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Fluoridation Keynoted at Dental Conference

Fluoridation of public water supplies was the central theme of the fourth annual conference of the State Dental Directors, held in Washington, D. C., June 6–8, 1951. The dentist's role in civilian defense occupied another important place on the agenda.

Conferees heard that some communities in nearly every State are already adding fluoride to their water supplies, and many more are considering fluoridation plans. Dentists, both individually and in groups, are taking the initiative in informing the public about fluoridation and in assisting public officials to formulate plans that will meet the need of the specific community.

Each State dental director was given an opportunity to submit questions and problems on fluoridation for discussion at the conference. These topics were placed into four categories: facts about fluoridation . . . the use of these facts with different groups . . . measuring effectiveness of fluoridation . . . technical, financial, and personnel problems.

A group was formed to discuss each of the four aspects of fluoridation. This device insured that specific problems met by the State dental directors in their work would be discussed in relation to similar problems.

Setting the stage for the work of the discussion groups were talks on the promotion and application of water fluoridation, and on the technical engineering phases of the program.

Promotion of Fluoridation

The fluoridation program gives the dental profession its first opportunity to offer a preventive for the mass control of dental caries in a large segment of the population, Dr. Francis A. Bull, director of dental education of the Wisconsin State Board of Health, told the conferees.

Like chlorination, pasteurization, the use of iodine for goiter prevention, and other earlier public health measures, fluoridation is now opposed by some individuals and groups, Dr. Bull pointed out. Their objections can frequently be overcome, however, with facts, he said.

He reported that experience in Wisconsin, where 46 communities

have already added fluoride to their water supplies, has shown the need in many States for:

1. A positive policy on fluoridation by the State dental society and State board or department of health.
2. A State fluoridation committee working in cooperation with the State dental director and the State dental society. In Wisconsin, this group provides data on fluoridation to local dental societies and nonprofessional and official groups. It invites representatives of such groups and the press to State-wide meetings on fluoridation.
3. The leadership of local dental societies in organizing local fluoridation committees and in establishing programs. The local committee should include representatives of community organizations. It can arrange for talks to service clubs, local officials, and PTA's, draw up a sample ordinance, collect information on installation costs in a particular community, and take responsibility for mobilizing popular support for fluoridation.

Fluoridation should not be made the whole dental program; it should be used as a stepping stone to a complete dental health program, Dr. Bull concluded.

Technical Aspects of Fluoridation

Franz J. Maier, senior sanitary engineer of the Division of Dental Public Health, Public Health Service, said that before advocating fluoridation of any particular water supply in a State, the State dental director should be prepared to answer three questions invariably raised:

Will it do any good? Will it do any harm? How much will it cost?

To answer these questions, he added, the director will want to obtain from the State sanitary engineer:

1. The fluoride content of the specific water supply.
2. Estimates of the capabilities of waterworks personnel.
3. Cost of fluoridation based on a detailed study of the water supply.

The fluoride compounds being used by various communities throughout the country, Mr. Maier said, are sodium fluoride, sodium silicofluoride, and hydrofluosilicic acid. Of the three, sodium silicofluoride provides fluoride at about a third of the cost of hydrofluosilicic acid, and at about half the cost of sodium fluoride.

When the community water system delivers more than 12,000 gallons per minute (172,000 population), gravimetric feeders produce the best results, he continued. Volumetric feeders can be used in places delivering less than this amount, down to about 18.6 gallons per minute (267 population). Solution feeders in single units can be used in the smallest installations up to about 1,880 gallons per minute

(27,000 people). Supplies of any size greater than 300 gallons per minute (4,300 people) can be treated with a feeder pumping 22 percent hydrofluosilicic acid.

When the type of feeder and fluoride compound has been determined, the community should submit plans and specifications for the proposed installation to the State health department for approval, he said. The State sanitary engineer will base his approval of the plan and specifications on the following considerations:

1. Adequacy of the proposed equipment.
2. Capabilities of operating personnel.
3. Point of application for fluoride.
4. Extent of safety precautions for protecting operators.
5. Effectiveness of controls to maintain desired fluoride concentration.

Fluoridation Reduces Decay 65 Percent

The discussion groups devoted considerable time to examining the advantages of fluoridation as a means of reducing tooth decay on a mass basis and to the public health aspects of the procedure. It was pointed out that:

+ Studies show 65 percent less dental decay in children born and reared in naturally occurring fluoride areas. There are also more caries-free children.

+ There is an anticipated percentage reduction for all ages of children where controlled-fluoridated water has been used continuously.

+ The present dentist population ratio can more adequately serve the total population as the result of fluoridation programs.

+ Fluoridation is a partial caries-control procedure and does not eliminate the need for other dental health measures.

+ No harmful effects have resulted from fluoridation when the recommended fluoride concentrations are maintained. No ill effects on human beings have been observed. Neither have bad effects been reported by bottlers, brewers, bakers, launderers, gardeners, or industrial users of water.

+ Since water fluoridation is most effective during the years of enamel calcification, it is advisable for those children whose teeth have already been calcified when fluoridation is started to have topical fluoride applications. As the benefits of fluoridated water become effective, topical fluoride applications should be discontinued gradually, beginning with the younger age groups.

Establishing and Evaluating Local Programs

In discussing the establishment and operation of local fluoride programs, the State dental directors emphasized the following points:

+ The public, dentists, and interested municipal officials should be

kept fully informed on the advantages of fluoridation and the techniques for introducing the compounds into public water supplies.

✦ The initiation and promotion of the program in a community is the responsibility of the State and local dental societies and the bureau or division of dental health. The establishment of technical standards and procedures is the responsibility of the State departments of health.

✦ Total cost figures amortized over 30 years on a per capita basis will average an estimated 5 to 14 cents per person per year.

✦ Suitable local plans for a dental health survey before fluoridation and periodic evaluations should be set up by the dental public health program director. The survey should be conducted by local dental personnel.

✦ Periodic evaluation of results should be planned so that: (1) progress can be measured; (2) collection of data and of techniques can be standardized; (3) data can aid in motivating the community toward the establishment of a well-rounded dental public health program. Data should be collected to establish age-specific DMF and def rates [1] per 100 children.

✦ Age-specific data should be collected for children of ages 5 through 15. In small communities all children should be examined, and in the larger communities a sample of from 200 to 300 children at each age should be examined. In larger cities, it may be desirable, although not necessary, to consider other factors, such as areas of the city, race, or economic level. In that case, the sample size should be 200 to 300 children in each age group for each of the factors to be considered.

