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QUARANTINE REGULATIONS OF AIRSHIPS AGAINST YELLOW FEVER

REPORT OF THE PRESIDENT OF THE COMMISSION ON YELLOW FEVER AT THE MEETING OF THE PERMANENT COMMITTEE OF THE INTERNATIONAL OFFICE OF PUBLIC HYGIENE, MAY, 1930

[Translation]

In the course of the present session of the committee, the Commission on Yellow Fever has held three sittings, the first of which took place on Saturday, May 10, and the second on Monday, May 12. There were present at these two sittings Messrs. Lutrario (reporter of the Commission on Aerial Navigation), Inspector General Lasnet, General Boyé, Major General Graham, Dr. Rupert Blue, Ricardo Jorge, de Vogel, Doctor Van Campenhout (reporter), and James (president).

In order to reply to the request for information by the Commission on Aerial Navigation, the first task of our committee has been to examine into what sanitary measures could be applied to aerial navigation as it relates to yellow fever. In this examination we have utilized the report of Doctor Van Campenhout which was communicated at the last session of the committee, and the epidemiological conclusions that our commission formulated at the time of the last session, as well as some results of recent researches which have permitted the imposition of effective measures to prevent the spread of yellow fever. Unhappily, in trying to draw up a program of aerial regulation based on this document, we have found ourselves face to face with great difficulties. At first, by reason of the lack of a member representing South America, we were constrained to examine the subject principally from the point of view of the relations with Central Africa and the Belgian Congo. This limitation is all the more regrettable since we have learned, in the course of our work, that there has been established in South America along a coastal route across the yellow fever regions, a hydroplane service, for which there are points of departure and landing only on the sea. With regard to this information one asks how the regulations relative to aerodromes can be applied to the air ports of this service. Another difficulty is that, up to the present time, we have no satisfactory data on the habits of mosquitoes in respect to airplanes, airships, and hydroplanes. The question of the transportation of adult mosquitoes aboard vessels was fully discussed in the International Sanitary Conferences of 1912 and 1926. As a result of these conferences it is admitted that all the

more recent experiences tend to show that the transportation of adult mosquitoes aboard a vessel is extremely rare. As to their transport aboard airplanes and other aircraft, we know nothing; but, in spite of that, there are some hygienists who insist that there is real danger. Besides, we have found ourselves in the face of a third difficulty. We know that it is doubtful whether we can base proposals for quarantine measures against yellow fever on recent laboratory researches in monkeys. Considering the errors which have followed the acceptance of *Leptospira icteroides* as the specific germ of yellow fever, as well as the inconclusive and variable results of the recent laboratory researches on monkeys, our commission is persuaded that, important as the results of late researches appear to be, the data derived from epidemiological experience with the disease in man, such as is produced in nature, merits much more consideration in respect to prophylactic measures of practical order.

For all of these reasons we believe that it is perhaps premature to seek to formulate articles for an aerial convention applicable to yellow fever.

Nevertheless, being informed of the fact that the Commission on Aerial Navigation has urged us to prepare a rough draft, our commission has attempted to do the best it could. In consequence, the articles of our provisional program, which concerns only the airships having their points of landing on the ground, are included in the tentative plan set forth in the reports of the Quarantine Commission on Aerial Navigation. With regard to certain of these articles relating to the organization of aerodromes, the opinion of the members of the commission was unanimous. With regard to others, there were, on the contrary, wide divergences. In particular, there was discussed at length the article which imposes on passengers starting out from an infected area a period of observation of six days before embarkation and a supplementary period of surveillance of six days after arrival. With regard to this subject the majority of the members of the commission were in favor of the propositions which we have submitted to you.

The commission met the third time on Wednesday, May 14. Attending this meeting were Inspector General Lasnet, General Boyé, General Graham, Ricardo Jorge, de Vogel, Doctor Mimbela, Doctor Van Campenhout (reporter), and James (president.) The purpose of this meeting was to examine the proposal submitted to the committee to modify article 36 (2) of the International Sanitary Convention of 1926, by reducing from five days to three days the period during which a person sick with yellow fever is considered infectious.

With regard to this matter it will be recalled that, in the International Sanitary Convention of 1911–12, it was accepted as an established fact that all of the experiences have tended to show that the period of infectivity does not extend beyond three days (p. 295, P. V.

Conf., 1911–12). However, the conference of 1926 extended this period to five days on the suggestion of Doctor Chagas, who said that Noguchi had isolated the *Leptospira icteroides* from the peripheral blood of certain cases up to the fifth day (p. 477, P. V. Conf., 1926). As we know to-day that the *Leptospira icteroides* is not the specific germ of yellow fever, it appears necessary to return to the fundamental basis of our epidemiological knowledge, which teaches that there exists no known example of mosquitoes being infected following a human feeding made after the third day of the sickness.

The opinion of the commission was unanimous on this point; but it thought that it could not propose a modification of the text of the convention unless the delegates from South America were given opportunity to express their opinion on this point. It was then decided to refer the question to the next session, hoping that the delegates from South American countries would be present in greater number at that session, or that they would be able in the meantime to arrange to give assent by correspondence. However, in the program of provisions concerning aerial navigation, which is presented to you, the commission holds to three days as the limitation of the period during which a person sick with yellow fever should be isolated.

ACUTE RESPONSE OF GUINEA PIGS TO VAPORS OF SOME NEW COMMERCIAL ORGANIC COMPOUNDS

III. "CELLOSOLVE" (MONO-ETHYL ETHER OF ETHYLENE GLYCOL)*

By C. P. WAITE, *Assistant Surgeon*,[1] F. A. PATTY, *Assistant Physiological Chemist*, and W. P. YANT, *Supervising Chemist, Health Laboratory Section, Pittsburgh Experiment Station, Bureau of Mines*

This report on the acute response of guinea pigs to Cellosolve (mono-ethyl ether of ethylene glycol) vapor is the third of a series of similar reports which deal with studies pertinent to evaluation of the hazards involved in exposure to some chemical products which have recently reached, or promise to reach, important domestic and industrial use. The investigation was undertaken at the request of the Carbide & Carbon Chemicals Corporation, and was conducted jointly with the United States Bureau of Mines at its Pittsburgh Experiment Station. The first report of the series dealt with exposure to ethylene dichloride vapor [2] and the second with exposure to ethyl benzene vapor.[3]

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*Published by permission of the Director, U. S. Bureau of Mines. Submitted for publication March 28, 1930.

[1] Assistant Surgeon, United States Public Health Service, detailed to the Bureau of Mines.

[2] Sayers, R. R., Yant, W. P., Waite, C. P., and Patty, F. A.: Acute response of guinea pigs to vapors of some new commercial organic compounds: I. Ethylene dichloride. Pub. Health Rep., vol. 45, No. 5, Jan. 31, 1930.

[3] Yant, W. P., Schrenk, H. H., Waite, C. P., and Patty, F. A.: Acute response of guinea pigs to vapors of some new commercial organic compounds: II. Ethyl benzene. Pub. Health Rep., vol. 45, No. 22, May 30, 1930.

PRESENT USE OF CELLOSOLVE

Cellosolve is principally used as a solvent for nitrocellulose and resins in the manufacture of lacquers and lacquer thinners. It has a particular use in making the so-called odorless lacquers which are desirable for household and architectural purposes, and in industry for leather finishes, lacquers for refrigerators, kitchen cabinets, and similar articles.

SCOPE OF WORK

The scope of the work included a study of the toxicity of Cellosolve and the physiological response to its vapors as determined by exposure of guinea pigs. Only the acute effects as produced by a single exposure were studied. The experiments were planned to give information relative to the concentrations and periods of exposure which produce but slight response, moderate response, and serious response.

DESCRIPTION OF MATERIAL USED FOR TESTS

Cellosolve is the trade name for the mono-ethyl ether of ethylene glycol ($CH_2OH \cdot CH_2OC_2H_5$). The pure liquid compound has a boiling point of 134.8° C.; specific gravity, 0.9305 at 20/20; flash point, 40° C.; and vapor pressure, 4.6 mm. Hg. at 20° C. The vapors are approximately three times heavier than air. Cellosolve is completely miscible with water; it is colorless, and possesses a mild, rather agreeable, ethereal odor in low concentrations and a disagreeable odor in high concentrations.

The Cellosolve used in the tests described in this report was a commercial product which conformed to the following plant specifications:

Specific gravity: 0.927 to 0.933 at 20/20° C.
Initial boiling point: Not less than 128° C. at 760 mm.
Boiling range: Not less than 95 per cent distills over from 130° to 136° C. at 760 mm.
Dry point: Not higher than 137° C. at 760 mm.
Acidity: A 50 c. c. sample shall not contain more than the equivalent of 0.3 c. c. normal acid or alkali.
Volatile chlorides: Not more than 0.01 per cent.

TEST APPARATUS, TEST PROCEDURE, DESCRIPTION, AND CARE OF ANIMALS

The test apparatus, test procedure, and description and care of animals were the same as described in the previous report dealing with ethylene dichloride.[4] The composition of the atmosphere was determined by calculation from the quantity of material vaporized

[4] See footnote 2.

and quantity of air used for diluting the vapor. The calculated concentrations in air were checked by absorption of the vapor from a given volume of vapor-air mixture with air-equilibrated activated charcoal and determining the gain in weight.

RESULTS OF TESTS

The detailed test data are too voluminous to be presented in this report; accordingly, only summarized results pertinent to symptoms, gross pathology, and fatality are given. Specimens of tissue were taken for microscopic examination, a report of which will be made later.

SYMPTOMS OF ANIMALS

Control animals.—The control and stock animals showed no unnatural behavior. Neither symptoms nor death occurred in 8 days following exposure for 16 and 24 hours to test conditions, lacking Cellosolve vapor.

Exposed animals.—The symptoms exhibited by the exposed animals were inactivity, weakness, dyspnea, and death. Exposure to 0.6 per cent vapor for 8 hours caused death to 1 animal 2 days after exposure. Exposure to 0.6 per cent vapors for 24 hours caused the deaths of 4 animals of a group of 6 during the test. The two animals remaining appeared to be weak, were inactive, and one showed dyspnea. One of these was killed immediately after test for autopsy and the remaining one died three hours later. Exposure to 0.3 per cent for 16 and 24 hours and 0.6 per cent for 8 hours caused the animals to remain quiet and inactive toward the end of the test period. The exposure to 0.3 per cent vapors for 16 hours caused the death of 1 animal of a group of 6 in 8 days after test; and 24 hours exposure to 0.3 per cent caused the death of 5 of a group of 6 within 24 hours after test. The remaining animal died three days later.

Exposure to 0.1 per cent vapor for 16 and 24 hours caused the death of 1 animal of each group in 3 days and 2 days, respectively, following the exposure.

Exposure to 0.6 per cent vapors for 1 hour and 4 hours, 0.3 per cent for 4 hours and 8 hours, and 0.05 per cent for 16 hours and 24 hours, caused no symptoms and no deaths.

SYMPTOMS OF MEN EXPOSED TO CELLOSOLVE VAPOR

Two of the investigators breathed 0.6 per cent Cellosolve vapors for a few seconds and reported the atmosphere to be irritating to the eyes and to have a very disagreeable odor. They thought that the odor and the irritation were sufficiently disagreeable to make one desire to avoid a like exposure.

GROSS PATHOLOGY

Control animals.—Nineteen control animals were killed for autopsy. No pathological changes were found to resemble those encountered in the test animals.

Exposed animals.—Exposure to 0.6 per cent for 24 hours caused the death of 4 of the group of 6 animals during exposure. One of the remaining animals died three hours after exposure. The principal findings were congestion and edema of the lungs. The stomach was distended, with numerous reddish-brown petechiæ, resembling petechial hemorrhages, over the mucous membrane, and a reddish-brown discoloration of the contents. The kidneys were congested.

Exposure to 0.3 per cent for 24 hours caused the death of 5 of the group of 6 pigs, 24 hours after the exposure. The prominent lesion was an acute congestion and edema of the lungs and a hyperemia of the kidneys. The congestion and edema gave place to a bronchopneumonia in the remaining member of the group that died three days following exposure.

The findings in animals exposed to 0.6 per cent for 8 hours, 0.3 per cent for 16 hours, 0.10 per cent for 16 hours and 24 hours, all of which caused death to 1 animal of each group within 8 days after test, were an acute congestion and edema of the lungs with a congestion of the kidneys. Animals of these groups that were killed immediately after test showed congestion and edema of the lungs. Autopsy made on 2 pigs immediately after exposure to 0.3 per cent vapors for 16 hours revealed the stomach to be dilated. The lining mucous membrane showed a number of brownish-red petechiæ scattered throughout resembling points of hemorrhage. The congestion of the lungs was considerably less 8 days after exposure to 0.1 per cent for 16 hours and 24 hours; in the other exposures the congestion was still present and quite noticeable after 8 days.

The prominent finding in animals which were exposed to 0.6 per cent vapors for 4 hours, and 0.3 per cent for 8 hours, none of which caused death during or following exposure, was an apparent parenchymatous change noted in the kidneys of those pigs which were killed 4 days after exposure. Animals autopsied 8 days following exposures were negative for pathology.

Guinea pigs exposed to 0.6 per cent vapors for 1 hour, 0.3 per cent for 4 hours, and 0.05 per cent for 16 hours showed no pathological changes on autopsy immediately after test or within 8 days.

DISCUSSION OF PATHOLOGY

The gross pathological changes encountered in guinea pigs exposed to Cellosolve vapor-air mixtures were chiefly those resulting from lung irritation.

In the light of only gross findings and the occurrence of hemorrhage into the stomach in only two groups of animals the explanation of its

occurrence is difficult. It should be noted, however, that this condition was not found in any of the control animals. Similar findings in the small intestine and stomach have already been reported to be caused by exposure to methyl chloride.[5 6]

The kidney changes noted in two of the groups were apparently of a secondary and temporary nature, inasmuch as they were found only in those pigs which were killed 4 days following exposure.

SUMMARY OF FATALITY AND RESPONSE

A summary of the fatality and response of guinea pigs exposed to Cellosolve vapor in air is shown graphically in Figure 1 and given in

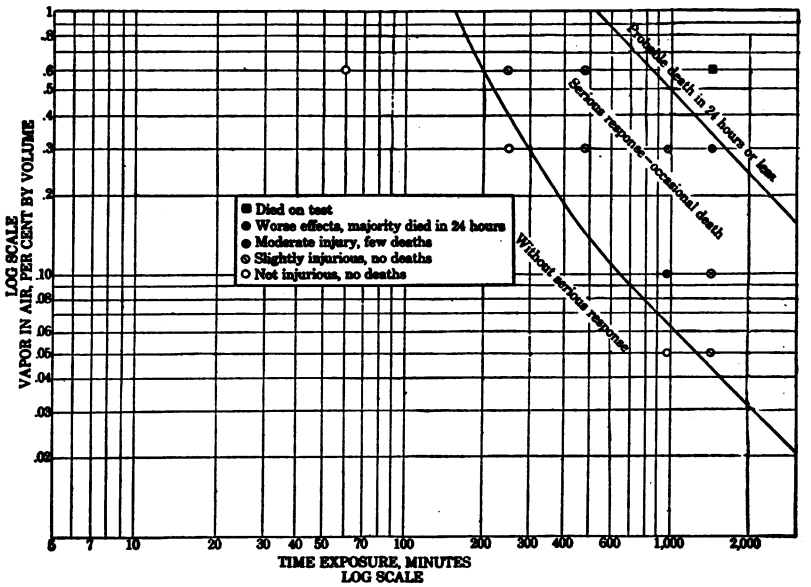

FIGURE 1.—Acute effects of exposure of guinea pigs to Cellosolve vapor in air

four conventional degrees in Table 1. Each point on the graph represents the average response of a group of animals simultaneously exposed to a particular test condition.

Table 1 gives four conventional degrees of response usually reported in the literature, and may be used for comparison with toxicological data for other compounds.[7 8 9 10]

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[5] Sayers, R. R., Yant, W. P., Thomas, B. G. H., and Berger, L. B.: Physiological response attending exposure to vapors of methyl bromide, methyl chloride, ethyl bromide, and ethyl chloride. Public Health Bulletin No. 185 (1929), 56 pp.

[6] Kegel, A. H., McNally, W. D., and Pope, A. S.: Methyl chloride poisoning from domestic refrigerators. Jour. Amer. Med. Assn., vol. 93 (1929), pp. 353-358.

[7] See footnotes 2, 3, and 5.

[8] International Critical Tables, first edition (1927), vol. 2, p. 318. Also see errata sheet, vol. 2.

[9] Henderson, Y., and Haggard, H. W.: Noxious Gases. American Chemical Society Monograph No. 35, 1927, Chemical Catalog Co., New York.

[10] Fieldner, A. C., Katz, S. H., and Kinney, S. P.: Gas masks for gases met in fighting fires. U. S. Bureau of Mines Tech. Paper No. 248, 1921, 56 pp.

