 5-year median of 7,556. The total for the year to date is 560,865, and the corresponding 5-year median is 504,808.

Of 26 cases of Rocky Mountain spotted fever (last week 25, 5-year median 22), 11 occurred in 4 South Atlantic States, 6 in the Mountain area, 7 in the South Central area, and 1 case each in New Jersey and Illinois. The total to date is 206, 5-year median 153.

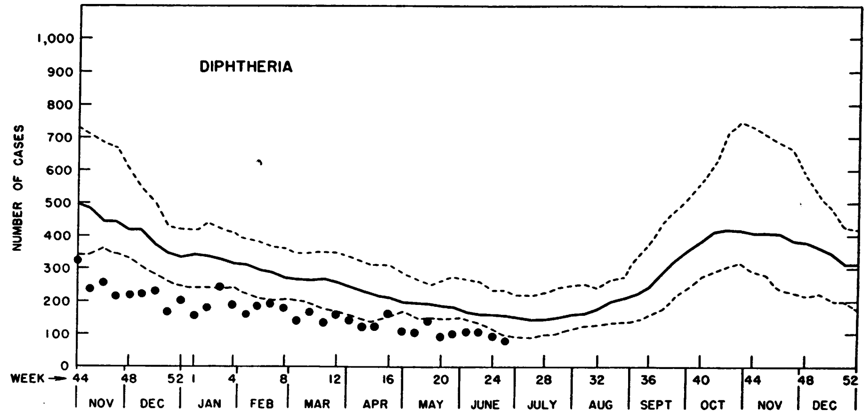
One case of anthrax was reported, in Pennsylvania, and 1 case of smallpox, in New Mexico.

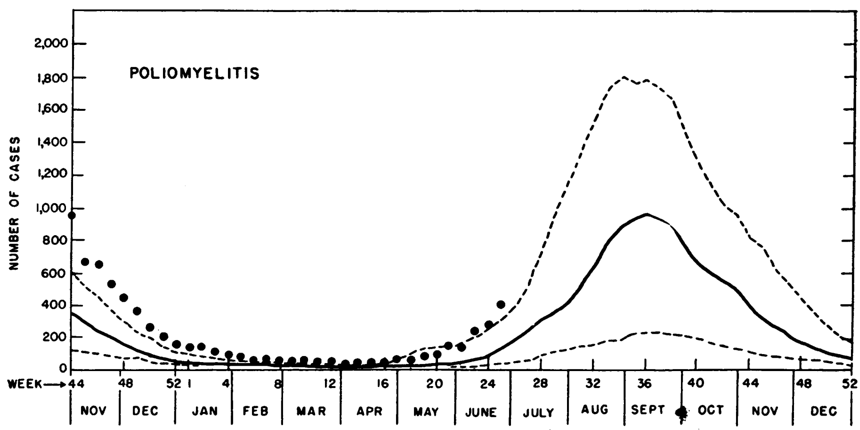
Of the disease included in the table, current and cumulative figures are above the corresponding 5-year medians (not available for pneumonia and rabies in animals) for only poliomyelitis, measles, infectious encephalitis, Rocky Mountain spotted fever, and tularemia.

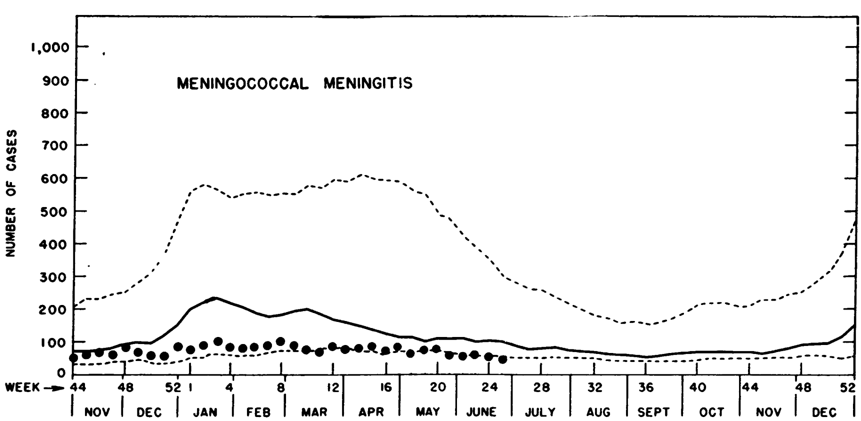
Deaths recorded during the week in 93 large cities in the United States totaled 8,834, as compared with 8,823 last week, 8,554 and 8,642, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,581. The total for the year to date is 236,892, as compared with 240,414 for the same period last year. Infant deaths for the week totaled 579, last week 649, 3-year median 629. The cumulative figure is 16,112, corresponding period last year 16,932.