✦ In order to be able to measure changes in the caries-attack rate after water fluoridation, examinations made at 3- to 5-year intervals following the introduction of fluorides into the water supply are suggested.

The Engineering Phase of Fluoridation

The responsibilities of engineers in assisting communities to plan their fluoridation layouts, in the selection of fluoride compounds and feeders for introducing fluoride into water supplies, and in training personnel to operate equipment and to determine the fluoride content of water were discussed in detail by the State dental directors. Their conclusions included:

✦ The engineering phase of the fluoridation of a community's water supply should be carefully considered by competent engineers. Their advice is needed on the best type of feeder, the chemicals to be used, and equipment, installation, and operating problems. The

[1] DMF represents decayed, missing, or filled permanent teeth, and def stands for decayed, extraction indicated, or filled primary teeth.

bureau of sanitary engineering of the various State boards of health must review and approve the plans.

✦ Persons capable of operating a water plant, experience has shown, are capable of adding fluorides to the water supply of a community.

✦ Orientation and training of water plant operators in testing and safety procedures should be conducted on a continuing basis by the State departments of health.

✦ Engineering aspects of fluoridation, such as tests to determine the fluoride content of water and the safety, qualifications, and training of the operator, should be covered by State regulations. The recommendations of the American Water Works Association are acceptable to most State departments of health.

✦ The equipment involved in water fluoridation is the same standard type that has been used in water plants for many years and has proved to be reliable through long years of experience. The equipment to be used is an engineering decision subject to approval of State health authorities for any specific installations.

The Dentist in Atomic Warfare

Discussing the role of the dentist in atomic warfare were Colonel W. L. Wilson, assistant administrator for health and welfare of the Civil Defense Administration, and Dr. Arthur C. Bushel, assistant director of the Bureau of Dental Health of New York State.

Colonel Wilson told the State directors:

✦ During the initial stages of an atomic disaster, dentists (preferably with hospital experience) should be included in the staffs of hospitals—both existing and improvised types. Primarily, they would care for patients with maxillofacial injuries.

✦ Most of the dentists of the community should be assigned, during a period of civilian disaster, to work in first-aid stations. Their professional training should help them to treat shock, arrest hemorrhage, administer plasma, and perform similar lifesaving tasks.

✦ Dentists desiring to take training in medical aspects of atomic warfare should contact the Surgeon General of either the Army or the Navy. Courses in this subject are given regularly.

Dr. Bushel noted that:

✦ The major problem in atomic disaster is getting the proper supplies and trained personnel to attacked areas with the least possible delay.

✦ To help achieve this goal in New York State, the organization for civilian defense is based largely on the principles of decentralization and mutual aid. These principles dictate the need for tremendous numbers of medical workers, with dentists occupying an extremely important place in the organization.

✦ As a first step, dentists in New York State have been participating in two-session orientation courses designed to give them a broad picture of the medical problems of atomic disaster and the organizational patterns which are developing at the local level. Dentists trained in this manner should be equipped to act as assistant medical officers, providing essential medical treatment even for those who are seriously injured.

Officers of Association

Officers elected by the members of the Association of State and Territorial Dental Directors at the meeting were Dr. Carl L. Sebelius, Tennessee, president; Dr. James F. Owen, Kentucky, president-elect; Dr. Fred Wertheimer, Michigan, vice president; Dr. William A. Jordan, Minnesota, secretary-treasurer; and Dr. David B. Ast, New York, Dr. William H. Rumbel, Virginia, and Dr. Paul Cook, Louisiana, members of the executive council.

The directors were welcomed to the conference by Surgeon General Leonard A. Scheele of the Public Health Service and Katherine Bain, associate chief for program development of the Children's Bureau. Co-chairmen of the conference were Dr. John W. Knutson, chief of the Division of Dental Public Health of the Public Health Service, and Dr. John T. Fulton, dental services advisor of the Children's Bureau.

Leaders of the discussion groups were Dr. Paul Cook of Louisiana, Dr. Thomas W. Clune of Rhode Island, Dr. H. Shirley Dwyer of New Hampshire, and Dr. James F. Owen of Kentucky. Recorders were Dr. Richard C. Leonard of Maryland, Dr. Paul Sebelius of Tennessee, Dr. Roy D. Smiley of Indiana, and Dr. Floyd H. DeCamp of Florida.

Dr. Herschel W. Nisonger, director of the Bureau of Special and Adult Education of Ohio State University, assisted representatives of the Division of Dental Public Health, Public Health Service, and the Children's Bureau, Federal Security Agency, in planning the conference.

A Quantitative Study of Sanitary Engineering Graduates

By WALTER A. LYON, M. S.*

A considerable proportion of sanitary engineering graduates do not follow the profession. This study was designed to provide adequate data regarding the loss to the profession of these graduates. Without such information, it is impossible to estimate accurately the number of graduates in sanitary engineering needed each year to meet the national demand.

Miller's (*1*) recent study showed that 47 universities and colleges at some time during the period 1910–49 offered undergraduate sanitary engineering curricula or options. From these a sample of 25 institutions was studied. This sample represents 73.8 percent of the sanitary engineering graduates during that 40-year period.

Number of Sanitary Engineering Graduates

There is a broad parallelism between the fluctuations in the number of all engineering graduates, all sanitary engineering graduates, and those sanitary engineering graduates in the sample. Figure 1 illustrates this phenomenon. There are, however, variations in the proportion of sanitary engineering graduates to all engineering graduates. Figure 2 shows the relationship between the number of all sanitary engineering graduates and each 1,000 of all engineering graduates for the period 1920–50. The mean number of sanitary engineering graduates per 1,000 engineering graduates for this 31-year period is 5.77, with a standard deviation of 1.60.

In spite of the growth in number of institutions which offer sanitary engineering options, the number of sanitary engineering graduates has not kept pace with the increase in the number of all engineering graduates. Since the beginning of World War II, the proportion of sanitary engineering graduates to all engineering graduates has been much smaller than during the 13-year period prior to 1941.