TABLE 1.—*Acute effects of exposure of guinea pigs to Cellosolve vapor*

Kills in a very short time	Dangerous in 30 to 60 minutes	Maximum amount for 60 minutes without serious disturbances	Slight symptoms after several hours or maximum amount without serious disturbances
(*)	(*)	(*)	0.1

* No effect from 0.6 per cent, which is the amount present in saturated air at room temperatures.

Because of its comparatively low vapor pressure, the highest concentration of Cellosolve vapor that could be obtained at room temperature, 20° C., was 0.6 per cent by volume. Only slight response was noted after approximately three hours' exposure to this condition. An occasional death, however, occurred after about eight hours' exposure. It required 24 hours' continuous exposure to saturated air to kill the animals during exposure and a similar period to half-saturated air to kill all of a group in 24 hours after exposure. It should be noted that the maximum periods of exposure used for experiments with Cellosolve are much longer than those used in the previously published work with ethylene dichloride and ethyl benzene (references cited). It was necessary to extend the periods of exposure to obtain lethal conditions. These did not occur with exposure of six to eight hours to air saturated with Cellosolve vapor at room temperature.

RELATION OF SYMPTOMS TO FATALITY FOLLOWING EXPOSURE

It has been stated under description of symptoms that the only symptoms noted were inactivity, weakness, and dyspnea. These occurred only after prolonged exposure to high concentrations of vapor. Death either during or following exposure, however, invariably accompanied the symptoms. The dyspnea was particularly indicative of congestion and edema of the lungs.

GENERAL DISCUSSION OF HEALTH HAZARDS AND WARNING PROPERTIES

A comparison of the toxicity data obtained for Cellosolve with the data reported in the literature for other common compounds [11] can be made only for the degree of response referred to as "slight symptoms after several hours or maximum amount without serious disturbances." In this respect it appears to have a relative toxicity of approximately the same order as carbon tetrachloride and benzene, when considering acute poisoning. As previously stated, the vapor pressure of Cellosolve at room temperature made it impossible to obtain concentrations that would yield data within the time range of

[11] See footnotes 5, 8, 9, and 10.

the other three conventional degrees of response given in Table 1 of this report. Also, the comparatively low vapor pressure lessens its potential health hazards. If, however, Cellosolve is used at elevated temperatures such as in drying ovens, higher concentrations may be encountered.

Air saturated at room temperatures with Cellosolve vapor possesses a disagreeable odor and also produces moderate eye irritation. If these properties are heeded as warning of the occurrence of a potentially dangerous atmosphere, and exposure is avoided, it is believed that acute poisoning will not occur.

The investigation described in this report pertains to the effects of a single exposure, and the results do not apply to the possible effects of repeated exposure. Although no indications were observed that suggested the possibility of chronic Cellosolve poisoning, nevertheless in the use of new substances of this kind it is always recommended that in so far as possible (1) exposure should be reduced to a minimum and (2) unavoidably exposed workmen should be regularly given complete physical examinations. Nearly all organic vapors are toxic and present potential health hazards, and much remains to be learned about the effects of repeated exposure to relatively small amounts.

SUMMARY AND CONCLUSIONS

The acute physiological response of guinea pigs to air containing Cellosolve (mono-ethyl ether of ethylene glycol) vapor was determined. The concentration of vapor and periods of exposure ranged from those which produced death to those which caused no apparent effect after 24 hours' exposure. The symptoms, gross pathology, and fatality are given, together with a discussion of potential health hazards.

1. The symptoms exhibited after 18 to 24 hours' exposure to air saturated with Cellosolve vapor (0.6 per cent by volume) were inactivity, weakness, dyspnea, and death. Exposure to 0.6 per cent for 24 hours caused death at the end of the exposure; 0.3 per cent for 24 hours caused death in 24 hours following exposure; and exposure to 0.6 per cent for 10 hours, 0.3 and 0.1 for 18 hours, caused occasional death in from 1 to 8 days following exposure. Exposure to 0.6 per cent for 1 hour, 0.3 for 4 hours, and 0.05 for 14 hours caused no apparent harm.

2. The principal gross pathological findings were congestion and edema of the lungs; distention of the stomach, with numerous reddish-brown petechiæ scattered over the mucous membrane; and congestion of the kidney. The contents of the stomach were also discolored reddish brown. All these occurred in the animals that died during or soon after exposure. The congestion and edema were the

principal findings in the animals that died 24 hours following exposure and broncho-pneumonia in the animals that died three days following.

3. Due to comparatively low vapor pressure of Cellosolve it is not possible to create atmospheres at ordinary room temperatures which will produce serious acute poisoning in an hour.

4. Air saturated with Cellosolve vapor at room temperatures produces a disagreeable odor and produces moderate eye irritation. If these properties are heeded as warning of the occurrence of a potentially dangerous atmosphere it is believed that acute poisoning will not occur.

ACKNOWLEDGMENTS

The writers desire to give acknowledgment to J. G. Davidson, manager of chemical sales of the Carbide & Carbon Chemicals Corporation; to E. W. Reid, senior fellow of the firm's fellowship at the Mellon Institute, Pittsburgh, Pa., for sponsoring the investigation; to R. R. Sayers, chief surgeon, Bureau of Mines, for suggestions and advice; and to H. F. Brubach, laboratory assistant, for assistance in performing the experimental work.

A QUANTITATIVE COLORIMETRIC REACTION FOR THE ERGOT ALKALOIDS AND ITS APPLICATION IN THE CHEMICAL STANDARDIZATION OF ERGOT PREPARATIONS

By MAURICE I. SMITH, *Senior Pharmacologist, Hygienic Laboratory, United States Public Health Service*

The fluid extract of ergot, which is the United States Pharmacopœia official preparation of the crude drug used therapeutically, is a complex mixture of variable composition, containing alkaloids, proteinogenous amines, organic and inorganic salts, etc. The known pharmacologically active constituents are the alkaloids, certain sympathomimetic and other amines such as tyramin, histamine, isoamylamine, and certain other bases such as acetyl choline.[1]

While it is not yet certain as to the rôle of the various amines and bases in the therapeutic use of ergot, it is very doubtful whether any of the ergot constituents other than the alkaloids serve any useful purpose in the oral administration of the drug, for even the most active known amines and bases contained in ergot are either not absorbed from the intestinal tract or are so rapidly destroyed there that no demonstrable pharmacologic effects can be ascribed to them.

Of the alkaloids that have been isolated from ergot and which are in great measure if not wholly responsible for the pharmacologic and therapeutic action of this drug, the following are known:

[1] For an excellent review of this subject the reader is referred to an article by Barger (1).

1. Ergotoxine $C_{35}H_{41}N_5O_6$ isolated by Barger, Carr, and Dale (2), (3), and subsequently shown by Dale and Spiro (4) to be pharmacologically identical with the more recently isolated alkaloid ergotamine.

2. Ergotamine $C_{33}H_{35}N_5O_5$ isolated by Stoll (5) and studied pharmacologically by Spiro and Stoll (6) and Stoll and Rothlin (7).

3. Ergotaminine, an isomer of ergotamine, also isolated by Stoll and shown by Rothlin (8) to be physiologically inactive, or only slightly so.

4. Ergotinine crystalline $C_{35}H_{39}N_5O_5$ isolated by Tanret in 1875 (9). This is a dehydration product of ergotoxine, differing from it by one molecule of water and said to be physiologically inactive (8) or only one-fourth as active as ergotoxine (10). It appears to be readily convertible to the more active amorphous ergotinine.

5. Ergotinine amorphous of Tanret (9) $C_{35}H_{41}N_5O_6$, which, according to Barger and Dale (10), appears to be an impure mixture of ergotinine and erogtoxine and physiologically similar to the ergotoxine of Barger and Carr (2).

It is not at all surprising, therefore, in view of the chemical complexity of ergot and its preparations, that chemical standardization of the drug should have been looked upon with disfavor and that more difficult pharmacologic methods have been resorted to. For many years the cockscomb method of assay, first suggested by Kobert (11) and in 1911 described by Edmunds and Hale (12), has been used in this country. This is now the official method of the United States Pharmacopœia for the standardization of ergot. Though generally held to be specific for the ergot alkaloids, this method has not been found uniformly satisfactory, on account of lack in accuracy. Thus Barger and Dale (10), Schegg (13), Issekutz and Leinzinger (14), Braun (15), and Broom and Clark (16) assert that the cockscomb method, though satisfactory as a qualitative test, is not sufficiently accurate and therefore unsuitable for the quantitative assay of ergot or its alkaloids. This has also been the experience of the present writer, a matter which will be discussed more fully in a subsequent publication. Broom and Clark (16) have indeed proposed a different biological method for the standardization of ergot, more difficult and more time-consuming, but more accurate. This is based upon the well-known pharmacologic action of antagonism of epinephrine and the ergot alkaloids upon the augmentor sympathetic nerve supply to smooth muscle. It should be added that both methods aim at measuring the alkaloidal content of ergot preparations.

With the increasing accumulation, in recent years, of evidence of the paramount importance of the ergot alkaloids in ergot therapy, there has been a tendency to place more reliance upon such chemical

methods of assay as are capable of estimating the alkaloidal content in the crude drug. Forst (17) in 1926 described a chemical gravimetric method for the standardization of ergot by which the total alkaloids are isolated quantitatively and with a sufficient degree of purity to the exclusion of other constituents. This is a rather difficult process and not generally applicable. It requires a large amount of crude drug (500 gms. for a single estimation), the technique is involved and time-consuming, and it would probably not yield consistent results except in the hands of the thoroughly experienced worker.

As to the value of the foregoing method it is not certain whether or not the total alkaloids so obtained represent quantitatively the physiologic activity of the drug. Forst gives some pharmacologic evidence on this point, but it is only of a qualitative nature. In a more recent publication Schübel and Straub (18) extended the method of Forst to a series of preparations of certain ergot specialties, generally low in alkaloidal content, and obtained further qualitative evidence of a general parallelism between the chemical and certain physiological tests. Specifically, they found that preparations containing ergot alkaloids as determined by the method of Forst gave the epinephrine vasomotor reversal (19), while those devoid of or very low in alkaloidal content failed to produce the reversal phenomenon.

In the course of some work on certain phases of the problem of bioassay of ergot, we became impressed with the desirability of having a quick and reliable method for the chemical evaluation of the alkaloidal content of ergot preparations. A consideration of this problem led to the examination of certain of the chemical reactions supposed to be characteristic of the ergot alkaloids with a view to developing a color reaction suitable for colorimetric comparison. The so-called Tanret-Keller reaction, first described by Tanret (9) for ergotinine and later again by Keller (20), was not found satisfactory; for, though the ring test is quite distinctive, no clear homogeneous color of sufficient stability suitable for colorimetric reading could be obtained. Van Urk (21), however, has recently described a modification of the Tanret-Keller ring test, in which Ehrlich's reagent, para-dimethyl-amino-benzaldehyde in alcohol is used, which makes the test far more sensitive. The test as carried out by Van Urk is as follows: The alkaloid, after extraction with ether, is dissolved in ethyl alcohol. To 1 c. c. of this solution is added 1 c. c. of a 1 per cent solution of para-dimethyl-amino-benzaldehyde in ethyl alcohol, and concentrated H_2SO_4 is allowed to flow to the bottom of the tube, whereupon a violet or blue ring is formed at the junction of the two layers. This test as applied by Van Urk to ergotamine tartrate gave a perceptible ring test with as little as 0.001 mg. of the alkaloid.

Examination of this reaction at once confirmed Van Urk's claims as to its sensitiveness. An attempt made to obtain a homogeneous color for quantitative colorimetric examination was not successful, however, for two reasons: First, the color so obtained was a mixture of pink and blue, sometimes the one, sometimes the other predominating, making accurate colorimetric comparison impossible; second, the color did not develop at once to its maximum intensity, and when it did, it began to fade rather rapidly.

It was thus impossible to get a definite state of equilibrium.[2] A series of experiments was then begun with a view to modifying this reaction so as to make it applicable for quantitative colorimetric work; and as a result of this work the method described below was evolved.

The alkaloid, from whatever source, should be obtained in an aqueous tartaric acid solution. A definite volume thereof up to 2 c. c. is measured into a suitable container. We have found shell vials, 5 cm. high and 2 cm. in diameter with polished flat bottoms, such as are used in hydrogen ion work, very convenient. Sufficient water is added to make 2 c. c., and exactly 1 c. c. of M/60 para-dimethyl-amino-benzaldehyde[3] in concentrated sulphuric acid is run in from a burette down the sides of the tube. The contents are thoroughly mixed and placed, if possible, in direct sunlight. A clear violet-blue color gradually develops, at a rate depending upon the intensity of the light, and when developed to its maximum depth it is quantitatively proportional to the amount of alkaloid in the system. In direct sunlight the color develops its maximum intensity in from 10 to 15 minutes, while in diffuse daylight of a cloudy day it may take from half an hour to two hours or longer. When the color has developed to its maximum intensity it is read in the colorimeter[4] against a standard solution of known concentration of ergotamine tartrate prepared in the same manner.

The following is an illustration of the manner in which the test is carried out:

An aqueous 1 per cent tartaric acid solution of ergot alkaloids recovered from ether was made up to 20 c. c. Two tubes of 1 and 2 c. c., respectively, of this solution were prepared, and to the first 1 c. c. H_2O added. To both tubes 1 c. c. of the reagent was added. At the same time three tubes containing 0.06, 0.08, and 0.10 mg., respectively, of ergotamine tartrate each in 2 c. c. H_2O were prepared and 1 c. c. of the reagent was added. The tubes were all exposed to

[2] This was subsequently found to be due to the alcohol present in the system, which seriously interferes with the photochemical reaction to be described below.

[3] Specials Chemicals Co., Highland Park, Ill.

[4] We have used the Klett Bio-colorimeter with micro plungers and cups, for which 1 to 2 c. c. is sufficient for a determination.

direct sunlight for 30 minutes, after which the readings with 0.1 mg. ergotamine tartrate as the standard at 15 were as follows:

0.08 mg. ergotamine tartrate $=\frac{15}{20.0}\times 0.10=0.075$ mg. $=94\%$.

0.06 mg. ergotamine tartrate $=\frac{15}{24.6}\times 0.10=0.061$ mg. $=101\%$.

1.0 c. c. of the unknown $=\frac{15}{16.8}\times 0.10=0.089\times 20=1.78$ mg.

2.0 c. c. of the unknown $=\frac{15}{8.4}\times 0.10=0.178$ mg. $\times 10=1.78$ mg.

From this it is evident that the unknown solution contained the equivalent of 1.78 mg. ergotamine tartrate, and that the method may be expected to yield results accurate to within 5 to 10 per cent.

SOME PHYSICO-CHEMICAL CHARACTERISTICS OF THE REACTION

As the reaction was worked out with a view to making it quantitative for the ergot alkaloids, a number of points came to light, an understanding of which is essential before it can be safely applied in the chemical standardization of ergot. They will be taken up in order.

1. *The influence of certain nonspecific constituents of ergot.*—A number of substances known to occur in ergot were examined in order to discover any possible interference with the reaction as used herein for the ergot alkaloids. The substances so used included histamine, tyramine, ergosterol, acetyl choline and choline hydrochloride. None of these substances either gave any reaction with the reagent or interfered with the quantitative estimation of ergotamine tartrate added to them in known amounts.

2. *The influence of certain oxidizing and reducing agents.*—Oxidizing agents were found seriously to interfere with the reaction. H_2O_2, $NaNO_2$, and $FeCl_3$, substances often used to intensify the Tanret-Keller ring test presumably characteristic of ergotinine, have been found greatly to interfere with the color reaction as used herein for the ergot alkaloids. Some quantitative experiments were made on this subject with $NaNO_2$ which yielded the following results:

0.06 mg. ergotamine tartrate + 0.01 mg. $NaNO_2=\frac{15}{21.0}\times 0.04=0.023$ mg. or 38%.

0.06 mg. ergotamine tartrate + 0.001 mg. $NaNO_2=\frac{15}{15.2}\times 0.04=0.039$ mg. or 65%.

0.06 mg. ergotamine tartrate + 0.001 mg. $NaNO_2=\frac{15}{17.0}\times 0.04=0.035$ mg. or 58%.

Several reducing agents, such as magnesium in HCl, H_2S, Na_2SO_3, and NaCN, were tried. The first was without effect and the last three markedly interfered with the reaction. It is not clear at present whether or not the oxidizing and reducing substances interfering

with the reaction also destroy simultaneously the chemical identity and physiologic activity of the alkaloid.

3. *Unidentified substance in ergot.*—One other interfering substance that may materially affect the results when the reaction is applied in the quantitative estimation of the alkaloidal content in ergot is an unidentified substance occurring in ergot which is soluble in ether, and insoluble in water, but soluble in alkali. From its appearance and behavior it seems to correspond to the yellow pigment $C_{15}H_{14}O_7$ isolated and identified by Freeborn (22). While insoluble in water, it may form colloidal aqueous solution, and if present in sufficient amount along with the alkaloids it may entirely obscure the color reaction of the latter. Until this was realized, much difficulty was encountered in obtaining uniformly good checks in estimates of the alkaloidal content of ergot, but the method to be described as finally worked out, entirely circumvents this difficulty.