Communicable Disease Charts

All reporting States, November 1948 through June 25, 1949







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

Telegraphic case reports from State health officers for week ended June 25, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis-meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	62	------	12	1	------	3	------	------	------	8	------
New Hampshire	------	------	------	25	2	2	------	------	------	------	------	------	2	------
Vermont	------	------	------	52	2	------	------	------	3	------	------	------	------	------
Massachusetts	4	------	------	266	2	------	4	------	64	------	------	1	125	------
Rhode Island	------	------	------	9	------	5	------	------	3	------	------	------	------	------
Connecticut	------	------	------	347	------	19	1	------	13	------	------	------	10	------
MIDDLE ATLANTIC														
New York	4	1	(c)	1,019	3	164	7	------	83	------	------	4	171	5
New Jersey	5	2	1	953	2	40	5	1	23	------	------	------	53	2
Pennsylvania	1	------	(c)	955	1	------	2	------	69	------	------	1	72	1
EAST NORTH CENTRAL														
Ohio	------	------	------	1,044	4	37	------	------	67	------	------	3	46	8
Indiana	4	------	------	71	------	5	2	------	11	------	1	1	18	18
Illinois	------	------	4	396	3	142	3	1	31	------	------	1	85	3
Michigan [e]	1	1	------	457	2	4	8	------	75	------	------	------	26	13
Wisconsin	1	------	2	1,380	------	1	2	------	21	------	------	1	34	------
WEST NORTH CENTRAL														
Minneosta	------	1	------	70	------	12	16	------	9	------	1	------	------	------
Iowa	------	1	------	80	------	2	4	------	1	------	------	------	1	7
Missouri	1	------	1	25	1	5	7	------	4	------	1	1	9	------
North Dakota	------	------	------	5	------	------	9	------	------	------	------	------	1	------
South Dakota	------	------	------	9	------	------	2	------	------	------	------	------	------	------
Nebraska	------	------	------	32	------	------	3	------	3	------	------	------	4	------
Kansas	------	------	3	65	------	4	2	------	3	------	------	------	8	------
SOUTH ATLANTIC														
Delaware	------	------	------	25	------	------	------	------	------	------	------	------	1	------
Maryland [e]	3	------	------	79	------	25	1	3	6	------	------	2	22	------
Dist. of Columbia	------	------	------	21	1	14	------	------	7	------	------	------	------	------
Virginia	7	------	50	212	------	25	1	3	8	------	------	1	44	3
West Virginia	2	------	------	21	------	6	3	------	1	------	------	2	21	------
North Carolina	4	------	------	403	1	------	5	4	5	------	1	4	55	------
South Carolina	5	1	114	255	------	57	3	------	1	------	------	2	32	3
Georgia	2	1	1	110	2	10	2	1	8	------	------	2	------	12
Florida	5	1	14	85	2	7	12	------	------	------	1	1	6	------

EAST SOUTH CENTRAL														
Kentucky	2		6	100	4	14	4	1	11			5	17	17
Tennessee	1		4	94		23	10	2	11		1	2	32	
Alabama	2		2	45	2	27	11	2	6			1	14	6
Mississippi [a]	3		3	17	3	10	9		4			2	16	
WEST SOUTH CENTRAL														
Arkansas	2		9	77		12	42		2		9	3	22	3
Louisiana	1		2	7	1	25	4					5	3	
Oklahoma	1		14	167		22	47	2	5		2	1		3
Texas	14	2	293	224	2	206	113		21		2	11	124	16
MOUNTAIN														
Montana				105			1	1	5			1	2	
Idaho	1		1	68		5	9	1	[d] 6			3	4	
Wyoming				4			1	2						
Colorado			4	127		9	3	2	2			1	8	
New Mexico				61		11	7		3	1			2	
Arizona			29	68		2	3		4			2	4	
Utah [a]			6	59		2			2		2		44	
Nevada														
PACIFIC														
Washington	1			204		2	6		8			1	12	
Oregon	1		3	90	1	14	4		5				16	
California	4		6	628	6	33	30		[d] 40			6	70	2
Total	82	11	572	10,678	47	1,015	409	26	657	1	21	71	1,244	
Median, 1944–48	168	9	631	7,556	85		125	22	1,482	4	19	98	2,052	
Year to date 25 weeks	3,616	257	73,674	560,835	1,944	49,170	2,718	206	56,128	40	612	1,219	26,230	
Median, 1944–48	6,016	221	187,745	504,808	3,883		1,123	153	80,891	240	443	1,448	49,049	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,730		109,944	613,258	2,786		1,794		78,826	50		759	36,263	
Median, 1943–48 [b]	13,582		331,786	539,754	5,387		718		119,462	323		973	80,315	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944–45 to 1948–49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: West Virginia 1; South Carolina 1; Tennessee 1; Mississippi 2; Louisiana 2; Texas 3; California 4. Cases reported as Salmonella infection, not included, were as follows: Massachusetts 1; New York 2.

Anthrax: Pennsylvania 1.
Alaska: No cases reported of the diseases listed.
Hawaii Territory: Measles 50; lobar pneumonia 1; poliomyelitis 1.