Miller showed that the 21 institutions having courses in sanitary engineering during the full 5-year period 1934–39 graduated 3.9 men per institution per year, and that the 33 institutions having courses during the full 5-year period 1946–50 graduated 5.0 men per institution per year. Figure 2 shows that the proportion of sanitary engi-

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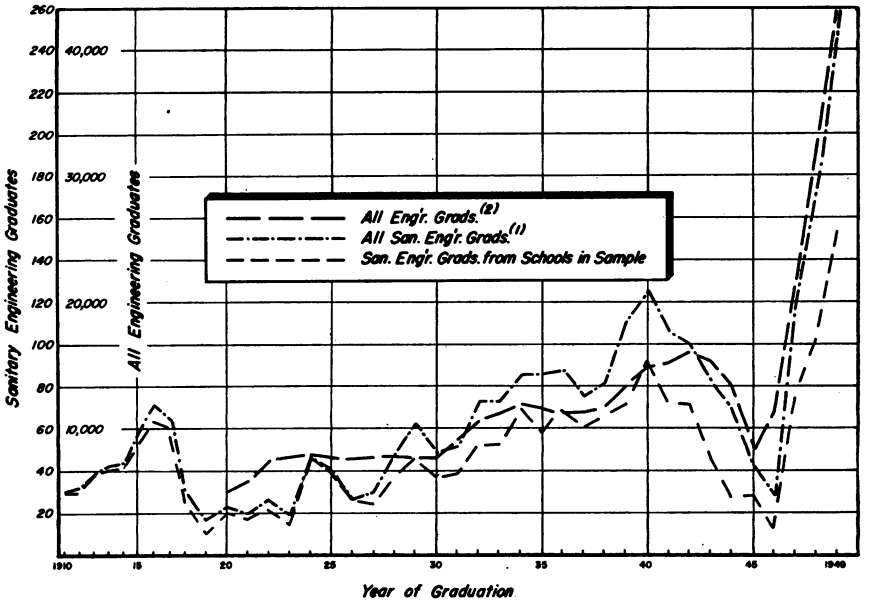

Figure 1. Number of all engineering graduates, all sanitary engineering graduates, and sanitary engineering graduates from schools in sample.

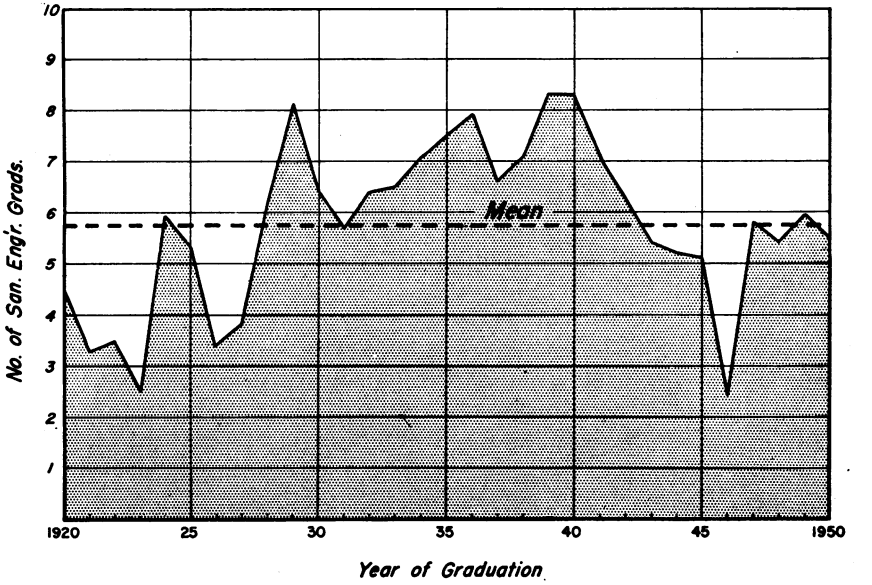

Figure 2. Number of all sanitary engineering graduates per 1,000 engineering graduates, for each year in the period 1920–50 (*1*, *2*).

neering graduates to all engineering graduates has been lower in recent years; actually the average for the 1946–50 period was 32.4 percent lower than for the 1934–39 period. Thus, while there was an increase in the number of institutions offering options, the proportion of sanitary engineering graduates to all engineering graduates has decreased. Should consideration be given to the possibility that sanitary engineering educational efforts are being spread too thin?

Loss From the Profession

In order to obtain information on sanitary engineering graduates, it was first necessary to get their names from the universities and colleges in the sample. Because lists of those who take sanitary engineering options or curricula are rarely kept, the records of all engineering graduates for the 40-year period (or since the inception of the option) were examined to obtain the names of those graduates which could be used in this study.

Although the courses required for the completion of an option may be in an institution's catalogue, these guide lines frequently are not followed. In such instances, it was necessary to apply a minimum criterion to determine whether or not a graduate should be considered as having completed a sanitary engineering option. The minimum criterion was developed by averaging the sanitary engineering content of courses followed by 12 institutions and accepted by a representative group of professors of sanitary engineering to whom it was submitted for criticism. The criterion was designed only as a screening device for this study and is not proposed as an educational standard.

Some of the schools which adhered to the catalogue description of their options did not meet the requirements of the criterion. This points up the problem discussed by Miller regarding the considerable variation in curriculum content for sanitary engineering undergraduates and the difficulty of defining a sanitary engineering graduate.

Having prepared a list of sanitary engineering graduates, it was next necessary to learn the present occupations of the graduates. This was done by examining the records in alumni offices and in the engineering departments of the institutions. Engineering school faculties were also helpful in supplying information. A search of membership rosters of two professional organizations provided additional useful data. When none of these sources furnished the facts required, letters of inquiry were sent to the graduates, and follow-up letters were used if necessary.

In tabulating the information, a graduate was considered to be in the profession if, during the year 1950, he was active in an occupation involving the application of engineering knowledge to the control of

the environment in order to promote and protect the public health in administrative, promotional, operational, teaching, testing, design, or research activities; or he was a graduate student in sanitary engineering. In the case of city engineers, consulting engineers, and those engaged in other broad types of professional engineering activity, a graduate was considered to be in the profession if 50 percent or more of his work appeared to be devoted to sanitary engineering.

Minimum Criterion

*Semester hours**	*Subjects*
2–4	Broad aspects of sanitary engineering, such as: Environmental health. Sanitation science. Public health.
6–8	Water and sewage: Treatment. Design. Collection. Storage. Distribution.
2–4	Sanitary engineering laboratory (water and sewage) analysis; or Bacteriology laboratory; or Quantitative analysis.
2–4	Related science, such as: Microbiology of water. Bacteriology. Industrial hygiene. Insect control. Rodent control. Sanitary inspection. Chemistry (beyond freshman chemistry). Sanitary engineering seminar.
1–2	Related field, such as: Geology. Soil mechanics. Hydrology. Municipal engineering. Advanced hydraulics or fluid mechanics. Sanitary structures.