4. *The influence of light upon the reaction.*—As stated previously the reaction of para-dimethyl-amino-benzaldehyde in H_2SO_4 with the ergot alkaloids is a photochemical one. If left in the dark, no color develops. Light is essential for the reaction and the speed of the reaction is intimately connected with the intensity of the light.

The light factor in relation to the present reaction was studied from a qualitative as well as a quantitative standpoint. First, experiments were made to ascertain the wave length of the rays of the spectrum concerned with this reaction. Ultra-violet rays were excluded by the fact that irradiation of the solution in a pyrex tube was just as effective in developing the color as in a quartz tube. Carbon arc irradiation of a series of tubes placed in a reflecting box provided with tightly fitting glass screens of different light transmissibility showed that the short visible rays of the spectrum, of approximate length of 300 to 400 millimicrons, were essential in this reaction. The experiment was made with a series of tubes each containing 0.06 and 0.08 mg. ergotamine tartrate, exposed for 30 minutes; and at the end of that time the color developed was estimated colorimetrically in terms of alkaloid as measured against a standard solution rayed directly without the interposition of any screens. The results of this experiment are shown in Table 1.

TABLE 1.—*Character of spectral rays concerned with the reaction of para-dimethyl-amino-benzaldehyde with the ergot alkaloids*

Screen used	Rays transmitted (23) (millimicrons)	Per cent of standard
Window glass	290 and over	100
G 586 A 6 mm	320 to 400; 700 and over	100
G 585 L 4 mm	310 to 480; 700 and over	80–100
G 584 J 4 mm	340 to 460	80
Noviol O 5 mm	400 and over	50
G 401 GZ 4 mm	480 to 610	0
G 38 H 5 mm	485 and over	0

The factor of light intensity in relation to this reaction was studied by irradiating a series of tubes each containing 0.1 mg. ergotamine tartrate exposed to a light of constant intensity [5] at a definite distance, and at definite intervals colorimetric readings were made against suitable standards. The findings of this series of experiments are summarized in Table 2, from which it is clearly seen that the reaction bears a direct relationship to the time of radiation and at a given time is roughly inversely proportional to the distance between the source of light and the radiated tubes. The reaction does not follow the law of inverse square of the distance, as might be expected, on account of the reflecting character of the lamp used, the rays of light being reflected more nearly parallel than radially. These results are plotted and shown graphically in Figure 1. The time of exposure is plotted

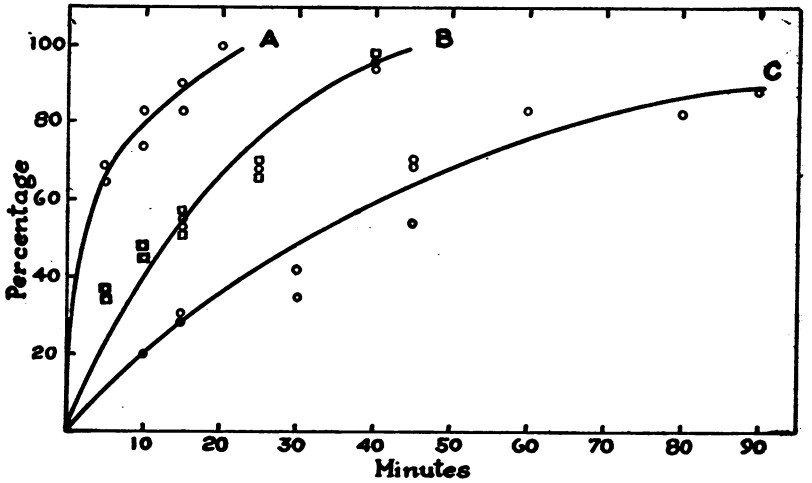

FIGURE 1.—Influence of light intensity upon the photochemical reaction of para dimethyl amino benzaldehyde and the ergot alkaloids ergotamine and ergotoxine. Source of light was carbon-arc lamp, reflecting type, 110 volts, 10 amperes. A—Tubes radiated at 15 cm. from the lamp. B—Radiated at 30 cm. from the lamp; circles represent findings with ergotamine tartrate, squares with ergotoxine base. C—Tubes radiated at a distance of 60 cm. from the lamp

in minutes on the abscissae and the photochemical reaction, plotted on the ordinates, is expressed in terms of per cent of alkaloid found by colorimetric reading at definite intervals. Curve A represents the time reaction of the tubes radiated at 15 cm., curve B at 30 cm., and curve C at 60 cm. from the source of light. Curves A and C were constructed from experiments with ergotamine tartrate. Curve B represents results obtained with crystalline ergotoxine base in aqueous tartaric acid solution in addition to experiments with ergotamine tartrate. The former are marked in squares and the latter in circles. It will be seen that with decreasing intensity of light the reaction is correspondingly prolonged and also somewhat less regular.

[5] Carbon arc reflecting lamp operating on 110 volts at 10 amperes.

TABLE 2.—*Time and intensity factors in the photochemical reaction of para-dimethyl-amino-benzaldehyde with ergot alkaloids*

Time of exposure	Per cent of standard			Time of exposure	Per cent of standard		
	15 cm.	30 cm.	60 cm.		15 cm.	30 cm.	60 cm.
5 minutes	66	35	0	40 minutes		96	
10 minutes	78	48	20	45 minutes			64
15 minutes	86	53	30	60 minutes			83
20 minutes	100			80 minutes			82
25 minutes		68		90 minutes			88
30 minutes			38				

5. *The acid factor in the reaction.*—It will be recalled that the reagent is an M/60 solution of para-dimethyl-amino-benzaldehyde in concentrated sulphuric acid used in the proportion of 1 c. c. to 2 c. c. of the aqueous solution of the alkaloid. Many experiments were made to ascertain the effect of varying the aldehyde and acid constituents. The results showed that nothing would be gained by using larger amounts of aldehyde which, if used in excess of M/30 and M/15, imparts a brownish tinge to the solution, making accurate reading in the colorimeter somewhat more difficult. The acid factor on the other hand was found of considerable importance in determining the velocity of the reaction. Indeed the acid factor seems to stand in some mutual relationship with the light factor in determining the speed and completeness of the reaction. It may be stated at once that the optimum conditions are achieved with the use of 1 c. c. concentrated H_2SO_4 (containing 2.5 mg. of the aldehyde) to the alkaloidal salt in a volume of 2 c. c. of water or the alkaloid in 2 c. c. of 0.5 to 1 per cent aqueous solution of tartaric acid. Decreasing the quantity of acid reduces the velocity of the reaction, which, however, to a certain degree can be compensated for by increasing the intensity of the light or by lengthening the period of radiation.

The results of many experiments of this type are illustrated in Figure 2. In all of these experiments the amount of alkaloid was kept constant throughout at 0.1 mg. ergotamine tartrate; the total volume was kept constant being 3 c. c. in all cases; the quantity of aldehyde was constant, 2.5 mg., the variables being the amount of acid and the time and distance of radiation. The results plotted in curve A represent tubes radiated with the carbon arc lamp 25 minutes at 30 cm.; B, 15 minutes at about 20 cm.; and C, 40 minutes at 15 cm. It will thus be seen that the reaction may reach completion with as little as half, and probably less, of the optimum amount of acid, provided a good source of light of sufficient intensity can be had and sufficient time allowed for the photochemical reaction to reach

equilibrium. Stronger acidity than that indicated as optimal is prohibitive; for instead of a clear blue, various shades of brown develop which are utterly usless for colorimetric comparison. No experiments were made to ascertain whether other acids could be used in place of H_2SO_4, with the exception of HCl, which if used in sufficient amount, was found to yield a reaction quite similar to that obtained with H_2SO_4 but less suitable on account of lack of stability. The color reaction as obtained with the reagent described herein is not subject to change through over irradiation, and it is permanent for many hours, with little if any change in 24 hours. The color reaction obtained with HCl seems to appear more rapidly and fades rather too rapidly to be useful for colorimetric comparison.

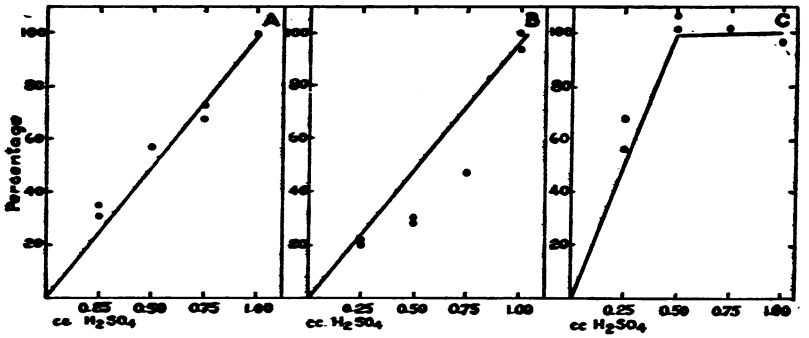

FIGURE 2.—Influence of acidity upon the photochemical reaction of para dimethyl amino benzaldehyde and ergotamine tartrate. In all cases 0.1 mg. ergotamine tartrate was used and 2.5 mg. of the reagent in a total volume of 3 c.c. All radiations were made with a carbon-arc lamp. A—Tubes radiated 25 minutes at 30 cm. from lamp; B—15 minutes at 20 cm.; C—40 minutes at 15 cm. from lamp

THE CHEMICAL REACTION AS APPLIED TO THE INDIVIDUAL ALKALOIDS OF ERGOT

After all the details of the reaction had been worked out so that quantitative results could be obtained with ergotamine tartrate,[6] quantitative chemical tests were made in parallel with the bio-assay method of Broom and Clark (16) upon such other known ergot alkaloids as we have been able to procure. These included the following:

1. Ergotoxine phosphate of Burroughs Wellcome & Co., a very old specimen received in the laboratory in 1917.

[6] I am indebted to the Sandoz Chemical Co. for a generous supply of crystalline ergotamine tartrate which has been used as a standard of reference in this and other work on ergot assay to be published elsewhere. The tartrate is stated to contain 64.5 per cent of the base.

2. Ergotoxine base, crystalline, contains 17.8 per cent benzene of crystallization.

3. Ergotoxine ethanesulphonate, crystalline, melting point 201° C. Contains 83.7 per cent ergotoxine base.

4. Ergotinine citrate, an amorphous preparation.[7]

The activity of these alkaloids as ascertained colorimetrically and compared with the biological method of Broom and Clark (16) is shown in Table 3.

TABLE 3.—*Comparison of colorimetric and biologic methods of assay as applied to the ergot alkaloids*

Alkaloid	Potency in per cent of ergotamine tartrate	
	Biologic method of Broom and Clark (16)	Colorimetric
Ergotamine tartrate	100	100
Ergotoxine phosphate	50	45
Ergotoxine base crystalline	125	104
Ergotoxine ethanesulphonate crystalline	110	96
Ergotinine citrate	15	12

Besides showing the quantitative relationship of the two methods, the results are of further interest in that they show the relative activity of ergotamine and ergotoxine. Dale and Spiro (4) concluded, on the basis of qualitative evidence, that the two alkaloids are identical pharmacologically. Quantitatively, Clark and Broom (24) reported ergotoxine to be about half as active as ergotamine, while Burn and Ellis (25) concluded that ergotamine bitartrate represents 85 per cent of the activity of ergotoxine phosphate, the difference apparently being accountable by the relative base content of the two salts. More recently Pattee and Nelson (26), working with a specimen of amorphous ergotinine Merck, and apparently assuming its identity with ergotoxine, concluded, after comparing its activity with ergotamine methanesulphonate, that 1 mg. ergotoxine is equal in activity to 1.33 mg. ergotamine.

Our results indicate that within the limits of experimental error there is no appreciable difference between the crystalline salts of ergotamine and ergotoxine. The alkaloidal content of the two salts is nearly the same, it being 84.5 per cent for ergotamine tartrate and 83.7 per cent for the ethanesulphonate of ergotoxine. The relatively high biologic activity of ergotoxine base is difficult to account for,

[7] Thanks are due to Dr. C. S. Leonard, of Burroughs, Wellcome & Co., for a supply of the ergotoxine base ergotoxine ethanesulphonate and the ergotinine citrate. The last named product is an impure preparation of indefinite chemical composition.

since its alkaloidal content is only 82.2 per cent, 17.8 per cent being benzene of crystallization.

Very significant are the values obtained for the impure preparations ergotoxine phosphate and ergotinine citrate. Both methods indicate decided inferiority in activity of these preparations as compared with the pure crystalline products.

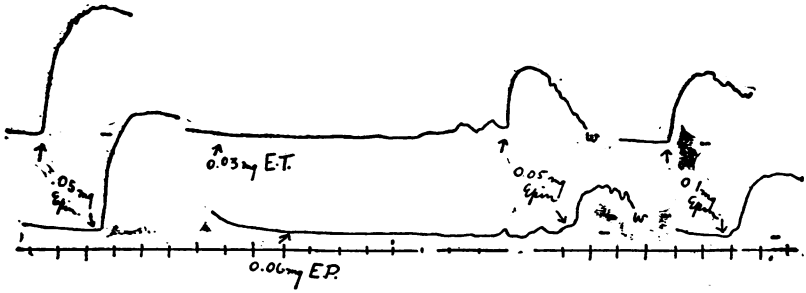

FIGURE 3.—Tracing 305. Segment of isolated rabbit uterus divided longitudinally into two equal strips, each suspended in 100 c.c. oxygenated Ringer-Locke solution at 38° C. After uniform and equivalent responses were obtained to 0.65 mg. epinephrine, 0.63 mg. ergotamine tartrate (E. T.) was added to the upper and 0.06 mg. ergotoxine phosphate (E. P.) to the lower. In 10 minutes, without washing, 0.05 mg. epinephrine was added to each bath, showing a somewhat greater reversal in the lower strip. The solution was then washed, and the addition of 0.1 mg. epinephrine confirmed the first result, from which it may be concluded that 1 mg. ergotoxine phosphate is somewhat greater in activity than 0.5 mg. ergotamine tartrate. Time is indicated in minutes

Figures 3 and 4 are given as illustrative of the experiments on the bio-assay of ergotoxine phosphate. From Figure 3 it appears to be somewhat greater than 50 per cent, from Figure 4 somewhat less than 56 per cent; and by averaging up these with several similar experiments the value of 50 per cent was arrived at. Figure 5 represents

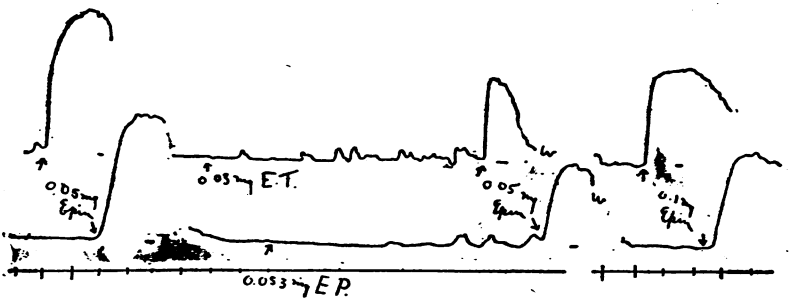

FIGURE 4.—Tracing 306. Conditions similar to those of Figure 3. The results of this experiment indicate that 1 mg. ergotoxine phosphate is less in activity than 0.56 mg. ergotamine tartrate. Taken together with several other similar experiments, an approximate value of 50 per cent for ergotoxine phosphate was obtained

one of several experiments carried out upon the assay of ergotinine citrate from which it appears to be approximately 15 per cent as active as ergotamine tartrate.

We may therefore conclude from these experiments that the colorimetric method as described herein when applied to the individual

alkaloids of ergot, whether to the pure and physiologically active ones or to the impure mixtures of inferior physiologic activity yields quantitative results which within the limits of experimental error are sufficiently close to the results obtained by the more difficult and time-consuming quantitative bio-assay method of Broom and Clark (16).