PLAGUE INFECTION IN COLORADO, MONTANA, AND NEW MEXICO

Under date of June 24, plague infection was reported proved in tissue and ectoparasites of rodents collected in Park County, Colo., Beaverhead County, Mont., and Sandoval County, N. Mex., as follows:

COLORADO

Park County.—A pool of 45 fleas from 1 prairie dog, *Cynomys gunnisoni*, shot June 10 at a location 4½ miles southwest of Fairplay.

MONTANA

Beaverhead County.—A pool of 64 fleas from 39 ground squirrels, *Citellus armatus*, shot June 13 in Small Horn Canyon, 13 miles southwest of Dillon; tissue from 1 ground squirrel, *Citellus richardsonii elegans?*, found dead on a ranch 13 miles west of Dell on Big Sheep Canyon Road and a pool of 244 lice from 58 ground squirrels, same species, shot on the same date at the same location.

NEW MEXICO

Sandoval County.—A pool of 20 fleas from 17 prairie dogs, *Cynomys gunnisoni*, shot June 6 on State Highway 44 within a distance of 7 miles northwest of the town of Cuba.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended June 4, 1949.—During the week ended June 4, 1949, cases of certain notifiable 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		29		235	448	30	98	61	166	1,067
Diphtheria				4				2		6
German measles		39		218	79	9	72	79	20	516
Influenza		12			3	2			6	23
Measles		7	11	340	364	291	177	531	502	2,223
Meningitis, meningococcal			1		1	2			1	5
Mumps		2		65	296	18	7	23	85	496
Poliomyelitis				2		1		1	1	5
Scarlet fever		2	1	87	73	2	1	9	10	185
Tuberculosis (all forms)		5	18	124	39	29	6	18	31	270
Typhoid and paratyphoid fever			2	8	1		1		4	16
Undulant fever				1						1
Venereal diseases:										
Gonorrhea		2	11	66	54	23	20	25	71	272
Syphilis		7	2	95	27	17	4	9	18	179
Whooping cough				57	17	10	1		1	86

CUBA

Habana—Notifiable diseases—4 weeks ended May 28, 1949.—During the 4 weeks ended May 28, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	12		Smallpox	1	
Diphtheria	19		Tuberculosis	3	
Measles	8	1	Typhoid fever	11	1
Poliomyelitis	1		Typhus fever (murine)	1	

Provinces—Notifiable diseases—4 weeks ended May 28, 1949.—During the 4 weeks ended May 28, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	13	17	25	2	14	73
Chickenpox	2	15	1		3	88	109
Diphtheria		19	1	3		5	28
Leprosy		6					6
Malaria	4			1	2	7	14
Measles		9	4	3	3	10	29
Poliomyelitis		1					1
Smallpox		1					1
Tuberculosis	1	16	11	23	15	15	81
Typhoid fever	5	15	4	12	11	24	71
Typhus fever (murine)		1					1
Undulant fever	2					4	6
Whooping cough		6			3	1	10

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—April 1949.—During the month of April 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Poliomyelitis	4
Diphtheria	112	Scarlet fever	295
Dysentery	1	Syphilis	94
Gonorrhea	585	Typhoid fever	17
Paratyphoid fever	146		

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

NOTE.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. 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

Burma—Bassein.—During the week ended June 4, 1949, 15 cases of cholera were reported in Bassein, Burma.

Plague

Belgian Congo—Costermansville Province.—On June 15, 1949, 1 fatal case of plague was reported northeast of Lubero in the village of Kiamabia, Costermansville Province, Belgian Congo.

Brazil.—Delayed reports: During the month of September 1948, 65 cases of plague with 4 deaths were reported in Brazil, distributed as to States as follows: Bahia State 34 cases, 3 deaths; Pernambuco State 23 cases, 1 death; Ceara State 8 cases, no deaths. For the month of December 1948, 25 cases, 3 deaths were reported, distributed as follows: Bahia State 17 cases, 1 death; Pernambuco State 5 cases; Ceara State 2 cases, 2 deaths; Alagoas State 1 case.

India—Calcutta.—During the week ended June 18, 1949, 27 cases of plague were reported in Calcutta, India.

Peru.—During the period April 1–30, 1949, plague was reported in Peru as follows: In Huacho City, Chancay Province, Lima Department, 3 cases; in Singo Settlement, Huancabamba Province, Piura Department, 3 cases.

Smallpox

Java—Batavia.—During the week ended June 11, 1949, 226 cases of smallpox, with 41 deaths, were reported in Batavia, Java.

Typhus Fever

Bolivia.—For the period February 1–15, 1949, 39 cases of typhus fever, with 7 deaths, were reported in Bolivia, of which 32 cases 7 deaths were stated to have occurred in Potosi Department, where the disease was epidemic.

Yellow Fever

Gold Coast.—Yellow fever has been reported in Gold Coast as follows: On June 1–2, 1949, 1 fatal case in Oseikrome, a village near Sekondi; on April 30, 1 suspected case in Birim District, also 1 suspected case on May 30 in this District. (One of these cases was reported from the "African Selection Trust," and the other from Bawdua, a village located three miles further north).