*17 credit hours should be considered the minimum for the 2-semester year, and 26 credit hours for the 3-term year.

From a total of 1,959 sanitary engineering graduates in the 40-year period from the universities and colleges studied, the necessary information was obtained from 1,782, or 91.0 percent. Table 1 shows in detail for each institution the data collected on its sanitary engineering graduates.

For the purpose of this study, the percent of graduates remaining in the profession is defined as the percent of those who were alive in

Table 1. *Summary, as of 1950, of information on sanitary engineering graduates from 25 universities and colleges, 1910–49*

School	In profession		Out of profession		Dead		Unknown		Total
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
California, University of	104	44.3	100	42.6	7	3.0	24	10.2	235
Cornell University	31	35.2	40	46.6	11	12.5	6	5.7	88
Florida, University of	10	100.0	-----	-----	-----	-----	-----	-----	10
Georgia Institute of Technology	14	100.0	-----	-----	-----	-----	-----	-----	14
Illinois, University of	79	42.5	59	31.7	24	12.9	24	12.9	186
Iowa, State University of	75	50.0	48	32.0	2	1.3	25	16.7	150
Kansas, University of	43	63.2	19	27.9	3	4.4	3	4.4	68
Kentucky, University of	2	40.0	2	40.0	-----	-----	1	20.0	5
Louisiana State University	5	100.0	-----	-----	-----	-----	-----	-----	5
Maine, University of	24	30.4	48	60.8	2	2.5	5	6.3	79
Massachusetts Institute of Technology	98	39.5	128	51.6	12	4.8	10	4.0	248
Michigan College of Mining and Technology	9	29.0	22	71.0	-----	-----	-----	-----	31
Michigan State College	27	60.0	15	33.3	1	2.2	2	4.4	45
Michigan, University of	78	33.5	96	41.2	26	11.2	33	14.2	233
New York University	26	31.3	33	39.8	1	1.2	23	27.7	83
Oregon State College	38	67.9	18	32.1	-----	-----	-----	-----	56
Pennsylvania State College	68	44.7	55	36.2	18	11.8	11	7.2	152
Purdue University	42	40.8	54	52.4	4	3.9	3	2.9	103
Rensselaer Polytechnic Institute	1	100.0	-----	-----	-----	-----	-----	-----	1
Rutgers University	18	64.3	8	28.6	1	3.6	1	3.6	28
South Carolina, University of	1	50.0	1	50.0	-----	-----	-----	-----	2
Texas, University of	10	43.5	10	43.5	1	4.3	2	8.7	23
Utah State Agricultural College	2	100.0	-----	-----	-----	-----	-----	-----	2
Virginia Polytechnic Institute	30	49.2	27	44.3	-----	-----	4	6.6	61
Wisconsin, University of	25	49.0	26	51.0	-----	-----	-----	-----	51
Totals	860	43.9	809	41.3	113	5.8	177	9.0	1959

1950 and for whom the information was available. In other words, those who have died and those for whom no information could be obtained have been subtracted from their graduating classes to obtain the denominator for the percent figure for each year. Thus, the "percent of graduates remaining in the profession" for the schools sampled for the 40-year period was:

$$\frac{860}{860+809}\times 100 = 51.5 \text{ percent}$$

The "percent of graduates remaining in the profession" in 1950 for each year of graduation is shown in figure 3. This graph appears primarily to reflect the interplay between the demand and supply of graduates. General economic conditions as well as the effect of two wars which occurred in this period have influenced this interplay. The high percentages in the period 1946–49 are probably due to the recency of graduation in those years. The jaggedness of the graph is characteristic of a study in which relatively small numbers are used.

To summarize the "percent of graduates remaining in the profession" for the 40- and 10-year periods, table 2 has been prepared by averaging the annual "percents of graduates remaining" for certain periods.

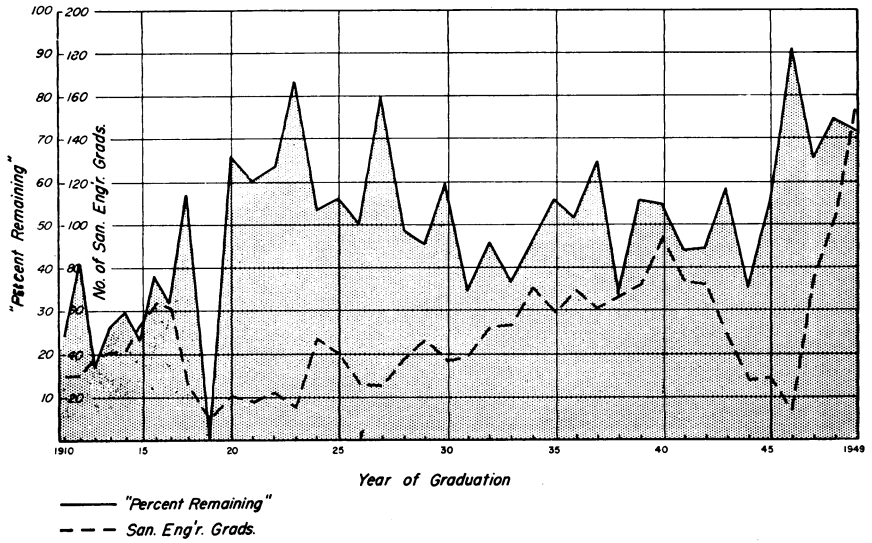

Figure 3. Sanitary engineering graduates from schools in sample and "percent remaining in profession" in 1950, for each year, 1910–49.

Table 2. *Percent of sanitary engineering graduates from selected classes remaining in the profession in 1950*

Years of graduation	Mean percent	Standard deviation
1910–19	29.1	14.3
1920–29	60.7	12.2
1930–39	48.3	10.3
1940–49	59.6	15.1
1910–49	49.4	18.4

The data in table 2 are indicative only of trends on how the profession absorbed the graduates of certain periods. They show that there is still in the profession a slightly greater percent of those who graduated in the 1920–29 period than of those who graduated in the last 10-year period, 1940–49. Probably, many of those who graduated during the genesis of sanitary engineering moved quickly into important positions and have consequently remained in the profession.