THE APPLICATION OF THE COLORIMETRIC METHOD IN THE ESTIMATION OF THE ALKALOIDAL CONTENT OF ERGOT

In order to measure the alkaloidal content of ergot colorimetrically it is necessary only to obtain the alkaloids quantitatively in an aqueous solution in such a degree of purity as to permit carrying out of the reaction without interference. For this purpose a definite volume of the fluid extract is carefully freed of its alcohol, the residue is suspended in water, made alkaline with ammonia, and the alkaloids are extracted with ether. The latter is washed free of yellow coloring matter and the alkaloids are extracted with an aqueous 1 per cent

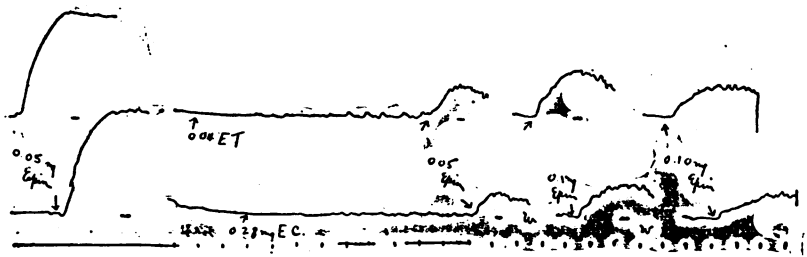

FIGURE 5.—Tracing 317. Shows one of the several experiments made to assay ergotinine citrate. A slightly greater though nearly equal degree of reversal was produced by 0.28 mg. ergotinine citrate (E. C.) than 0.04 mg. ergotamine tartrate (E. T.), thus showing that 1 mg. ergotinine citrate is somewhat more active than 0.14 mg. ergotamine tartrate. Averaging the results of several experiments, a value of 15 per cent was assigned to ergotinine citrate

tartaric acid solution. The latter, after being freed of ether, is made up to definite volume, and the alkaloids are determined colorimetrically. That such a procedure insures almost quantitative recovery of the alkaloids was shown by preliminary experiments with ergotamine and ergotoxine salts in aqueous solution or when added in definite amounts to a fluid extract of ergot of known alkaloidal content.

The method as applied to the fluid extract of ergot may now be described in detail.

Five c. c. of the fluid extract are evaporated on the water bath under a current of air or *in vacuo* to remove the alcohol. Excess heating should be avoided. The thick, sirupy residue is transferred quantitatively with the aid of about 50 c. c. H_2O to a separatory funnel. The aqueous suspension is rendered slightly alkaline with NH_4OH to distinct blue reaction with litmus. About 2 c. c. of 1:10 of concentrated NH_4OH will generally suffice. The solution is then extracted with four successive portions of ether, using 40 c. c. in the first, 25 c. c. in the second, and 15 to 20 c. c. in the third and fourth.

The ethers are then united, returned to the separatory funnel, and washed two or three times with about 25 c. c. H_2O and a few drops of NH_4OH. This treatment removes most of the yellow alkali soluble pigment which is present in greater or less amount in most ergots. One or two additional washings with water will remove the excess of alkali. The washed ether is made up to 100 c. c. and may be kept in this condition, if well stoppered and protected from light, for many weeks.

To complete the determination, 50 c. c. of the ether containing the alkaloids of 2.5 c. c. of the fluid extract of ergot are extracted in a separatory funnel three times with an aqueous 1 per cent tartaric acid solution, using 10, 10, and 5 c. c., respectively. The acid solution is freed from ether by evaporating it on the water bath under the electric fan to about 15 c. c., and this made up to volume. Unless the fluid extract is very low in alkaloids, this may be made up conveniently to 20 c. c., otherwise it may be necessary to concentrate further to a total volume of 10 c. c. The alkaloids are determined in this solution colorimetrically as described earlier in the paper for the individual ergot alkaloids.

The essential features of the method may best be illustrated by referring to some of the results obtained upon several fluid extracts of ergot.

Chemical assay of fluid extract No. 1.—Five c. c. of the fluid extract prepared as described above. Fifty c. c. of the ether extracted with 1 per cent aqueous solution of tartaric acid and made up to 20 c. c. One c. c. thereof or the equivalent of 0.125 c. c. of the fluid extract read in the colorimeter $\frac{15}{13.3}$ against 0.06 mg. ergotamine tartrate as standard or 0.067 mg. $\times 8 = 0.54$ mg. per c. c. A duplicate sample carried out in the same way and 2.0 c. c. of the solution, the equivalent of 0.25 c. c. of the fluid extract read in the colorimeter $\frac{15}{7.4}$ against the same standard, giving an equivalent of 0.1216 mg. ergotamine tartrate or 0.48 mg. per c. c. The same fluid extract standardized by the method of Broom and Clark with ergotamine tartrate as the standard showed an ergotamine tartrate equivalence of about 0.45 mg. per c. c. it having been greater than 0.40 and somewhat less than 0.50.

Fluid extract No. 2.—This extract yielded colorimetrically 0.49 mg. ergotamine tartrate per c. c., biologically approximately 0.45.

Fluid extract No. 3.—Fluid extract No. 3 contained too little alkaloid to be estimated with certainty colorimetrically, while biologically it contained approximately 0.08 mg. per c. c., a negligible amount.

Fluid extract No. 4.—This extract showed colorimetrically an ergotamine tartrate equivalent of 0.63 mg. per c. c., biologically 0.66 mg.

Fluid extract No. 5. No. 5 was another preparation of low potency, estimated biologically to contain 0.09 mg. ergotamine tartrate per c. c. It assayed colorimetrically at 0.10 mg.

It should be emphasized that unless the colorimetric reaction can be shown to be specific for the physiologically active alkaloids of ergot its application to the standardization of this drug must be deferred until further and more complete evidence is available to indicate the parallelism between values obtained by this method and the most reliable biological method. That the reagent is not specific for the ergot alkaloids is a certainty, for it is known to react with tryptophane with a blue color (27) (28) not unlike that of the ergot alkaloids. The reaction of the present reagent with tryptophane differs, however, in certain essential respects from that of the ergot alkaloids: First, the reaction is much slower; and, second, it is influenced favorably by oxidizing agents (28). Rhode (27), who studied the reaction of para-dimethyl-amino-benzaldehyde with tryptophane, suggested that the indol radical of tryptophane is probably the reacting group.

We have made experiments to ascertain whether tryptophane, indol, or skatol, when added to the fluid extract of ergot, could in any way affect the results, and obtained completely negative results. Under the conditions of the test as applied to the fluid extract of ergot, no tryptophane or skatol is recoverable by the solvents that are used in the extraction of the ergot alkaloids, and indol, which is partially recoverable, imparts a red tinge, masking to a slight extent the blue color of the alkaloids. None of the fluid extracts of ergot which we have examined, however, indicated anything suggestive of the presence of indol.

The colorimetric reaction is being applied to a large series of fluid extracts of ergot the physiologic activity of which is being determined simultaneously by the method of Broom and Clark. The results of this comparative study will be published in a forthcoming paper.

SUMMARY

A quantitative colorimetric test for the ergot alkaloids is described, based upon the reaction of Van Urk, wherein para-dimethyl-amino-benzaldehyde is used.

The results of some experiments on the photochemical nature of this reaction are presented.

Several ergot alkaloids of different physiologic activity were examined quantitatively by the colorimetric method with respect to ergotamine tartrate. The results of the chemical test corresponded well with the biological test.

The application of the colorimetric test to the estimation of the alkaloidal content of the fluid extract of ergot is described, and some of the results so obtained in comparison with the bio-assay method of Broom and Clark are cited.

ADDENDUM

Since this was written, samples of crystalline ergotinine and ergotaminine have become available through the kindness of Dr. E. Rothlin, of Basel, to whom I am greatly indebted. An examination of these alkaloids colorimetrically gave values of about 90 per cent as compared with ergotamine tartrate. When tested for physiologic activity by the method of Broom and Clark, the two alkaloids assayed at approximately one-tenth the activity of ergotamine tartrate. It appears from this experiment that the ergotinine citrate referred to in this paper was, as suspected, an impure preparation containing but a small amount of physiologically active alkaloid. It is also evident from this experiment that the colorimetric test described in this paper does not differentiate specifically the physiologically active alkaloids ergotoxine and ergotamine from the physiologically inactive isomers ergotinine and ergotaminine. Since it is not known to what extent, if any, the latter occur in ergot preformed or in the official fluid extract, the value of the present chemical method can be determined only by an exhaustive comparative study of the two methods as applied to a large series of fluid extracts. This evidence will be presented in a subsequent publication.

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COURT DECISIONS RELATING TO PUBLIC HEALTH

Milk ordinance upheld.—(Oklahoma Criminal Court of Appeals; Grider *v.* City of Ardmore, 287 P. 776; decided Jan. 25, 1930.) An ordinance of the city of Ardmore imposed an annual license fee of $1 for each cow whose milk was distributed in the city. The plaintiff in error, who was engaged in the business of selling and distributing milk in the city, refused to pay the license fee and was convicted of selling milk without a license. He offered no evidence to show that the license fee was unreasonable. The criminal court of appeals sustained the conviction, saying:

> Ordinance No. 528 of the city of Ardmore being within the police power of the city is constitutional and is a valid regulation of the business of producing and distributing milk in such city. The defendant having made no showing that the license fee required is unreasonable, the presumption is that such fee is reasonable and necessary for issuing such license and regulating such business.

Act relating to barbering upheld.—(North Carolina Supreme Court; State *v.* Lockey, 152 S. E. 693; decided Apr. 2, 1930.) The defendant was convicted of violating the law pertaining to barbering (Public Laws 1929, ch. 119) in that he performed the work of a barber without obtaining the certificate of registration required by the statute. On appeal to the supreme court the defendant contended that the act was unconstitutional, but the court decided against this contention. It was held that there was no unjust burden placed upon barbers and that there was no unreasonable classification because the act applied only to cities and towns of 2,000 or more population. The court also held that the act came under the police power of the State, and, with reference to the public health aspect, said in part:

> * * * We think the regulations reasonable and the whole act in the interest of skill and proficiency, health and sanitation; and brings the barber and barber shop up to a high standard for the protection of the health of the public.

Other holdings were that the act applied to proprietor barbers and that the fees levied by the act were not so disproportioned to the expenses of enforcing the act as to affect its constitutionality.

DEATHS DURING WEEK ENDED JUNE 14, 1930

Summary of information received by telegraph from industrial insurance companies for the week ended June 14, 1930, and corresponding week of 1929. (From the Weekly Health Index, June 18, 1930, issued by the Bureau of the Census, Department of Commerce)

	Week ended June 14, 1930	Corresponding week, 1929
Policies in force	75, 764, 230	74, 333, 206
Number of death claims	14, 251	13, 958
Death claims per 1,000 policies in force, annual rate	9. 8	9. 8

Deaths from all causes in certain large cities of the United States during the week ended June 14, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, June 18, 1930, issued by the Bureau of the Census, Department of Commerce)

City	Week ended June 14, 1930		Annual death rate per 1,000, corresponding week, 1929	Deaths under 1 year		Infant mortality rate, week ended June 14, 1930 [2]
	Total deaths	Death rate [1]		Week ended June 14, 1930	Corresponding week, 1929	
Total (65 cities)	6, 840	12. 0	11. 9	594	598	[3] 51
Akron	45			2	4	18
Albany [4]	33	14. 3	13. 0	2	4	44
Atlanta	76	15. 5	15. 5	13	13	137
White	43			3	7	95
Colored	33	(5)	(5)	10	6	159
Baltimore [4]	161	10. 1	11. 9	5	18	17
White	112			2	13	9
Colored	49	(5)	(5)	3	5	49
Birmingham	84	19. 7	12. 7	11	7	103
White	37			7	3	108
Colored	47	(5)	(5)	4	4	95
Boston	188	12. 3	13. 5	17	28	48
Bridgeport	23			0	1	0
Buffalo	110	10. 3	12. 2	9	2	40
Cambridge	23	9. 5	9. 1	1	2	19
Camden	33	12. 7	7. 3	4	2	73
Canton	16	7. 1	7. 6	2	1	50
Chicago [4]	677	11. 2	11. 0	58	63	51
Cincinnati	108			5	11	30
Cleveland	183	9. 4	10. 7	11	19	33
Columbus	80	14. 0	13. 8	7	7	68
Dallas	67	16. 0	12. 7	6	7	
White	52			4	5	
Colored	15	(5)	(5)	2	2	
Dayton	32	9. 0	9. 3	2	3	30
Denver	70	12. 4	12. 8	4	4	42
Des Moines	36	12. 4	8. 9	2	2	35
Detroit	292	11. 0	11. 5	37	50	57
Duluth	33	14. 7	7. 6	1	0	27
El Paso	31	13. 7	15. 9	7	11	
Erie	26			3	0	64
Fall River [4]	19	7. 4	9. 3	1	5	23
Flint	20	7. 0	12. 6	3	5	35
Fort Worth	40	12. 2	11. 9	5	3	
White	33			4	2	
Colored	7	(5)	(5)	1	1	
Grand Rapids	26	8. 3	10. 5	2	1	30
Houston	85			15	5	
White	52			10	4	
Colored	33	(5)	(5)	5	1	
Indianapolis	113	15. 4	10. 6	4	5	30
White	88			3	5	26
Colored	25	(5)	(5)	1	0	54
Jersey City	62	10. 0	11. 1	6	5	52
Kansas City, Kans	25	11. 0	15. 4	3	2	71
White	18			2	2	53
Colored	7	(5)	(5)	1	0	217
Kansas City, Mo	90	12. 0	11. 2	6	5	47
Knoxville	18	8. 9	12. 4	1	5	23
White	12			0	5	0
Colored	6	(5)	(5)	1	0	247

Footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended June 14, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, June 18, 1930, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended June 14, 1930		Annual death rate per 1,000, corresponding week, 1929	Deaths under 1 year		Infant mortality rate, week ended June 14, 1930 [2]
	Total deaths	Death rate [1]		Week ended June 14, 1930	Corresponding week, 1929	
Los Angeles	252			20	21	61
Louisville	62	9.8	14.7	5	4	43
White	49			4	2	40
Colored	13	(5)	(5)	1	2	72
Lowell	19			3	2	71
Lynn	15	7.4	12.4	3	2	76
Memphis	80	21.9	14.8	7	4	83
White	35			3	4	55
Colored	45	(5)	(5)	4	0	135
Milwaukee	118	11.3	12.6	16	6	81
Minneapolis	103	11.8	9.8	7	3	45
Nashville	37	13.8	20.5	4	4	62
White	22			1	3	21
Colored	15	(5)	(5)	3	1	190
New Bedford	23			1	0	26
New Haven	36	10.0	8.0	5	4	97
New Orleans	145	17.6	19.1	9	16	52
White	87			6	7	53
Colored	58	(5)	(5)	3	9	50
New York	1,458	12.6	12.1	130	111	55
Bronx Borough	193	10.6	9.5	19	9	45
Brooklyn Borough	499	11.3	10.1	43	31	46
Manhattan Borough	587	17.5	17.9	53	60	87
Queens Borough	139	8.5	8.4	15	10	43
Richmond Borough	40	13.8	13.1	0	1	0
Newark	87	9.6	12.4	8	7	42
Oakland	67	12.7	12.4	3	4	36
Oklahoma City	45			10	4	196
Omaha	47	11.0	11.7	2	5	23
Paterson	37	13.3	11.5	1	0	17
Philadelphia	500	12.6	11.1	41	34	61
Pittsburgh	176	13.6	11.5	16	15	59
Portland, Oreg	59			7	1	86
Providence	51	9.3	10.0	2	7	18
Richmond	49	13.1	13.1	3	5	44
White	29			2	2	45
Colored	20	(5)	(5)	1	3	44
Rochester	64	10.2	12.7	4	6	35
St. Louis	295	12.6	13.9	14	14	45
St. Paul	67			5	1	51
Salt Lake City [4]	34	12.8	12.5	4	4	63
San Antonio	91	21.8	20.1	25	13	
San Diego	12			1	1	21
San Francisco	146	13.0	13.7	5	7	34
Schenectady	16	8.9	8.9	0	2	0
Seattle	62	8.4	10.1	5	7	50
Somerville	13	6.6	6.6	2	1	65
Spokane	20	9.6	7.6	1	2	26
Springfield, Mass	28	9.7	18.2	2	5	32
Syracuse	47	12.3	13.6	4	2	50
Tacoma	29	13.7	12.3	1	0	26
Toledo	39	9.8	9.8	6	4	55
Trenton	30	11.3	14.3	0	3	0
Utica	29	14.5	15.5	4	3	114
Washington, D. C	146	13.8	10.4	13	9	75
White	88			2	4	17
Colored	58	(5)	(5)	11	5	195
Waterbury	22			5	2	128
Wilmington, Del	29	11.8	6.1	2	0	45
Worcester	36	9.5	9.2	4	1	52
Yonkers	17	7.3	9.5	4	2	96
Youngstown	33	9.9	6.1	2	3	31

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births. Cities left blank are not in the registration area for births.
[3] Data for 73 cities.
[4] Deaths for week ended Friday.
[5] In the cites for which deaths are shown by color, the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

PREVALENCE OF DISEASE

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

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended June 14, 1930, and June 15, 1929

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 14, 1930, and June 15, 1929

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929
New England States:								
Maine	23		2		77	101	1	0
New Hampshire	1	3			27	72	0	0
Vermont					25		0	0
Massachusetts	39	68	4	3	1,224	614	5	4
Rhode Island		8	1		29	28	0	0
Connecticut	20	15	1	2	41	154	3	2
Middle Atlantic States:								
New York	128	218	[1] 4	[1] 2	2,425	689	11	27
New Jersey	89	105	5	2	1,260	211	3	6
Pennsylvania	87	128			1,106	1,277	16	9
East North Central States:								
Ohio	46	50	12	13	651	1,118	6	12
Indiana	4	13			129	237	1	2
Illinois	153	173	33	23	404	1,340	8	13
Michigan	51	100		4	728	650	22	75
Wisconsin	6	15	7	9	448	1,334	1	3
West North Central States:								
Minnesota	7	18	3	2	106	233	2	0
Iowa	4	6			87	46	1	0
Missouri	27	31		3	40	73	3	13
North Dakota	3	8			17	56	1	3
South Dakota	3				228	32	1	0
Nebraska	6	6			49	202	1	0
Kansas	14	4	2	2	333	681	2	2
South Atlantic States:								
Delaware	1	1			6	12	0	0
Maryland [2]	19	21	9	8	26	53	0	1
District of Columbia	4	9			56	22	1	0
West Virginia	6	8	2	8	34	150	0	1
North Carolina	12	11	2		74	7	0	4
South Carolina	9	8	174	221	79		1	0
Georgia	4	5	10	26	92	17	2	1
Florida	5	5	1	4	82	19	0	0
East South Central States:								
Kentucky		5			24	7	0	0
Tennessee	6	4	11	9	77	23	2	2
Alabama	5	8	11	13	107	22	0	0
Mississippi	8	5					3	1

[1] New York City only.

[2] Week ended Friday.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 14, 1930, and June 15, 1929—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929
West South Central States:								
Arkansas	----	5	4	2	18	2	5	0
Louisiana	25	10	5	10	19	56	0	1
Oklahoma [3]	8	18	19	15	81	50	3	0
Texas	13	27	23	5	103	126	0	2
Mountain States:								
Montana	----	1	----	----	25	30	0	2
Idaho	----	----	----	4	4	47	0	1
Wyoming	----	----	----	----	51	22	0	0
Colorado	7	8	----	----	320	21	3	0
New Mexico	8	3	----	----	43	7	1	0
Arizona	----	1	----	----	75	4	0	0
Utah [3]	----	1	----	2	192	2	1	3
Pacific States:								
Washington	1	7	----	----	516	127	4	3
Oregon	4	7	6	9	95	130	0	0
California	44	39	13	18	1,470	111	4	9

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929
New England States:								
Maine	0	1	10	17	0	0	6	3
New Hampshire	0	0	8	22	0	0	0	0
Vermont	0	0	8	1	0	0	0	0
Massachusetts	0	1	150	181	0	4	2	8
Rhode Island	0	0	11	4	0	0	1	2
Connecticut	2	0	43	40	0	0	0	0
Middle Atlantic States:								
New York	2	5	287	297	5	0	18	10
New Jersey	0	1	144	107	0	0	5	4
Pennsylvania	2	1	270	242	0	0	13	14
East North Central States:								
Ohio	3	2	252	117	119	30	11	5
Indiana	0	0	75	93	106	70	3	2
Illinois	1	0	325	302	90	108	10	10
Michigan	1	0	215	290	41	94	4	4
Wisconsin	1	0	126	132	17	15	2	2
West North Central States:								
Minnesota	2	1	61	57	8	1	1	3
Iowa	0	1	35	59	147	30	1	1
Missouri	0	0	94	45	44	17	10	9
North Dakota	0	1	20	17	20	6	1	0
South Dakota	1	0	5	8	21	25	0	0
Nebraska	0	1	13	35	39	37	1	1
Kansas	1	1	52	53	98	67	8	5
South Atlantic States:								
Delaware	0	0	5	4	0	0	0	0
Maryland [2]	0	0	65	89	0	0	7	10
District of Columbia	0	1	16	9	0	0	0	1
West Virginia	0	1	24	16	10	13	25	90
North Carolina	2	3	21	13	13	5	27	24
South Carolina	1	0	4	5	0	6	73	65
Georgia	0	0	10	12	0	0	17	30
Florida	0	0	3	0	1	0	7	6
East South Central States:								
Kentucky	0	0	27	81	5	20	4	0
Tennessee	0	1	15	17	11	2	21	10
Alabama	0	2	6	8	2	0	12	26
Mississippi	0	0	1	7	2	0	23	21

[3] Week ended Friday.
[2] Figures for 1930 are exclusive of Oklahoma City and Tulsa, and for 1929 are exclusive of Tulsa only.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 14, 1930, and June 15, 1929—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929	Week ended June 14, 1930	Week ended June 15, 1929
West South Central States:								
Arkansas	0	0	1	7	5	2	4	12
Louisiana	11	0	6	27	3	2	43	18
Oklahoma[3]	3	1	21	29	99	76	8	17
Texas	1	0	13	54	32	67	5	17
Mountain States:								
Montana	0	1	15	10	3	2	0	1
Idaho	0	0	3	1	0	8	0	3
Wyoming	0	0	4	4	20	15	1	0
Colorado	0	0	10	16	8	13	2	1
New Mexico	0	0	3	1	2	7	2	3
Arizona	0	0	1	0	1	1	4	5
Utah[2]	0	0	0	5	1	5	0	0
Pacific States:								
Washington	0	0	26	11	30	42	3	7
Oregon	0	0	15	10	16	16	6	3
California	36	4	112	326	31	45	16	7

[2] Week ended Friday.
[3] Figures for 1930 are exclusive of Oklahoma City and Tulsa, and for 1929 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April, 1930										
Mississippi	54	42	2,351	4,584	789	1,142	1	47	123	68
Washington	33	33	61	1	2,081		1	156	362	8
May, 1930										
Arizona	12	12	29	2	761		6	58	52	15
Dist. of Columbia	1	36	1		229	1	0	55	0	6
Georgia	9	23	117	393	1,000	144	0	65	7	45
New Hampshire		5	6					61		
New Jersey	23	379	30	2	5,564		1	853	1	11
North Dakota	10	19	2		74		2	80	145	3
Porto Rico		34	63	493	116	5	1		0	89
Tennessee	72	27	137	279	1,180	33	1	215	83	56

April, 1930

	Cases
Chicken pox:	
Mississippi	984
Washington	464
Dengue:	
Mississippi	9
Dysentery:	
Mississippi (amebic)	40
Mississippi (bacillary)	575
German measles:	
Washington	231
Hookworm disease:	
Mississippi	269
Impetigo contagiosa:	
Washington	1
Lethargic encephalitis:	
Washington	1
Mumps:	
Mississippi	998
Washington	513
Ophthalmia neonatorum:	
Mississippi	15
Puerperal septicemia:	
Mississippi	44
Washington	7
Rabies in animals:	
Mississippi	3
Rocky Mountain spotted or tick fever:	
Washington	1

Trachoma:	Cases
Mississippi	15
Undulant fever:	
Washington	1
Vincent's angina:	
Washington	184
Whooping cough:	
Mississippi	1,709
Washington	510

May, 1930

Chicken pox:	
Arizona	76
District of Columbia	122
Georgia	129
New Jersey	721
North Dakota	42
Tennessee	167
Colibacillosis:	
Porto Rico	8
Conjunctivitis:	
Georgia	1
Dysentery:	
Arizona	19
Georgia	195
Porto Rico	17
Tennessee	28
Filariasis:	
Porto Rico	6
German measles:	
New Jersey	989
Hookworm, disease:	
Georgia	79
Lead poisoning:	
New Jersey	7
Leprosy:	
Porto Rico	1
Lethargic encephalitis:	
Tennessee	1
Mumps:	
Arizona	103
Georgia	242
Mumps—Continued.	Cases
North Dakota	198
Porto Rico	4
Tennessee	102
Ophthalmia neonatorum:	
New Jersey	3
Porto Rico	2
Paratyphoid fever:	
Georgia	2
Tennessee	3
Puerperal fever:	
Porto Rico	8
Septic sore throat:	
Georgia	47
Tennessee	3
Tetanus:	
Georgia	2
Porto Rico	32
Tetanus, infantile:	
Porto Rico	14
Trachoma:	
Arizona	12
Porto Rico	1
Tularaemia:	
North Dakota	1
Tennessee	1
Typhus fever:	
District of Columbia	1
Georgia	2
Undulant fever:	
Arizona	1
North Dakota	1
Vincent's angina:	
North Dakota	32
Whooping cough:	
Arizona	70
District of Columbia	21
Georgia	208
New Jersey	342
North Dakota	116
Porto Rico	190
Tennessee	119

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 96 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 32,125,000. The estimated population of the 89 cities reporting deaths is more than 30,535,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended June 7, 1930, and June 8, 1929

	1930	1929	Estimated expectancy
Cases reported			
Diphtheria:			
46 States	950	1,151	
96 cities	471	667	760
Measles:			
45 States	15,300	12,467	
96 cities	5,869	4,458	
Meningococcus meningitis:			
46 States	126	229	
96 cities	64	107	
Poliomyelitis:			
47 States	52	29	
Scarlet fever:			
46 States	2,892	3,287	
96 cities	1,313	1,267	965
Smallpox:			
46 States	1,062	948	
96 cities	121	50	58
Typhoid fever:			
46 States	343	431	
96 cities	51	47	58
Deaths reported			
Influenza and pneumonia: 89 cities	533	561	
Smallpox: 89 cities	0	0	

City reports for week ended June 7, 1930

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded and the estimated expectancy is the mean number of cases reported for the week during non-epidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1921 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND								
Maine:								
Portland	14	1	0		0	3	32	1
New Hampshire:								
Concord	0	0	0		0	1	0	1
Nashua	0	0	0		0	6	0	0
Vermont:								
Barre	0	0	0		0	12	0	0
Burlington	1	0	0		0	0	0	0
Massachusetts:								
Boston	48	35	27	1	0	443	46	18
Fall River	0	3	2		0	2	4	0
Springfield	9	2	4		0	2	3	1
Worcester	17	3	1		0	176	1	0
Rhode Island:								
Pawtucket	11	0	0		0	3	0	1
Providence	20	5	4		0	4	1	4
Connecticut:								
Bridgeport	1	5	0		0	0	0	3
Hartford	6	4	1	2	0	1	0	3
New Haven	20	1	0		0	13	10	1

City reports for week ended June 7, 1930—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MIDDLE ATLANTIC								
New York:								
Buffalo	18	10	3		0	16	15	20
New York	202	245	91	8	5	1,554	137	138
Rochester	16	8	1		0	23	6	2
Syracuse	32	4	0		0	25	32	2
New Jersey:								
Camden	3	6	5		0	7	1	2
Newark	11	12	23	2	0	159	12	4
Trenton	3	3	3		0	10	0	2
Pennsylvania:								
Philadelphia	100	53	10	4	4	300	98	26
Pittsburgh	31	14	14		0	157	10	23
Reading	3	2	1		0	1	7	2
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	6	5	4		0	60	12	0
Cleveland	117	23	6	1	2	15	49	12
Columbus	34	3	2		0	64	0	3
Toledo	33	4	2	1	1	43	32	5
Indiana:								
Fort Wayne	0	1	1		0	0	0	0
Indianapolis	28	3	1		0	34	3	10
South Bend	0	1	2		1	0	0	2
Terre Haute	1	0	0		0	58	0	0
Illinois:								
Chicago	75	82	123	3	3	26	82	34
Springfield	0	1	0		0	38	0	0
Michigan:								
Detroit	50	41	32	2	1	327	41	20
Flint	4	2	1		0	156	1	5
Grand Rapids	3	1	0		0	3	0	1
Wisconsin:								
Kenosha	1	0	0		0	2	0	2
Madison	5	0	0			39	2	
Milwaukee	122	12	8		0	21	114	4
Racine	1	1	0		0	21	0	0
Superior	3	0	0		0	0	0	0
WEST NORTH CENTRAL								
Minnesota:								
Duluth	4	0	0		0	27	0	0
Minneapolis	69	13	2		2	34	47	5
St. Paul	34	7	0		1	3	8	3
Iowa:								
Davenport	0	1	0			4	0	
Des Moines	1	1	0			2	0	
Sioux City	0	0	1			9	0	
Waterloo	9	0	0			2	1	
Missouri:								
Kansas City	18	3	1		1	1	1	6
St. Joseph	1	0	0		0	0	0	0
St. Louis	28	28	21			60	15	18
North Dakota:								
Fargo	2	0	0		0	1	16	3
Grand Forks	0	0	0			0	0	
South Dakota:								
Aberdeen	7	0	0			135	1	
Sioux Falls	0	0	0			0	0	
Nebraska:								
Lincoln	22	1	0		0	0	6	1
Omaha	9	2	2		0	35	0	6
Kansas:								
Topeka	5	0	0		0	40	6	1
Wichita	0	1	0		0	5	1	2

City reports for week ended June 7, 1930—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
SOUTH ATLANTIC								
Delaware:								
Wilmington	2	1	1		0	1	0	2
Maryland:								
Baltimore	87	19	9	2	1	17	16	15
Cumberland	4	0	1	1	0	0	0	0
Frederick	0	0	0		0	0	0	1
District of Columbia:								
Washington	25	8	11	2	1	79	0	8
Virginia:								
Lynchburg	7	1	1		0	15	5	0
Norfolk	25	0	0		0	6	9	1
Richmond	2	1	2		0	4	0	4
Roanoke	2	0	0		0	52	0	0
West Virginia:								
Charleston	3	0	0	1	0	2	1	2
Wheeling	7	0	0		0	5	0	1
North Carolina:								
Raleigh	1	0	1		0	0	0	0
Wilmington	0	0	0		0	0	0	1
Winston-Salem	2	0	0	1	0	0	3	1
South Carolina:								
Charleston	0	0	0	6	0	1	0	2
Columbia	2	0	0		0	0	1	1
Georgia:								
Atlanta	3	1	1	8	1	23	0	11
Brunswick	0	0	0		0	2	0	1
Savannah	1	0	0	1	1	6	0	1
Florida:								
Miami	2	2	0		0	6	1	2
St. Petersburg		0			5			0
Tampa	0	0	0		1	54	2	0
EAST SOUTH CENTRAL								
Kentucky:								
Covington	0	0	1		0	1	0	1
Tennessee:								
Memphis	5	1	1		0	1	1	0
Nashville	2	0	0		0	28	0	1
Alabama:								
Birmingham	3	1	0	3	0	30	0	8
Mobile	0	1	0		2	1	0	1
Montgomery	0	0	0			1	0	
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith	0	0	0			12	0	
Little Rock	0	0	0		0	4	0	0
Louisiana:								
New Orleans	1	6	1	1	1	3	0	11
Shreveport	0	1	0		0	0	1	0
Oklahoma:								
Oklahoma City	2	0	0	3	0	10	1	10
Tulsa	2	0	0			5	1	
Texas:								
Dallas	2	2	1		0	11	4	1
Fort Worth	0	1	0		0	11	0	3
Galveston	0	0	1		0	0	0	4
Houston	0	2	7		1	3	0	1
San Antonio	0	2	1		1	0	0	5
MOUNTAIN								
Montana:								
Billings	0	0	0		0	25	0	2
Great Falls	3	0	0		0	2	5	1
Helena	0	0	0		0	2	7	1
Missoula	0	0	0		0	5	0	0
Idaho:								
Boise		1						
Colorado:								
Denver	15	8	2		1	335	12	6
Pueblo	7	1	0		0	67	31	1

City reports for week ended June 7, 1930—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MOUNTAIN—contd.								
New Mexico:								
Albuquerque	4	0	0	----	0	8	2	0
Arizona:								
Phoenix	0	1	2	----	0	1	1	4
Utah:								
Salt Lake City	9	4	0	----	0	183	3	1
Nevada:								
Reno	----	0	----	----	----	----	----	----
PACIFIC								
Washington:								
Seattle	46	3	0	----	----	279	113	----
Spokane	12	2	1	----	----	9	0	----
Tacoma	1	1	2	----	0	201	3	0
Oregon:								
Portland	17	6	3	----	0	22	14	5
Salem	11	0	1	----	----	1	2	----
California:								
Los Angeles	57	31	17	7	0	365	54	10
Sacramento	4	3	1	----	0	23	36	2
San Francisco	32	14	11	5	1	63	43	1