As in any other type of social research, there are many factors which interact to produce the statistical picture that is found. One of the primary factors which appears to determine the loss from the profession is the condition of the job market at the time of graduation. At that time the graduate is confronted by a gamut of opportunities in the entire field of civil engineering. Unless he has a particular urge to do sanitary engineering work, the graduate will undoubtedly make his choice after considering the professional and financial attractions of all the available openings. Thus, the loss

from the profession tends not only to be influenced by opportunities in sanitary engineering, but also is determined by the competition within the job market for junior engineers irrespective of specialties. Another factor of some importance is the ability of the university, government, and professional organizations to present the prospective graduate with a sufficient amount of information on the availability of jobs within the field of sanitary engineering.

Answers supplied by the respondents to our inquiries indicate that a number of graduates pursue the profession of sanitary engineering for a period of years and then move to more remunerative jobs in other branches of engineering. There was little evidence that graduates returned to the profession after having once left it.

A comparison of the sizes of graduating classes by institution for the years 1947–49 with the loss from the profession revealed no relationship.

Outlook for the Future

With the assumptions that peacetime conditions will prevail, that the mortality rate among students will be average, and that there will be no losses under the Selective Service rules, the Office of Education has estimated (*2*) the total number of engineering graduates for the years 1951–54. By applying to these figures the mean num-

Table 3. *An estimate of future production of sanitary engineering graduates*

Year	Estimated number of all engineering graduates	Estimated number of sanitary engineering graduates	Estimated number of sanitary engineering graduates who will follow the profession
1951	38,000	219	108
1952	26,000	150	74
1953	20,000	115	57
1954	17,000	98	48
Total	101,000	582	287

ber of sanitary engineering graduates per 1,000 engineering graduates during the last 31 years, we obtain an estimate of the number of sanitary engineering graduates that might be expected. An appraisal of the number of graduates who could be expected to devote a considerable proportion of their working lives to the profession can be obtained by applying to the last figure the 40-year mean "percent remaining in the profession." This percentage, since it covers a 40-year period, is an index of the proportion of the past sanitary engineering graduates who are spending a significant part of their working lives in sanitary engineering.

Assuming normal college enrollment rates, the Office of Education

estimates (*2*) that the total number of engineering graduates will remain at the 17,000 level until 1961. After that year the number of engineering graduates is expected to rise again.

Of the 838 sanitary engineering graduates in the 4-year period 1947-50, an estimated 540 entered the profession. Sanitary engineering appears to have arrived at just the age when losses due to retirement and deaths are becoming increasingly felt. These vacancies will have to be filled in addition to the needs created by the natural growth of the profession's activities in this country and by expanding responsibilities in the international field.

This discussion has been limited to men who have completed undergraduate sanitary engineering curricula or options. Many of these graduates have gone on to postgraduate courses in sanitary engineering, as have others who have had no undergraduate sanitary engineering education. Some who have had an education in other branches of engineering have successfully engaged in professional sanitary engineering work. All of these make up the group which represents the sanitary engineering profession today.

Summary

A quantitative study has been made of sanitary engineering graduates from undergraduate options and curricula in the United States. Those graduating in the 40-year period 1910-49 were considered. A 73.8-percent sample of those who graduated during that period was included in the study.

It was found that 51.5 percent of that group was active in the profession in 1950. A discussion of the more detailed statistical information is presented, and an estimate of future production is made.

ACKNOWLEDGMENTS

Thanks are due to those members of the engineering faculties of the universities and colleges who assisted in this study. Particular thanks are extended to Sanitary Engineer Director Arthur P. Miller, Public Health Service, under whose guidance this study was carried out.

REFERENCES

(*1*) Miller, Arthur P.: Graduates from undergraduate sanitary engineering courses in the United States. Pub. Health Rep. **66**: 369 (1951).

(*2*) Armsby, Henry H., Associate Chief for Engineering Education, Division of Higher Education, Office of Education, Federal Security Agency. Personal communication.

Education and Utilization of Sanitary Engineers

The second meeting of representative persons concerned with the education and utilization of sanitary engineers was held in Washington, D. C., April 8 and 9, 1951, under the sponsorship of the Division of Engineering Resources, Public Health Service. This group of 34 men—representing universities and colleges, Federal, State, interstate, and local health agencies, industry, and other interests—presented their views on subjects related to the sanitary engineer's education and his employment status. Agreement was reached on a number of topics as set forth below:

1. Information of value was revealed by the Public Health Service study on the rate of loss from the sanitary engineering profession of men educated in undergraduate sanitary engineering courses. To increase its usefulness, it is desirable that the Service try to determine:

(a) Whether or not similar data are available for other branches of engineering to permit comparison;

(b) The reasons behind this rate of loss among graduates from undergraduate work and conversely the incentives causing those who remain to enter the field and to stay in it;

(c) Similar data for those who have continued their education and have been awarded the master's or doctorate degree;

(d) The incentives impelling those not educated primarily in sanitary engineering to practice in the sanitary engineering field.

2. It is desirable that the Public Health Service make studies to determine:

(a) To what extent licensing as a professional engineer is required by Federal, State, and local merit systems as a prerequisite for employment in sanitary engineering jobs;

(b) The number of men employed by Federal, State, and local health departments who are licensed.

3. Endorsement was given to the principle stated at the January 1950 meeting [1] concerning the desirability of a study of the need for sanitary engineering personnel in all areas of work where engineering disciplines might contribute to the promotion of health. Particular emphasis was placed on the desirability of obtaining data on the abstract (ideal) need and the actual need.

4. Training and orientation of groups of engineers inducted into

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Report from the Division of Engineering Resources, Bureau of State Services, Public Health Service.

[1] Reprint No. 3004 from the Public Health Reports, March 17, 1950.

the Public Health Service in case of emergency should be conducted by the Public Health Service utilizing university and college facilities and staffs as may be needed and available. The representatives of the colleges and universities present at this meeting were of the opinion that this type of training for a small group, probably to be conducted as a short course of the vocational type for a specific assignment, would not be readily adaptable to the organized operation of a university.

At the close of the meeting, the following motion was unanimously approved:

That this group, which includes 24 members of the American Society of Civil Engineers, request the Executive Committee, Sanitary Engineering Division, American Society of Civil Engineers, to implement that portion of the January 1949 report of the Committee on the Advancement of Sanitary Engineering, which recommends the creation of a joint committee comprised of representatives from selected groups or societies to facilitate the advancement of sanitary engineering.