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
NEW ENGLAND											
Maine:											
Portland	2	0	0	0	0	0	0	0	0	10	20
New Hampshire:											
Concord	1	0	0	0	0	0	0	0	0	0	12
Nashua	1	0	0	0	0	0	0	0	0	0	----
Vermont:											
Barre	0	1	0	0	0	2	0	0	0	0	7
Burlington	0	0	0	0	0	0	0	0	0	0	14
Massachusetts:											
Boston	53	58	0	0	0	9	1	2	0	46	200
Fall River	3	4	0	0	0	3	0	0	0	1	24
Springfield	6	1	0	0	0	1	0	0	0	7	43
Worcester	6	12	0	0	0	0	1	0	0	10	45
Rhode Island:											
Pawtucket	1	2	0	0	0	1	0	0	0	7	----
Providence	7	17	0	0	0	2	0	0	1	5	54
Connecticut:											
Bridgeport	8	3	0	0	0	0	0	0	0	0	23
Hartford	3	2	0	0	0	8	1	0	0	2	39
New Haven	3	4	0	0	0	4	0	0	0	6	31
MIDDLE ATLANTIC											
New York:											
Buffalo	22	24	0	0	0	6	0	0	0	16	146
New York	199	180	0	0	0	95	10	12	0	88	1,481
Rochester	8	17	0	0	0	4	1	0	0	3	83
Syracuse	7	12	0	2	0	2	0	0	0	33	57
New Jersey:											
Camden	5	12	0	0	0	0	0	0	0	0	37
Newark	21	18	0	0	0	16	1	0	0	12	116
Trenton	2	8	0	0	0	8	0	0	0	1	65
Pennsylvania:											
Philadelphia	76	117	1	0	0	33	2	1	1	13	416
Pittsburgh	28	18	0	0	0	11	1	0	0	34	175
Reading	3	4	0	0	0	2	0	0	0	8	36

City reports for week ended June 7, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	11	15	2	2	0	12	1	0	0	6	168
Cleveland	33	48	1	0	0	24	0	2	1	83	220
Columbus	6	3	1	1	0	4	0	0	0	2	87
Toledo	8	17	1	5	0	5	0	0	0	2	77
Indiana:											
Fort Wayne	2	4	2	0	0	0	0	1	0	0	25
Indianapolis	9	13	6	8	0	2	1	0	0	4	----
South Bend	2	4	1	0	0	1	0	0	0	0	17
Terre Haute	1	3	0	0	0	0	0	0	0	0	18
Illinois:											
Chicago	93	220	2	0	0	49	2	1	0	72	724
Springfield	3	3	1	0	0	0	0	1	0	8	10
Michigan:											
Detroit	78	97	1	0	0	28	2	1	0	110	320
Flint	7	14	1	1	0	1	0	1	0	18	40
Grand Rapids	5	13	0	0	0	2	0	0	0	1	39
Wisconsin:											
Kenosha	0	3	0	1	0	0	0	0	0	2	11
Madison	1	14	1	0	----	----	0	0	----	30	----
Milwaukee	21	29	0	0	0	6	0	0	0	56	----
Racine	3	1	0	0	0	1	0	0	0	4	14
Superior	2	3	0	0	0	0	0	0	0	0	11
WEST NORTH CENTRAL											
Minnesota:											
Duluth	6	3	0	0	0	0	0	0	1	5	27
Minneapolis	27	20	2	0	0	2	1	0	0	3	93
St. Paul	18	5	0	0	0	4	0	1	0	12	59
Iowa:											
Davenport	0	0	1	49	----	----	0	0	----	0	----
Des Moines	5	3	2	29	----	----	0	0	----	0	38
Sioux City	1	5	0	3	----	----	0	0	----	2	----
Waterloo	2	0	0	10	----	----	0	0	----	1	----
Missouri:											
Kansas City	7	11	0	0	0	10	0	0	0	10	----
St. Joseph	0	8	1	4	0	1	0	1	0	0	19
St. Louis	20	77	0	8	0	6	2	2	0	16	229
North Dakota:											
Fargo	1	0	0	8	0	1	0	0	0	7	12
Grand Forks	0	0	0	2	----	----	0	0	----	0	----
South Dakota:											
Aberdeen	1	0	0	3	----	----	0	0	----	9	----
Sioux Falls	0	0	0	15	----	----	0	0	----	0	10
Nebraska:											
Lincoln	1	4	1	4	0	0	0	0	0	6	11
Omaha	3	6	2	25	0	2	0	0	0	1	54
Kansas:											
Topeka	2	1	0	1	0	0	0	1	0	8	12
Wichita	2	1	1	2	0	1	1	0	0	0	33
SOUTH ATLANTIC											
Delaware:											
Wilmington	3	4	1	0	0	0	0	1	1	5	35
Maryland:											
Baltimore	25	55	0	0	0	20	2	2	0	30	222
Cumberland	0	0	0	0	0	0	0	0	0	4	3
Frederick	0	0	0	0	0	0	0	0	0	0	3
District of Columbia:											
Washington	16	4	1	0	0	12	1	3	0	3	151
Virginia:											
Lynchburg	0	0	0	0	0	0	0	1	0	6	9
Norfolk	1	1	0	0	0	2	0	3	0	1	----
Richmond	2	3	0	0	0	6	1	1	1	1	53
Roanoke	0	0	0	0	0	1	0	0	0	0	16
West Virginia:											
Charleston	0	0	0	1	0	0	0	0	0	0	12
Wheeling	2	0	0	0	0	0	1	0	0	8	16
North Carolina:											
Raleigh	0	0	1	1	0	0	0	0	0	1	13
Wilmington	0	0	1	0	0	2	0	0	1	0	12
Winston-Salem	1	1	1	0	0	3	0	1	0	1	23

City reports for week ended June 7, 1930—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
SOUTH ATLANTIC—continued											
South Carolina:											
Charleston	0	0	1	0	0	3	1	0	0	10	23
Columbia	0	0	0	0	0	1	2	0	0	2	13
Georgia:											
Atlanta	3	16	4	0	0	5	1	1	1	6	107
Brunswick	0	0	0	0	0	1	0	0	0	0	6
Savannah	0	1	0	0	0	4	2	1	1	0	43
Florida:											
Miami	0	0	0	0	0	4	0	0	0	0	27
St. Petersburg	0	----	0	----	0	0	0	----	0	----	13
Tampa	0	1	0	0	0	2	1	0	0	0	20
EAST SOUTH CENTRAL											
Kentucky:											
Covington	1	2	0	0	0	2	0	0	0	0	20
Tennessee:											
Memphis	3	8	1	0	0	0	2	2	0	11	----
Nashville	1	3	1	5	0	2	1	0	1	1	39
Alabama:											
Birmingham	1	3	3	0	0	6	2	0	0	10	68
Mobile	0	0	1	0	0	3	1	0	1	0	26
Montgomery	0	0	1	0	----	----	0	0	----	4	----
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	1	0	0	----	----	0	0	----	4	----
Little Rock	1	0	0	0	0	3	1	2	0	0	----
Louisiana:											
New Orleans	4	13	0	0	0	19	2	4	2	6	163
Shreveport	0	0	0	1	0	1	1	0	0	0	32
Oklahoma:											
Oklahoma City	1	10	2	8	0	4	1	0	0	20	59
Tulsa	1	3	1	6	----	----	1	0	----	11	----
Texas:											
Dallas	2	4	2	1	0	4	1	0	0	6	56
Fort Worth	2	1	1	1	0	2	0	1	0	0	40
Galveston	0	0	0	0	0	1	0	0	0	0	18
Houston	1	1	0	2	0	5	1	3	1	0	55
San Antonio	1	2	0	2	0	5	1	1	0	0	97
MOUNTAIN											
Montana:											
Billings	1	1	0	0	0	0	0	0	0	0	5
Great Falls	1	7	1	1	0	0	0	0	0	0	10
Helena	0	2	0	0	0	0	0	0	0	14	3
Missoula	0	0	0	0	0	0	0	0	0	0	7
Idaho:											
Boise	0	----	0	----	----	----	0	----	----	----	----
Colorado:											
Denver	8	3	0	0	0	6	0	0	0	56	83
Pueblo	1	0	0	1	0	0	0	0	0	0	12
New Mexico:											
Albuquerque	0	0	0	0	0	14	0	0	0	0	22
Arizona:											
Phoenix	0	0	0	0	0	2	0	2	0	0	----
Utah:											
Salt Lake City	2	8	1	1	0	3	0	0	0	41	39
Nevada:											
Reno	0	----	0	----	----	----	0	----	----	----	----
PACIFIC											
Washington:											
Seattle	6	8	1	9	----	----	1	0	----	25	----
Spokane	4	0	4	8	----	----	0	0	----	11	----
Tacoma	3	0	2	0	0	0	0	1	0	9	21
Oregon:											
Portland	4	2	7	10	0	0	0	2	0	5	82
Salem	1	1	1	0	0	0	0	0	0	2	----
California:											
Los Angeles	25	14	4	7	0	42	2	0	1	48	329
Sacramento	2	4	0	4	0	6	1	0	0	0	19
San Francisco	16	20	1	1	0	13	1	0	0	0	152

City reports for week ended June 7, 1930—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
NEW ENGLAND									
Maine:									
Portland	1	1	0	0	0	0	0	0	0
Massachusetts:									
Boston	1	1	0	0	2	0	0	0	0
MIDDLE ATLANTIC									
New York:									
New York City [1]	7	4	2	6	0	0	1	0	0
New Jersey:									
Newark	2	1	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia	1	0	0	0	0	1	0	0	0
Pittsburgh	2	1	0	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cleveland	2	1	0	0	0	0	0	0	0
Indiana:									
Indianapolis	1	1	0	0	0	0	0	0	0
South Bend	1	0	0	0	0	0	0	0	0
Terre Haute	0	1	0	0	0	0	0	0	0
Illinois:									
Chicago	6	2	2	0	0	0	0	0	0
Michigan:									
Detroit	19	9	2	0	0	0	0	1	0
Flint	2	1	0	0	0	0	0	0	0
Wisconsin:									
Madison	1	----	2	----	0	----	0	0	----
Milwaukee	1	0	0	0	0	0	0	1	0
WEST NORTH CENTRAL									
Iowa:									
Sioux City	1	0	0	0	0	0	0	0	0
Missouri:									
Kansas City	1	1	0	0	1	0	0	0	0
St. Louis	3	2	0	0	0	0	0	0	0
SOUTH ATLANTIC [2]									
Virginia:									
Norfolk	1	0	0	0	0	0	0	0	0
Roanoke	0	0	0	0	0	2	0	0	0
South Carolina:									
Charleston [3]	0	0	0	0	11	0	0	0	0
Georgia:									
Atlanta	1	1	0	0	1	0	0	0	0
Savannah	0	0	0	0	0	1	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	3	0	0	0	0	0	0	0	0
Nashville	1	1	0	0	0	0	0	0	0
Alabama:									
Birmingham	2	0	0	0	0	0	0	1	0
Montgomery	0	0	0	0	1	0	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans	1	1	0	0	2	1	0	0	0
Shreveport	0	0	0	0	0	0	0	1	0
Oklahoma:									
Oklahoma City	0	1	0	0	0	0	0	0	1
Texas:									
Dallas	0	0	0	0	0	2	0	0	0
Fort Worth	0	0	0	0	0	1	0	0	0
Houston	0	0	0	0	0	1	0	0	0

[1] Typhus fever: 1 case at New York City, N. Y.
[2] Dengue, 2 cases: 1 case at Charleston, S. C., and 1 case at St. Petersburg, Fla.

City reports for week ended June 7, 1930—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
MOUNTAIN									
Colorado:									
Pueblo	1	1	0	0	0	0	0	0	0
Utah:									
Salt Lake City	2	1	0	0	0	0	0	0	0
PACIFIC									
Washington:									
Seattle	1	0	0	0	0	0	0	0	0
California:									
Los Angeles	2	0	0	0	0	0	0	7	0
San Francisco	1	0	0	0	0	0	0	1	0

The following table gives the rates per 100,000 population for 98 cities for the 5-week period ended June 7, 1930, compared with those for a like period ended June 8, 1929. The population figures used in computing the rates are approximate estimates, authoritative figures for many of the cities not being available. The 98 cities reporting cases have an estimated aggregate population of more than 32,000,000. The 91 cities reporting deaths have more than 30,500,000 estimated population.

Summary of weekly reports from cities, May 4 to June 7, 1930—Annual rates per 100,000 population, compared with rates for the corresponding period of 1929 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	May 10, 1930	May 11, 1929	May 17, 1930	May 18, 1929	May 24, 1930	May 25, 1929	May 31, 1930	June 1, 1929	June 7, 1930	June 8, 1929
98 cities	79	139	76	124	81	135	77	124	[2]76	110
New England	60	118	97	94	62	108	51	90	86	72
Middle Atlantic	89	206	78	159	80	188	71	168	72	148
East North Central	104	145	91	143	117	165	111	155	113	123
West North Central	44	104	72	123	70	100	76	110	51	96
South Atlantic	57	64	49	62	49	49	55	41	49	54
East South Central	7	27	40	27	27	14	40	7	13	21
West South Central	78	88	71	110	56	46	52	57	41	88
Mountain	69	52	34	26	51	61	43	35	[2]18	61
Pacific	57	39	50	56	69	60	78	58	76	56

MEASLES CASE RATES

98 cities	1,443	894	1,285	890	1,185	903	932	659	[2]952	734
New England	2,109	480	1,688	431	1,719	552	1,426	364	1,462	602
Middle Atlantic	1,365	186	1,410	196	1,150	196	991	183	1,076	169
East North Central	936	2,194	822	2,138	692	2,286	529	1,597	517	1,827
West North Central	1,243	1,549	814	1,753	778	1,441	514	1,033	412	1,060
South Atlantic	1,187	521	1,123	474	875	242	725	298	478	238
East South Central	499	41	405	68	641	27	378	55	418	41
West South Central	762	366	788	331	587	430	486	236	123	400
Mountain	8,891	296	6,479	183	6,934	313	5,527	252	[2]5,656	192
Pacific	2,324	422	1,949	425	2,544	529	1,630	398	2,220	408

[1] The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1930 and 1929, respectively.

[2] Boise, Idaho, and Reno, Nev., not included.

Summary of weekly reports from cities, May 4 to June 7, 1930—Annual rates per 100,000 population, compared with rates for the corresponding period of 1929—Continued

SCARLET FEVER CASE RATES

	Week ended—									
	May 10, 1930	May 11, 1929	May 17, 1930	May 18, 1929	May 24, 1930	May 25, 1929	May 31, 1930	June 1, 1929	June 7, 1930	June 8, 1929
98 cities	264	289	231	290	210	268	186	269	[1] 213	209
New England	284	260	239	247	288	281	281	269	230	191
Middle Atlantic	281	209	234	220	215	196	171	193	196	135
East North Central	321	454	311	472	229	449	142	447	296	321
West North Central	233	277	256	281	300	208	209	179	260	165
South Atlantic	222	243	157	210	150	159	115	273	156	300
East South Central	155	130	27	103	115	137	81	123	108	96
West South Central	101	309	78	179	52	118	15	160	78	76
Mountain	360	52	223	104	292	113	94	96	[1] 192	78
Pacific	151	282	149	297	113	336	83	246	109	270

SMALLPOX CASE RATES

98 cities	24	11	23	11	20	14	16	9	[1] 20	8
New England	2	2	0	0	0	7	0	0	0	0
Middle Atlantic	0	0	0	0	0	0	1	0	1	0
East North Central	23	17	16	14	10	20	13	15	8	17
West North Central	99	27	123	15	108	15	55	15	116	12
South Atlantic	0	0	4	2	2	4	9	0	4	2
East South Central	7	27	81	14	34	27	34	7	34	14
West South Central	41	8	22	50	11	15	15	19	22	8
Mountain	77	26	60	148	69	35	60	52	[1] 27	52
Pacific	97	39	54	14	83	75	57	27	68	14

TYPHOID FEVER CASE RATES

98 cities	7	11	8	9	7	8	7	7	[1] 8	8
New England	0	11	9	9	18	7	11	2	4	7
Middle Atlantic	4	3	7	6	4	5	3	3	6	5
East North Central	3	6	2	3	5	3	3	3	4	3
West North Central	8	31	8	6	8	8	9	17	9	8
South Atlantic	15	15	13	17	11	15	13	19	20	17
East South Central	20	27	47	0	27	75	40	34	13	27
West South Central	4	53	37	65	11	11	22	19	37	27
Mountain	17	0	0	0	0	17	9	0	[1] 0	0
Pacific	24	7	2	7	7	10	9	2	2	12

INFLUENZA DEATH RATES

91 cities	10	10	8	8	6	10	4	7	[1] 5	7
New England	9	2	0	2	4	7	0	7	0	2
Middle Atlantic	10	8	7	8	8	8	4	4	4	5
East North Central	9	7	4	7	5	8	4	9	4	6
West North Central	3	3	3	0	0	15	3	3	12	3
South Atlantic	5	17	18	7	5	6	4	6	9	7
East South Central	15	37	44	30	22	45	37	0	15	22
West South Central	31	27	4	4	8	27	4	12	11	16
Mountain	0	26	9	17	9	9	17	17	[1] 9	35
Pacific	9	13	15	22	6	6	3	16	3	16

PNEUMONIA DEATH RATES

91 cities	137	109	104	106	103	116	80	105	[1] 86	90
New England	120	90	102	88	100	121	89	106	73	65
Middle Atlantic	185	123	130	114	137	129	94	113	106	105
East North Central	93	101	68	115	80	118	54	101	59	96
West North Central	124	105	106	75	83	123	68	120	130	81
South Atlantic	121	109	156	120	101	94	82	112	93	67
East South Central	162	149	96	90	88	104	110	112	81	60
West South Central	176	94	84	109	88	66	130	66	84	90
Mountain	120	87	77	13	120	139	77	113	[1] 110	61
Pacific	64	94	58	47	43	82	64	63	40	69

[1] Boise, Idaho, and Reno, Nev., not included.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended May 31, 1930.—The Department of Pensions and National Health reports cases of certain communicable diseases in Canada for the week ended May 31, 1930, as follows:

Province	Cerebro-spinal fever	Influ-enza	Polio-myelitis	Smallpox	Typhoid fever
Prince Edward Island [1]					
Nova Scotia		2			
New Brunswick					1
Quebec	2				8
Ontario	1	2	1	20	5
Manitoba				3	
Saskatchewan				3	1
Alberta	1				
British Columbia	1			2	2
Total	5	4	1	28	17

[1] No case of any disease included in the table was reported during the week.

Quebec Province—Communicable diseases—Week ended June 7, 1930.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended June 7, 1930, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Mumps	64
Chicken pox	103	Ophthalmia neonatorum	1
Diphtheria	38	Poliomyelitis	1
Erysipelas	5	Tuberculosis	50
German measles	38	Typhoid fever	7
Influenza	4	Whooping cough	27
Measles	93		

Ontario Province—Communicable diseases (comparative)—Five weeks ended May 31, 1930.—The following table shows the number of cases of certain communicable diseases, with deaths therefrom, reported in the Province of Ontario, Canada, for the five weeks ended May 31, 1930, as compared with the corresponding period of 1929.

Disease	5 weeks, 1929		5 weeks, 1930	
	Cases	Deaths	Cases	Deaths
Cerebrospinal meningitis	10	2	14	7
Chancroid			1	
Chicken pox	576		821	1
Conjunctivitis		2		
Diphtheria	129	9	237	18
Erysipelas			3	
German measles	33		994	
Goiter			3	2
Gonorrhea	156		194	
Influenza	26	3	30	10
Measles	1,889	1	1,883	2
Mumps	526		169	
Paratyphoid fever	1	1		
Pneumonia		132		236
Poliomyelitis			2	
Puerperal septicemia		1		1
Scarlet fever	378	1	881	11
Septic sore throat	6		8	
Syphilis	145		240	
Smallpox [1]	86		94	
Tuberculosis	72	50	194	75
Typhoid fever	35	1	36	1
Undulant fever			5	
Whooping cough	432	1	231	1

[1] Cases of smallpox for this period were distributed as follows: Ottawa, 27; Sudbury, 16; Hanover, 7; Rayside, 6; Elderslie, 5; Sullivan, 5; Toronto, 4; Bosanquet, 3; Williamsburg, 3; Bentinch, Neebing, and Welland, 2 cases each, and one case in each of the following places: Chesley, Alfred, Pembroke, Coniston, Wallaceburg, Albion, Elora, Casselman, Lanark Tp., St. Catherines, Listowel, and Brudensell and Lyndock.

CHINA

Meningitis.—During the two weeks ended May 31, 1930, 11 cases of meningitis, with 10 deaths, were reported in Canton, China.

GREAT BRITAIN

Scotland—Vital statistics—Quarter ended March 31, 1930.—The Registrar General of Scotland has published the following statistics for the first quarter of the year 1930:

Population, estimated	4,879,700
Births	23,684
Birth rate per 1,000 population	19.7
Deaths	19,052
Death rate per 1,000 population	15.8
Marriages	7,298
Deaths under 1 year	2,598
Deaths under 1 year per 1,000 births	110
Deaths from—	
Bronchitis	1,533
Broncho-pneumonia	1,089
Cerebrospinal meningitis	63
Diabetes	173
Diphtheria	157
Dysentery	2
Erysipelas	68
Heart disease	2,585
Influenza	37
Deaths from—Continued.	
Lethargic encephalitis	36
Malaria	2
Measles	355
Nephritis (acute)	69
Nephritis (chronic)	485
Paratyphoid fever	2
Pneumonia	1,006
Poliomyelitis	6
Puerperal sepsis	71
Scarlet fever	44
Syphilis	35
Tetanus	1
Tuberculosis (pulmonary)	797
Tuberculosis (other forms)	357
Typhoid fever	4
Whooping cough	178

ITALY

Communicable diseases—Four weeks ended March 16, 1930.—During the four weeks ended March 16, 1930, certain communicable diseases were reported in Italy as follows:

Disease	Feb. 17-23		Feb. 24-Mar. 2		Mar. 3-9		Mar. 10-16	
	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected	Cases	Communes affected
Anthrax	13	12	8	7	16	13	19	18
Cerebrospinal meningitis	12	10	19	17	12	11	12	12
Chicken pox	311	106	356	139	463	151	522	173
Diphtheria and croup	520	285	410	282	681	369	816	414
Dysentery			4	1	2	2	15	10
Lethargic encephalitis	6	6	3	3	6	5	3	3
Measles	3,408	333	3,308	388	2,805	358	4,938	471
Poliomyelitis	4	4	3	3	2	2	4	4
Scarlet fever	285	116	304	112	354	104	386	161
Typhoid fever	262	144	245	137	287	166	379	211

MEXICO

Vera Cruz—Communicable diseases—Six weeks ended May 31, 1930.—During the six weeks ended May 31, 1930, deaths from certain communicable diseases were reported in Vera Cruz, Mexico, as follows:

Disease	Week ended—						
	Apr. 26, 1930	May 3, 1930	May 10, 1930	May 17, 1930	May 24, 1930	May 31, 1930	Total
Bronchitis	2		1	1			4
Cancer	2	2	1	2	1	1	9
Cerebrospinal meningitis	1	2					3
Dysentery			1				1
Gastro-intestinal disorders	12	8	10	12	10	16	68
Hookworm	1				1	1	3
Malaria			2	1		1	4
Measles					1		1
Pneumonia				1	2	5	8
Syphilis	1	1			1		3
Tetanus		2			2	1	5
Tuberculosis	4	3	6	9	8	4	34
Typhoid fever		1		1	2	1	5

Tampico—Communicable diseases—May, 1930.—During the month of May, 1930, certain communicable diseases were reported in Tampico, Mexico, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria		3	Measles	9	2
Enteritis (various)		74	Smallpox	6	1
Influenza	3		Tuberculosis	45	30
Leprosy	1		Typhoid fever	2	2
Malaria	69	6	Whooping cough	10	2

PORTO RICO

San Juan—Communicable diseases—Five weeks ended May 31, 1930.—During the five weeks ended May 31, 1930, cases of certain communicable diseases were reported in San Juan, Porto Rico, as follows:

Disease	Cases	Disease	Cases
Diphtheria	7	Puerperal fever	1
Malaria	8	Tetanus (infantile)	2
Mumps	2	Tuberculosis	72
Ophthalmia neonatorum	1	Typhoid fever	1

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

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

CHOLERA

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
China:																		
Canton	C													1	1	1		
Manchuria—Dairen	C			1														
Swatow	C																	3
India	C	12,350	6,461	5,914	1,834	2,278	2,687	4,018		7,436	15,870							
	D	6,507	3,606	3,371	929	1,225	1,526	2,186		4,345	10,403							
Bassein	C								3	1	1	2	3	4				
	D								2	1	1	1	3	2				
Bombay	C							4										
Calcutta	C	138	202	269	97	53	110	94	137	165	165		194	175	142	98		
	D	90	110	153	73	25	51	71	85	118	118	93	125	107	83	57		
Negapatam	C	1	12															
	D	1	4															
Rangoon	C	6	3	3	1	1						1		5	2	2		
	D	5	3	1	1	1						1		1		2		
Tuticorin	C	35	3															
	D	9	1															
India (French):																		
Chandernagor	C	1		4	1				1	2		3	2					
	D	1		2		1		2			4	1	1	4				
Karikal	C	1		4			1	11		1								
	D			1			1	8		1								
Indo-China (see also table below):																		
Pnompenh	C	3	11	9							2		1					
	D	3	8	7	1	2	1	2						2	2	1		
Saigon and Cholon	C	1	2	5	1	6	1	6	17	12	19	28	59	40	48	13		
	D	1	2	4	1	5			10	10	13	22	43	27	24	7		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

CHOLERA—Continued

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
Philippine Islands:																		
Bulacan, Malolos	C																1	
	D																1	
Cebu—																		
Bantayan	C																3	8
	D																3	7
Santa Fe	C																1	
	D																1	
Manila	C														[1] 1			
Negros—																		
Cadiz	C															10	2	
	D															7	1	
Escalante	C																1	
	D																1	
San Antonio	C																	1
	D																	1
Rizal—Navatos	C																1	
	D																1	
Siam	C	11	3	7				1	8	7	3		12	4	6			
	D	2		4					6	3	2		10	2	2			
Bangkok	C	9	3	2		1		1	1	5	4	5			6	3		
	D	1						1	1	2	1				2	1		
Nagara Pathom	C			1							4	6						
	D			1							2							
On vessel:																		
S. S. at Suva, Fiji Islands	C			1														
S. S. Sutley, at Batavia, from Calcutta	C			1														
S. S. Sassari, at Massoua, from Jeddah	C															1		
	D															1		
On small boat at Port Cebu, from Bantayan Island	C																1	
	D																1	

[1] Diagnosis not confirmed.

Place		November, 1929	December, 1929	January, 1930			February, 1930			March, 1930			April, 1930		
				1-10	11-20	21-31	1-10	11-20	21-28	1-10	11-20	21-31	1-10	11-20	21-30
Indo-China (French) (see also table above):															
Annam [1]	C	2		1			2	2			52				60
Cambodia [1]	C	43	41	71		76	41	3	46	49	32		18	6	
Cochin-China [1]	C	15	46	67		110	64	39	21	5	22	55	48		

PLAGUE

Place		Dec. 15, 1929-Jan. 11, 1930	Jan. 12-Feb. 8, 1930	Feb. 9-Mar. 8, 1930	Week ended—												
					March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
Argentina:																		
Andalgala.[2]																		
Rosario	C		P															
Santa Fe	C		6															
Villa Lia	D			2														
Azores: Ponta Delgada	C	P																
Brazil:																		
Rio de Janeiro	C		1															
	D		1															
Sao Paulo.[3]																		
British East Africa (see also table below):																		
Tanganyika	C			7						11	33							
	D									10	10							
Uganda	C	127	82	47	30	40		28	27	20	23							
	D	112	70	43	26	33		28	27	19	21							
Ceylon:																		
Colombo	C	2	4	3		1	1	2			1		4	1		1		
	D	1	4	3		1	1	2			1		3	1		1		
Plague-infected rats			1	3		2			2			2						
Chile: Antofagasta	C		1	1				1				1						
	D							2				1						

[1] Reports incomplete.
[2] On Mar. 11, 3 deaths from bubonic plague were reported in Andalgala, Catamarca Province, Argentina, since Feb. 5, 1930.
[3] 21 cases of plague with 8 deaths were reported Jan. 29, 1930, in the State of Sao Paulo, Brazil; 15 of these cases were in the city of Sao Paulo.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
Dutch East Indies:																		
Batavia and West Java	C	286	167	153	34	41	23	26	27	16	20	1						
	D	280	164	150	33	42	23	25	27	16	20							
Plague-infected rats			3	3		2		1		6	2				3	2		
Celebes—Makassar	C		1															
	D		1															
Plague-infected rodents		4																
East Java and Madura	C	2																
	D	2																
Java and Madura	D	458	317	296	59	73	45	46	59	40			8					
Ecuador (see table below).																		
Egypt:																		
Alexandria	C	2	4	1	1	1	1	1			1	1	2	3	3	5	3	
	D	3	1			1					1	1			1	2		
Assiout	C	4									7	7	3	9	2	6	4	
	D	2									3	2		3	1	1		
Assuan	C	2																
Beheira	C		2		3	1												
Beni Suef	C				3		1											
Dakahlieh	C	1		8	4		1		2		1	2	3	1	2	5	1	
	D	1			1									1	1			
Gharbieh	C	2	1								1							
	D	1									1							
Girga	C								1									
Minieh	C														6	1	1	
	D															1		
Port Said	C								1					1	1		1	
Greece (see also table below):																		
Patras	C					P	1											
Piraeus	C		1															
Pyrgos	C							1										
India	C	4,713	4,814	5,639	1,090	1,187	1,005	805		343	535							
	D	3,093	3,308	3,940	838	911	889	706		229	517							
Bassein	C		1		2	1												
	D		1		1													

Bombay	C		1	1		2	2	3		4			4	1					
	D		1	1		2	2	1	1	3	4		1	4					
Plague-infected rats		29	28	31	31	7	33	25	20	28	25	35	23	39		19			
Madras Presidency	C	336	27	230	56	67	14	20	12	15	9								
	D	174	13	140	34	32	6	15	6	8	4								
Rangoon	C	3	3	7		1	2			3		2		1	3				
	D	4	2	6		1	2			2	1	1	1	1	1				
Plague-infected rats			1	7			2	1	1	2		1	1	3	1				
India (Portuguese)	D												7						
Indo-China (see also table below):																			
Pnompenh	C		1						2			1	1			2			
	D		2	13	7	2	2	2	2	1	1				1				
Saigon and Cholon	C	1	2				1						1				1		
	D	1	2				1												
Iraq:																			
Baghdad	C	2	6	6	2	1	1	3		2		4	7	11	7	12	12		
	D	1	2	1	1			3				2	3	5	4	6	7		
Basra	C	1																	
Naudham	C	1																	
Japan: Osaka (vicinity of)—Plague-infected rats		1	7	6	2		1	1	1	1	1								
Kwang-Chow-Wan	C		25	25				7											
Madagascar (see also table below):																			
Tamatave	C	4								1									
	D	3																	
Morocco	C	12	4	48	8	5	26	16	14	41	34	32	19	22	18				
	D			13	4	1	7	6	6	26	12	11	11	14	6				
Nigeria: Lagos	C	15	6	7	4	1	7	1					1	1					
	D	15	6	7	4			1					1	1					
Plague-infected rats		18	44	42	7	12	3	3	3		1		1						
Senegal (see table below).																			
Siam	C	11	8	17	1	4	8	3	4		1								
	D	9	6	13	1	3	8	3	4		2								
Bangkok	C	1		1	1	1	2	1					1	1	3				
	D	1		1	1	1	2						1		3				
Nagara Pathom	C	6	7	5				1	4	3	2	1							
	D	5	7	6				1	4	3	1	1							
Nagara Rajsima	C	2	2	2				1		1									
	D	1						1		1									
Syria: Beirut	C																		1
Tunisia:																			
Sfax district	C	14	18	22							1		17						
Tunis	C	42	6	5	1														
	D	21																	
Union of Socialist Soviet Republics:																			
Kazaks	C	P																	
Salsk Region	C																1		
	D																1		
Stavropol Region	C																1		
	D																1		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
Union of South Africa:																		
Cape Province	C	------	1	2	------	1	------	------	------	------	------	------	------	------	------	------	------	------
	D	7	------	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------
Orange Free State	C	5	15	11	3	1	------	1	1	------	------	------	------	------	------	------	------	------
	D	1	9	3	2	1	------	------	------	------	------	------	------	------	------	------	------	------
Transvaal	C	------	8	2	------	1	------	------	------	------	------	------	------	------	------	------	------	------
	D	------	3	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------
On vessel:																		
At Rio de Janeiro, Brazil, from Argentina	C	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

Place		December, 1929	January, 1930	February, 1930	March, 1930	April, 1930	May, 1930
British East Africa (see also table above):							
Kenya	C	54	34	------	------	------	------
Uganda	C	216	184	109	------	------	------
	D	199	155	99	------	------	------
Ecuador: Guayaquil	C	17	4	2	2	0	------
	D	6	2	2	------	0	------
Plague-infected rats		13	4	2	2	0	------
Ecuador (outside of Guayaquil)	C	19	4	------	------	------	------
	D	5	2	------	------	------	------
Greece (see also table above)	C	1	------	------	------	1	------
Indo-China (see also table above)	C	10	10	30	27	4	------
Madagascar (see also table above)	C	264	282	------	------	------	------
	D	248	258	------	------	------	------
Ambositra Province	C	111	128	49	25	------	------
	D	90	111	41	20	------	------
Antisirabe Province	C	16	26	22	38	------	------
	D	16	25	22	36	------	------
Itasy Province	C	19	31	------	4	------	------
	D	16	31	------	4	------	------

Place		December, 1929	January, 1930	February, 1930	March, 1930	April, 1930	May 1930
Madagascar—Continued							
Mlarinarivo Province	C	3	------	25	14	------	------
	D	3	------	25	14	------	------
Moramanga Province	C	12	22	7	5	------	------
	D	12	21	4	5	------	------
Tamatave Province	C	2	3	------	------	------	------
	D	2	1	------	------	------	------
Tananarive Province	C	97	88	110	52	------	------
	D	98	83	107	52	------	------
Senegal:							
Baol [1]	C	5	------	------	18	24	10
	D	2	------	------	8	12	9
Dakar [1]	C	8	------	------	------	2	34
	D	1	------	------	------	2	26
Louga [1]	C	------	------	2	------	33	33
	D	------	------	------	------	10	19
Thies [1]	C	------	3	------	3	12	9
	D	------	------	------	2	9	7
Tivaouane [1]	C	------	1	------	11	71	95
	D	------	------	------	8	38	50

[1] Incomplete reports.