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 August 25, 1951

Poliomyelitis

The total cases of poliomyelitis reported for the current week in the Nation was 1,714 compared with the corresponding total of 1,725 for last week. Since the seasonal low week, 10,380 cases have been reported as compared with 10,513 for the same period in 1950. The cumulative total for the calendar year is 11,561, and for the calendar year 1950, the corresponding total was 11,624.

Of the 9 geographic divisions, 4 showed increases in total reported cases for the current week over the previous week, 4 showed decreases, and 1 showed no change. The Mountain Division increased to a total of 235 cases from 173 last week; the Pacific Division, to 161 cases from 130; the Middle Atlantic Division, to 187 from 174; and the South Atlantic Division, to 127 from 124. The East North Central Division decreased by 84 cases, to 392 from 476; and the West South Central decreased by 35 cases, to 193 from 228. The above data exclude Mississippi from which no report was received for the current week.

States reporting the largest numbers of cases were California, 133; Colorado, 114; New York, 109 (including New York City, 38); and Wisconsin, 107.

The following summary of poliomyelitis in Illinois has been received from Dr. L. M. Schuman:

A polio-like disease has appeared in at least two localities in Illinois—one in Williamson County, in the extreme southern part of the State, with 7 cases reported; and the other in Champaign County, in the east central part, where 85 cases have been reported through August 18. Our attention to this possibly different entity was drawn by the fact of disproportion between nonparalytic and paralytic cases.

In the small and localized outbreak in the southern part of the State, all were mild and nonparalytic, and but one additional case could definitely be called paralytic poliomyelitis. In Champaign County, with a population of 70,578, it is presumed that the incidence is confined to this single county, in view of the extremely few cases of

polio, or polio-like disease, in the contiguous counties. Seventy-seven epidemiological investigation reports have been received for the 85 cases reported, and of these 77 cases so far investigated, 69 are nonparalytic; 4 are spinal paralytic; 2 are bulbar; 1 is bulbo-spinal, and 1 is polioencephalitis. Thus, it may be seen that the nonparalytic cases constitute practically 90 percent of the total. The only fatality reported for either outbreak is the polioencephalitis case in Champaign County.

The disease is extremely mild, rather self-limited and of short duration. Symptoms are predominantly severe—headache, fever (of 101°–102°), nausea, vomiting, and stiff neck. This latter may be transient, as was noted in Williamson County, so that few spinal examinations could be made. However, in Champaign County, every reported case has had a spinal fluid examination and the cell counts have ranged between 20 and 150 cells.

Depending on the stage of the disease, the differentials on the cells have yielded pictures similar to that noted in poliomyelitis, that is, polymorphonuclear leucocytes very early in the disease and a preponderance of lymphocytes later. A few nonparalytic cases have had higher counts, in keeping with the broader ranges noted in poliomyelitis. Prodromata are either abrupt or of the dromedary type. Lymphocytic choriomeningitis or Coxsackie infection have been postulated, but the symptomatology and spinal fluid cellular response has not been typical for the former. Laboratory investigation is proceeding for isolation of the etiologic agent and includes virus studies on the stools and complement fixation tests on paired sera. It is surmised, at this time, that there is a probability of Coxsackie infection, but proof must await laboratory investigations.

Epidemiological Reports

Mushroom Poisoning

Six persons, from ages 11 to 76, became ill August 4 after eating mushrooms picked near a cabin in northern Minnesota. The mushrooms were served at a noon meal. Six persons ate mushrooms and developed symptoms late the same day. Two persons who did not eat mushrooms remained well. All of the patients were hospitalized, and two aged 74 and 76 died on August 7 and 8. Autopsy findings confirmed the diagnosis of musbroom poisoning.

Meningitis

The report of the investigation of suspected infectious encephalitis cases in Richmond, Va., late in July, indicates that they were acute fulminating meningitis. No virus agent has been isolated from any of the materials examined.

Tularemia

Dr. D. S. Fleming, Minnesota Department of Health, has reported four cases of tularemia in persons 11, 12, 14, and 22 years of age. Symptoms were stated to have developed 8 hours to 1 week after the persons were bitten by a young squirrel found in a park. Symptoms were headache, high fever, and swollen glands. Two patients continued having some complaints 3 to 4 weeks later. Treatment with penicillin, aureomycin, and chloromycetin was effective. Agglutination with *Pasteurella tularensis*, initially absent, was demonstrated in blood from 2 to 3 weeks after the biting, to titers of 1:160 in two cases, 1:320 in one case, and 1:640 in one case.

Disease of Unknown Etiology

Dr. B. F. Hamilton, Missouri Director of Health, has reported the occurrence of a disease in Newton County during the past month in which the predominant symptoms are fever, headache, multiple minute throat lesions, and nonsuppurative conjunctivitis sometimes unilateral. Twenty-five cases are known to have occurred, mostly in children. The course of the disease in families suggests that the incubation period is about 1 week. Adenopathy is reported not to be marked, but one child had 56 percent lymphocytes on differential blood count. The disease has not been influenced by therapy.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1946–50	Seasonal low week	Cumulative total since seasonal low week		5-year median 1945–46 through 1949–50	Cumulative total for calendar year—		5-year median 1946–50
	Aug. 25, 1951	Aug. 26, 1950			1950–51	1949–50		1951	1950	
Anthrax (062)	1			[1]	[1]	[1]	[1]	46	29	34
Diphtheria (055)	65	76	145	27th	328	463	842	2,336	3,591	5,452
Encephalitis, acute infectious (082)	28	18	21	[1]	[1]	[1]	[1]	660	534	407
Influenza (480–483)	329	282	296	30th	1,065	1,389	1,244	117,120	140,153	129,820
Measles (085)	1,110	826	737	35th	[2]496,581	306,600	585,484	[2]467,880	287,470	550,538
Meningitis, meningococcal (057.0)	48	38	42	37th	3,880	3,594	3,496	2,919	2,681	2,524
Pneumonia (490–493)	357	673	[3]	[1]	[1]	[1]	[1]	46,424	61,362	[3]
Poliomyelitis, acute (080)	1,714	1,617	1,617	11th	10,622	10,707	10,707	11,834	11,838	11,155
Rocky Mountain spotted fever (104)	12	21	27	[1]	[1]	[1]	[1]	[4]265	369	434
Scarlet fever (050) [5]	259	263	341	32d	519	502	683	53,905	40,672	58,110
Smallpox (084)	1			35th	19	46	71	11	26	50
Tularemia (059)	9	21	21	[1]	[1]	[1]	[1]	[6]455	663	686
Typhoid and paratyphoid fever (040, 041) [7]	93	121	121	11th	1,409	1,725	1,895	1,844	2,235	2,380
Whooping cough (056)	991	1,918	1,789	39th	[8]70,346	109,859	92,350	[8]48,744	88,323	66,332

[1] Not computed.
[2] Addition: Utah, week ended Aug. 18, 18 cases.
[3] Data not available.
[4] Deduction: Arkansas, week ended May 19, 1 case.
[5] Including cases reported as streptococcal sore throat.
[6] Addition: Arkansas, week ended May 19, 1 case.
[7] Including cases reported as salmonellosis.
[8] Addition: Michigan, week ended Aug. 18, 9 cases.