SMALLPOX

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
Algeria:																		
Algiers	C	-------	6	1	2	2	1	-------	1	-------	-------	-------	-------	1	-------	-------	-------	-------
Constantine	C	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Oran	C	-------	5	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Arabia: Aden	C	1	1	2	-------	1	1	1	-------	-------	1	-------	-------	-------	-------	-------	-------	-------
Bolivia: La Paz (see table below).																		
Brazil: Rio de Janeiro	C	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
British Borneo: Sarawak	C	-------	4	19	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
British East Africa (see also table below):																		
Tanganyika	C	27	5	49	17	32	53	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	5	-------	8	3	1	3	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
British South Africa: Southern Rhodesia	C	33	1	6	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	42	-------	-------	-------
	D	6	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	8	-------	-------	-------
Canada:																		
Alberta	C	16	22	4	2	5	2	1	3	1	-------	-------	-------	-------	-------	-------	-------	-------
Edmonton	C	15	19	1	1	-------	1	2	3	-------	-------	-------	-------	-------	-------	-------	-------	-------
British Columbia—Vancouver	C	17	16	16	1	7	3	9	8	1	5	3	-------	-------	2	2	-------	-------
Manitoba	C	8	6	2	2	1	1	-------	2	-------	-------	2	-------	-------	7	3	-------	-------
Ontario	C	51	63	86	38	27	26	9	17	30	18	12	14	24	24	20	-------	-------
Fort William	C	-------	4	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
North Bay	C	-------	2	1	-------	-------	-------	-------	-------	-------	-------	-------	1	-------	-------	-------	-------	-------
Ottawa	C	7	10	11	9	-------	6	4	8	4	7	2	3	10	7	5	6	-------
Toronto	C	-------	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	3	1	2	1
Quebec	C	3	11	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Montreal	C	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Saskatchewan	C	61	86	76	9	11	15	12	3	10	7	21	20	6	10	-------	-------	-------
Regina	C	31	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	1	-------	3	-------	-------	-------
Ceylon:																		
Angoda, Western Province	C	-------	-------	10	-------	-------	-------	-------	-------	-------	-------	6	-------	-------	-------	-------	-------	-------
	D	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	2	-------	-------	-------	-------	-------	-------
Colombo	C	1	1	3	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	-------	-------	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
China:																		
Canton	C	5	7	11	1	1	4	-------	-------	2	1	-------	-------	-------	-------	-------	-------	-------
	D	-------	2	3	-------	1	-------	1	1	1	-------	1	-------	-------	-------	-------	-------	-------
Chungking	C	P	P	P	P	P	P	P	P	P	P	P	P	-------	-------	-------	-------	-------
Foochow	C	P	P	P	P	-------	-------	P	-------	P	-------	P	-------	-------	-------	-------	-------	-------
Hong Kong	C	102	118	62	12	10	5	11	20	7	-------	1	5	5	2	-------	-------	-------
	D	73	109	51	6	10	4	5	11	9	3	-------	4	2	3	-------	-------	-------

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
China—Continued.																		
Manchuria—																		
Harbin	C	1	3							1								
Kwantung—Dairen	C	1	6	5						1			1		7			
Nanking	C	P	P	P	P				P			P	P					
Shanghai—																		
Foreigners only	C	7	5	2	1		1		2	1				1				
Including natives	D	6	8	7	4	1	3	2	4	3	2	1		1	2	2		
Swatow	D	2	3	6		3	2	1	2			1	1					
Tientsin	C	2	1	1		2			1			1	1					
Chosen (see table below).																		
Colombia:																		
Barranquilla	C	1		102	1	1			1									
Buenaventura	C	13		1					7	5	2	1	2		1	1		
Costa Rica:																		
Port Limon	C								1	1	2	2				2	2	
San Jose [1]	C						10		7									
Curacao (alastrim)	C				10	3		1			1	1	2					
Dahomey (see table below).																		
Dutch East Indies:																		
Belawan Deli	C	1																
Borneo	C		1			25	98	62	17	43	20	10						
	D		1			1	5	6	16	12	2	1						
Java—																		
Batavia and West Java	C	17	14	14	2	10	16	50	30	25	8	1	1		5	1		
	D	10	7	7	1	1	2	2	6	1	3	1	1			2		
East Java and Madura	C																	
Sanggi Islands	C	17	25	12		5												
	D	3				1												
Sumatra	C	1	2		48													
	D				5													
Egypt: Port Said	C		2						1					1				

[1] 5 cases of smallpox were reported Apr. 14 in Costa Rica outside of city of San Jose

Great Britain:																		
England and Wales	C	1,005	1,455	1,530	433	361	449	457	423	345	353	306	462	324	304			
Ashton under Lyne	C	3	4	29	5	4	2	4	9	3	4	2	6	3	4			
Bradford	C	8	5	2					1			2		1				
Cardiff	C						2		1	2								
Leeds	C		6	11	6	3	4	3	1	1								
London	C	480	597	699	210	124	195	181	169	169	129	137	222	138	148			
London and Great Towns	C	799	1,101	1,156	323	243	350	332	308	264	265	229	339	250	235			
	D		2	5	1		1	1	2	1	1							
Sheffield	C						5	3	1	1								
Stoke-on-Trent	C	12	12	41	18	23	40	41	17	23	33	12	19	9	13			
Greece: Patras	C	1																
Hedjaz	C	11	11															
India	C	12,789	26,524	36,036	9,269	10,122	10,174	9,764		7,786	8,385							
	D	3,730	6,186	7,710	1,826	2,128	2,213	1,948		1,543	1,779							
Bombay	C	119	342	638	233	187	114	184	143	114	89	84	52	68	58	40		
	D	57	164	314	123	114	78	116	88	78	64	44	33	49	44	35		
Calcutta	C	88	185	399	106	155		100	153	116	122		109	70	52	71		
	D	62	130	287	77	138		90	124	97	103		94	72	40	52		
Cochin	C	234	234	184	87	71	72	61	56	49	58	20	13	8	7	9		
	D	20	27	29	14	11	3	7	3	4	6	2	5	1	2			
Karachi	C	17	30	38	14	13	12	8	10	9	7	4		6	7	1		
	D	11	9	16	5	3	3	4	10	3	2	2	2		1	1		
Madras	C	85	105	159	38	53	43	39	55	26	27	25	24	13	15	20		
	D	16	16	29	8	9	12	7	6	6	5	10	4	5	6			
Moulmein	C	18	65	143	39	43	40	25	10		33		27	29	20			
	D	9	18	40	15	9	8	9	4		3		4	6	5			
Negapatam	C			1											1			
Rangoon	C	2	7	7	5	1	3	1		1	1	2	2		3	1		
	D		4	2	2	1	2						1					
Tuticorin	C		3												5			
Vizagapatam	C	2	5	9	4	8	53	4	1		2	3	3	1	1			
	D			1	1	1	14	2	1			1		3				
India (French):																		
Chandernagor	C		3	11		4	2		4		6		6	2	8	8		
	D			5			2				2		2	4	1			
Karikal	C		3	12		10	12	2	8	9	2		6	5	1			
	D		3	8		5	2		3	3	2		2	1				
Pondicherry Province	C	20	22	52		9	12		12	1	11		9	13	10	8		
	D	19	19	40		7	6		11	1	8		7	12	10	7		
India (Portuguese)	C		16	50	5	21	3	9	5	6	15	17						
	D			6		1		1			5	3						
Indo-China (see also table below):																		
Pnompenh	C												1		1	1		
	D		1							1	1							
Saigon and Cholon	C	4	3	4		2		1			4	1	1					
	D	2	3	2		1				1	3	1		1		1		
Iraq:																		
Baghdad	C	16	7	3					1	2	3	2				1		
	D	5	3	1								1						
Basra	C			1								1						
Mossoul Liwa	C	80	26	12						22			13		8			
	D	3	7	2						3			2		1			

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930					June, 1930	
					15	22	29	5	12	19	26	3	10	17	24	31	7	14
Ivory Coast (see table below).																		
Macao	D			2	1	2			1			1	1					
Mexico (see also table below):																		
Jalisco (State): Guadalajara	D	9	9	14	3	7	5	7	6	4	8	2			6	1	4	
Juarez	C	3	2	3				2										
	D	2	1	1														
Mexico City and surrounding territory [1]	C	25	30	38	26	13	21	46	36	19	20	24	30					
	D	4	7	21	3	9	6	13	14	8	14	11	6					
Morelos State. [2]																		
Progreso	C														1			
	D														1			
San Luis Potosi	C			1														
	D			1														
Morocco (see table below).																		
Netherlands: Rotterdam	C	1																
	D																	
Nigeria (see also table below): Lagos	C	2	5	2				1	1									
	D	1	2															
Persia (see table below).																		
Philippine Islands: Sarangani and Balut Islands [3]	D	40	18	3														
Poland	C	2		2							2	5		1				
Portugal: Lisbon	C	6	4	7		4	1	2	2	3	3		6		2			
Rumania	C		1	1	1			1										
Siam	C	42		2					2	2	2	2	2					
	D	9	1							2	2							
Somaliland, British: Boales	C	5	35	19		2												
	D	9	8	2	2	3	1											
Straits Settlements	C		2				2	3	2	1		2	1	3	2			
	D		1				1		1			1		1	1			
Sudan (Anglo-Egyptian)	C	290	230	79	8	5	22	25	2	9	31			5	13	1	4	8
	D	65	34	6		2		3	1		3				1	1		
Sudan (French) (see table below).																		
Syria (see table below).																		
Tunisia: Tunis	C	20	7	3			2	1			1	3						
Turkey (see table below).																		

Place		Feb. 1-10	Feb. 11-20	Feb. 21-28	Mar. 1-10	Mar. 11-20	Mar. 21-31	Apr. 1-10	Apr. 11-20	Apr. 21-30	May 1-10	May 11-20
Union of South Africa:												
Cape Province	C	P	P		P		P					
Natal	C											
Orange Free State	C	P	P	P								
Transvaal	C	P	P	P								
Upper Volta	C	1		2								
Zanzibar	C	9	2	2								
On vessel:												
S. S. Tairoa, at Liverpool, from London	C											
S. S. Karagola, at Zanzibar, from India	C											
S. S. Karagola, at Lourenço Marques, from India	C											
S. S. Elysia, at Port Sudan, from Bombay	C						1					
S. S. Naldera, at Port Said	C							1				

Place		Nov. 1929	Dec. 1929	Jan. 1930	Feb. 1-10	Feb. 11-20	Feb. 21-28	Mar. 1-10	Mar. 11-20	Mar. 21-31	Apr. 1-10	Apr. 11-20	Apr. 21-30	May 1-10	May 11-20
Belgian Congo	C	42	74												
	D	2	4												
Dahomey	C	19	19												
Indo-China (see also table above)	C	245	142	460	148	286				26	261				
Ivory Coast	C								7						
Sudan (French)	C	P	17	229	12	P	201		200	409	371		150	40	16
	D			25	1		10		18	31	30		6	7	
Syria: Beirut	C	60	25	70	4	7	7	4	8	5	10	2	7		
	D	6													
Taiwan: Taihoku	C					31	12	31	12	15	10	2			

Place		Nov. 1929	Dec. 1929	Jan. 1930	Feb. 1930	March 1930	April 1930
Bolivia: La Paz	C	22					
British East Africa (see also table above):							
Kenya	C	278	168	12	12	6	
Chosen	C	2		1	4		
Mexico: Durango (see also table above)	D	2	4	12	6	5	4
Morocco	C	41	84	29	74		10

Place		Nov. 1929	Dec. 1929	Jan. 1930	Feb. 1930	March 1930	April 1930
Nigeria	C	228	293				
	D	45	70				
Persia	C		P				
	D	37					
Turkey	C	136	883	215	114		3
	D	12	457	66	42		

[1] During the month of March, 1930, 100 cases of smallpox were reported in Mexico City, Mexico, and surrounding territory.
[2] Newspaper reports of Feb. 4 show an epidemic of smallpox in Ionacatepec, Morelos State, Mexico, and vicinity giving 600 deaths in preceding 2 weeks.
[3] On Feb. 1, 1930, 317 cases of smallpox with 102 deaths were reported to that date in the Sarangani and Balut Islands.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

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

Place		Nov. 17–Dec. 14, 1929	Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Week ended— March, 1930			April, 1930				May, 1930				
						15	22	29	5	12	19	26	3	10	17	24	31
Algeria:																	
Algiers	C	1	14	3	4	2	1	----	3	2	3	2	1	1	2	4	----
Constantine Department	C	3	2	4	5	2	3	----	6	4	9	2	----	----	4	----	----
Oran	C	1	----	2	----	----	----	----	----	----	----	----	----	----	----	----	----
Bolivia: La Paz	C	14	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Brazil: Sao Paulo [1]																	
Bulgaria	C	9	41	----	13	9	----	----	----	15	----	----	----	1	----	5	----
	D	1	2	----	1	----	----	----	----	1	----	----	----	1	----	----	----
Sofia	C	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
Chile:																	
Talcahuano	D	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
Valparaiso	C	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
China:																	
Manchuria—Harbin	C	----	----	----	1	----	----	----	4	5	----	20	27	----	----	----	----
Shanghai	C	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----
Tientsin	C	----	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----
Chosen (see table below).																	
Czechoslovakia (see table below).																	
Egypt:																	
Alexandria	C	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----
Assuan	C	----	9	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	D	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Beheira Province	C	----	7	14	18	----	----	2	----	----	----	2	----	----	21	9	10
	D	----	----	----	5	----	----	----	----	----	----	----	----	----	4	4	1
Cairo	C	1	----	----	5	----	----	----	----	----	----	----	----	----	----	----	----
	D	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Dakahlieh	C	----	11	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	D	----	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Port Said	C	----	----	2	1	----	----	----	----	----	----	----	----	----	----	----	----
Suez	C	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
Great Britain: Scotland—																	
Glasgow	C	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----
	D	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----
Greece (see table below).																	
Iraq: Baghdad Liwa	C	----	1	----	----	----	----	----	2	----	----	----	----	----	----	----	----
	D	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Ireland:																	
Irish Free State	C		1														
Ballina—Mayo County	C																2
Dingle—Kerry County	C											3	2				
Swinford—Mayo County	C														7	7	
Northern Ireland—Cookstown	C				3												
Latvia (see table below).																	
Lithuania (see table below).																	
Mexico: Mexico City, including municipalities in Federal District	C	5	6	12	9		2	1	1	2	1		1				
	D		2	4				1		2	1		1				
Morocco	C	2	6	23	21	4	7	14	13	6	5	3	1	3	6	1	
	D							4	3	2	1					1	
Palestine	C	1			1	1	1	2	2		1				2		
Poland	C	74	61	296	183	69	54	43	61	59	64	53	67	64	45	34	
	D	10	4	21	8	5	2	2	4	4	2	3	6	2	2		
Portugal:																	
Lisbon	C												4				
Oporto	C	3			1		2			1							
Rumania	C	103	82	241	293	90		95									
	D	10	5	25	23	7		5									
Tunisia	C	3	2		3									2		1	
Turkey (see table below).																	
Union of South Africa:																	
Cape Province	C	P	P	P	P	P	P		P	P	P						
Natal	C	P	P	1	3				P	P	P	P					
Orange Free State	C	P	P	P	P	P	P		P								
Transvaal	C									P	P	P					
Yugoslavia (see table below).																	

Place		November, 1929	December, 1929	January, 1930	February, 1930	March, 1930	April, 1930
Chosen: Seoul	C		1		17		
Czechoslovakia	C	3		10	2	42	29
France	C		1				
Greece: Athens	C		6	12	6	3	1
Latvia	C		2	18			

Place		November, 1929	December, 1929	January, 1930	February, 1930	March, 1930	April, 1930
Lithuania	C	4	5	2	70	62	
	D	1	1		5	4	
Turkey	C	2	4	2	3	1	3
Yugoslavia	C		6	26	33	46	
	D		1	3	5	2	

YELLOW FEVER

On April 22, 1930, two cases of yellow fever were reported in Mage, Brazil, located on the Leopoldina Railway, between Rio de Janeiro and Nichtheroy; one case of yellow fever was reported in Campos, Rio de Janeiro Province, Brazil, on May 23, 1930; and one case of yellow fever was reported in the Gold Coast during the week ended December 21, 1929. A case of yellow fever was reported in Monrovia, Liberia, on June 3, 1930.

[1] Press reports show that 10 deaths from typhus fever occurred in Sao Paulo, Brazil, from Nov. 3 to 30, 1929.