NOTE.—Data exclude figures for Mississippi for week ended Aug. 25, from which no report was received.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Aug. 25, 1951

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**65**	**28**	**329**	**1,110**	**48**	**357**	**1,714**
New England	**1**	**1**		**148**	**3**	**17**	**56**
Maine				29			4
New Hampshire				7		1	3
Vermont				10			5
Massachusetts	1	1		82	1		21
Rhode Island				7		1	3
Connecticut				13	2	15	20
Middle Atlantic	**6**	**4**		**306**	**12**	**52**	**187**
New York	5	3	(1)	170	7		109
New Jersey		1		88	3	34	32
Pennsylvania	1			48	2	18	46
East North Central	**5**	**6**	**27**	**231**	**1**	**39**	**392**
Ohio	2	1		60			83
Indiana	1		27	4		3	27
Illinois		2		53		19	90
Michigan	2	3		35		17	85
Wisconsin				79	1		107
West North Central	**5**	**3**	**8**	**38**	**6**	**17**	**242**
Minnesota	2			6	1	5	43
Iowa				2	2		38
Missouri	2	1	1	8			55
North Dakota		1	3	11	1	6	7
South Dakota		1		1			4
Nebraska	1			1			32
Kansas			4	9	2	6	63
South Atlantic	**14**	**1**	**112**	**109**	**7**	**38**	**127**
Delaware							
Maryland		1		66	2	10	5
District of Columbia			1	4		9	14
Virginia	1		99	15		15	10
West Virginia				7	1		12
North Carolina	6			1	1		15
South Carolina	4		1	1	1		11
Georgia	2		11	2		4	47
Florida	1			13	2		13
East South Central	**12**	**10**		**13**	**6**	**3**	**121**
Kentucky	1				2		31
Tennessee	5			8	1		36
Alabama	6	10		5	3	3	54
Mississippi [2]							
West South Central	**18**		**56**	**61**	**6**	**136**	**193**
Arkansas	2		27	7		20	36
Louisiana	1		1	1		12	39
Oklahoma	2		28	2		14	34
Texas	13			51	6	90	84
Mountain	**2**		**94**	**48**		**26**	**235**
Montana	1		12	16			6
Idaho	1			3			7
Wyoming				3			15
Colorado			2			11	114
New Mexico				1		4	14
Arizona			80	10		11	25
Utah				15			53
Nevada							1
Pacific	**2**	**3**	**32**	**156**	**7**	**29**	**161**
Washington			5	27			17
Oregon			23	6	1	4	11
California	2	3	4	123	6	25	133
Alaska							1
Hawaii				24			

[1] New York City only. [2] Report from Mississippi was not received.

Anthrax: New Jersey, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Aug. 25, 1951—Continued

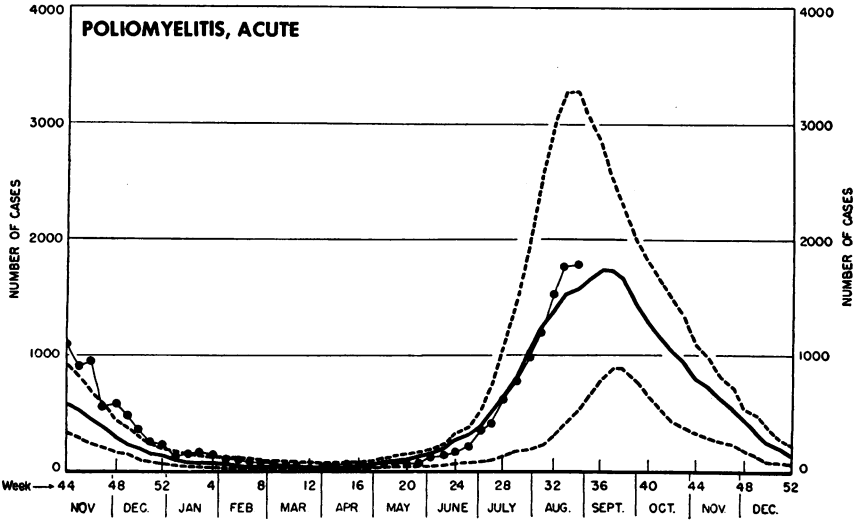
[Numbers under diseases are International List numbers, 1948 revision]

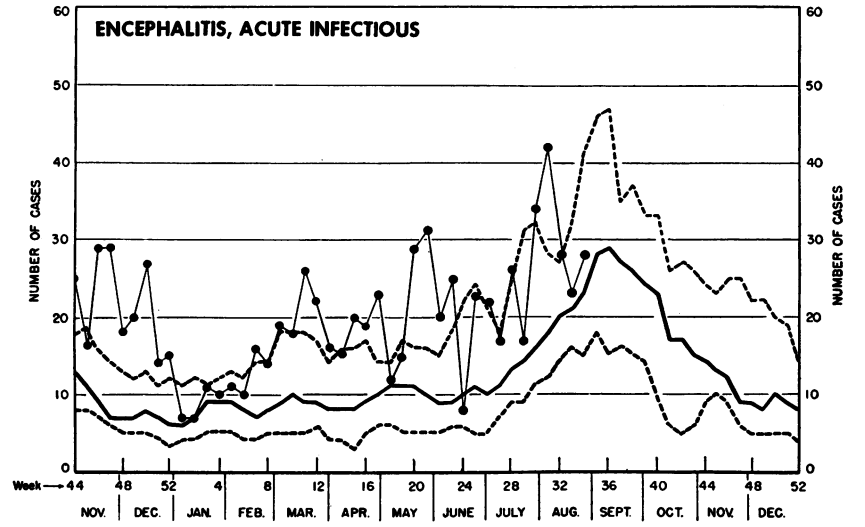
Area	Rocky Mountain spotted fever (104)	Scarlet fever [1] (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [2] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**12**	**259**	**1**	**9**	**93**	**991**	**102**
New England		**22**				**33**	
Maine						12	
New Hampshire		8				2	
Vermont		4				1	
Massachusetts		8				15	
Rhode Island							
Connecticut		2				3	
Middle Atlantic	**1**	**46**			**13**	**173**	**25**
New York		27			4	72	14
New Jersey		8			2	50	
Pennsylvania	1	11			7	51	11
East North Central	**1**	**69**		**2**	**11**	**176**	**9**
Ohio		28			3	42	1
Indiana		6			3	36	4
Illinois	1	8		2	2	23	
Michigan		11			1	40	1
Wisconsin		16			2	35	3
West North Central		**17**		**1**	**4**	**77**	**12**
Minnesota		3			1	4	4
Iowa		2			1	11	4
Missouri		3			1	34	2
North Dakota				1			
South Dakota		2					
Nebraska		1				6	2
Kansas		6			1	22	
South Atlantic	**8**	**25**		**1**	**19**	**134**	**17**
Delaware		1					
Maryland	1	3				5	
District of Columbia	1					2	
Virginia	2	5		1	2	25	10
West Virginia					2	51	
North Carolina	3	11			3	30	
South Carolina	1	2			5		5
Georgia		2			4	14	2
Florida		1			3	7	
East South Central	**1**	**13**			**6**	**66**	**24**
Kentucky		2			2	19	12
Tennessee	1	7			1	37	6
Alabama		4			3	10	6
Mississippi [3]							
West South Central	**1**	**10**		**2**	**22**	**185**	**15**
Arkansas		2		1	2	12	1
Louisiana		4			10	1	
Oklahoma	1	1		1	2	4	3
Texas		3			8	168	11
Mountain		**3**	**1**	**3**	**2**	**60**	
Montana		1		2		1	
Idaho		1				10	
Wyoming		1				8	
Colorado					1	11	
New Mexico					1	13	
Arizona						14	
Utah						3	
Nevada			1	1			
Pacific		**54**			**16**	**87**	
Washington		3			1	14	
Oregon		1				2	
California		50			15	71	
Alaska						3	
Hawaii							

[1] Including cases reported as streptococcal sore throat.
[2] Including cases reported as salmonellosis.
[3] Report from Mississippi was not received.
Rabies in man: Indiana, 1 case.

Communicable Disease Charts

All reporting States, November 1950 through August 25, 1951





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the preceding 5 years. The solid line is a median figure for the preceding 5 years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported weekly, 1950–51.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Aug. 11, 1951

Disease	Total	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Brucellosis	5					3	2				
Chickenpox	211	4		3		35	88	12	4	44	21
Diphtheria	1										1
Dysentery, bacillary	20					3		7			10
German measles	73			9		18	13	2	14	9	8
Influenza	27			5			17	3			2
Measles	334	17		17	2	53	53	15	25	82	70
Meningitis, meningococcal	2						1	1			
Mumps	135	3		1		27	40	3	17	10	34
Poliomyelitis	157			8	2	29	103		10	2	3
Scarlet fever	73	3				12	13	11	8	6	20
Tuberculosis (all forms)	212	15			11	60	18	16	12	35	45
Typhoid and paratyphoid fever	6				2	4					
Venereal diseases:											
Gonorrhea	316	8		5	14	79	45	22	18	43	82
Syphilis	63	2			4	30	10	3	4	4	6
Primary	4	1			1	1			1		
Secondary	1									1	
Other	58	1			3	29	10	3	3	3	6
Other forms	1					1					
Whooping cough	117			2	1	43	43	7	7	6	8

NORWAY

Reported Cases of Certain Diseases—June 1951

Disease	Cases	Disease	Cases
Diphtheria	6	Poliomyelitis	40
Dysentery, unspecified	4	Rheumatic fever	94
Encephalitis, infectious	1	Scabies	463
Erysipelas	317	Scarlet fever	94
Gastroenteritis	3,917	Tuberculosis (all forms)	357
Hepatitis, infectious	63	Typhoid fever	5
Impetigo contagiosa	1,277	Venereal diseases:	
Influenza	1,672	Gonorrhea	165
Malaria	2	Syphilis	51
Measles	2,197	Other forms	2
Meningitis, meningococcal	8	Weils disease	1
Mumps	102	Whooping cough	1,880
Pneumonia (all forms)	2,370		

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

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.

Plague

Yemen. A total of 13 cases of plague was reported August 1–10, in the rural area of Khawlan. Of the total, 1 case was pneumonic type and 12 cases were bubonic type.

Smallpox

French West Africa. For the period August 1–10, 13 cases and no deaths from smallpox were reported in the Upper Volta.

Ivory Coast. For the period July 1–10, 3 cases of smallpox were reported.

Burma. For the period August 12–18, 8 cases of smallpox were reported from Mergui and 1 case from Rangoon.

India. For the period July 12–18, a total of 34 cases and 2 deaths were reported as follows: Madras 15, Calcutta 8, Bombay 6, Tiruchirappalli 3, Cochin 2 deaths, Tellicherry 1, and Visalshapatnam 1.

Indonesia. For the period July 29–August 4, 24 cases of smallpox were reported as follows: Samarinda 14, Balikpapan 3, Bandjarmasin 2. For the period August 5–11, 5 cases were reported in Surabaya.

French Niger. For the period August 1–10, 30 cases of smallpox were reported.

Indochina. For the period August 12–18, smallpox cases were reported in Viet Nam as follows: Hanoi 31, Nam-Dinh 13, Haiphong 5, and Saigon 1.

Yellow Fever

Costa Rica. Three new cases of jungle yellow fever with two deaths have been officially reported. Numerous dead or dying monkeys in the jungle along the east coast indicate extension of the disease.

Colombia. Three fatal cases of yellow fever confirmed by histological examination have been reported from Colombia. One case occurred in each of three Provinces: Boyaca, Santander, and Caqueta. The three deaths occurred between July 6 and 10.

Gold Coast. For July 26, one case of yellow fever was reported from Dunkwa. The patient was an African male, not inoculated, and is the first case reported from the area.