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PHARMACOLOGICAL AND CHEMICAL STUDIES OF THE CAUSE OF SO-CALLED GINGER PARALYSIS

A PRELIMINARY REPORT[1]

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A peculiar form of paralysis, perhaps unlike anything ever known before, has recently afflicted a relatively large proportion of the population throughout some of the midwestern and southwestern States. Definite figures on the extent of the disease are not available, but it is certain that the numbers run into the thousands. An investigation of this condition in some of the stricken areas in Ohio and Tennessee seemed to confirm the widespread rumor that the disease is closely associated with the drinking of an adulterated fluid extract of ginger. That it could not be due to the ginger as such became clearly evident from the fact that many of the victims, when questioned, freely admitted having used similar preparations for beverage purposes for from one to five years with no other effects than those derived from the alcohol. It soon became evident, therefore, that the condition must have resulted from some unknown poison or from some known poison whose pharmacologic action was so altered through the ginger or the alcohol, or both, as to render it unrecognizable, which poison in some way got into a manufactured lot of so-called U. S. P. fluid extract of ginger at a relatively recent date.

EPIDEMIOLOGY

It must be borne in mind that the so called U. S. P. fluid extract of ginger has been sold extensively for many years for beverage purposes, mostly and perhaps exclusively throughout the States where the paralysis is prevalent at present. This seems to have followed the ruling of the Prohibition Bureau to the effect that the

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official fluid extract of ginger is a nonpotable beverage, thus removing all restrictions from the sale thereof. Following this, it appears, there soon came upon the market what seems to have been in effect a tincture of ginger adulterated with substances not easily detectable by the chemist and resembling oleoresin of ginger to make it conform with the official fluid extract. Such a preparation has been used very widely as a beverage in the States alluded to.

The close relationship of the disease to the consumption of an adulterated fluid extract of ginger is clearly brought out by the epidemiological studies at the Cincinnati General Hospital by Dr. T. J. LeBlanc, to whom we are greatly indebted for this information. Briefly, Professor LeBlanc's studies indicate that the cases of paralysis, of which they had over 200, first began to show up the latter part of February, that the epidemic reached the peak by the middle of March, and that by April it was well on the decline. Almost exactly the same data were obtained in an epidemiological study by the Tennessee State health department, at Nashville, of 119 cases that occurred for the most part in eastern Tennessee. Both epidemiological studies agree in that the great majority of the patients were males, that it affected all ages between 20 and 80 years, usually about 40, that no cases occurred among children and very infrequently among young adults, and that practically in all cases a history of drinking ginger could be obtained. Another significant fact disclosed by these investigations was that an interval usually of from 10 days to 3 weeks elapsed between the drinking of the suspected ginger and the onset of paralysis. These findings were confirmed by one of us (M. I. S.) by a personal examination early in May of six cases in Ripley, Ohio, and eight cases, including one lawyer and one retired merchant, in Johnson City, Tenn.

Bearing in mind that the "epidemic" first occurred the latter part of February and that there was on an average an "incubation period" of two weeks, it appeared clear that the poisoned ginger must have been shipped for distribution from its source of manufacture (which no one knows) early in February or possibly during the month of January. Furthermore, since the ginger was sold in and about Cincinnati under at least eight different brands and in Johnson City under at least four different brands, and since in no case could paralysis be definitely associated with or definitely dissociated from any one brand, it appears probable that the poisoned "fluid extract" of ginger must have come from some one source at a fairly definite time. The evidence which will follow bears out these early assumptions.

SYMPTOMATOLOGY AND CLINICAL FINDINGS

There is a remarkable uniformity in the history and the symptoms and physical signs. In every case investigated there is a clear history of drinking "U. S. P. fluid extract" of ginger purchased from a local dealer (not from a pharmacist) who distributed the ginger in 1½ or 2 ounce bottles. The brands were different according to the locality sold; Anchor, Peer, Royal, K. D., K. K., Q. C., B. & L., Fulton, Tommac, Deco, Uanaca, and Land were some of the brands drunk by many of the victims questioned. A noteworthy point is the fact that apparently the quantity consumed was not a deciding factor in the outcome, except perhaps in degree. Apparently reliable histories have been obtained indicating that one drink of as little as 1 ounce of the ginger produced essentially the same result, except perhaps for some differences in degree, that followed the drinking of 10, 15, or more 2-ounce bottles over a period of some days. The immediate effects in many cases were none other than those of alcoholic intoxication. In many of the cases there were gastrointestinal disturbances characterized by nausea, vomiting, abdominal pain, and diarrhea. These lasted a day or two. The gastrointestinal disturbances seem to have had no relationship to the brand consumed nor to the ultimate outcome, for fairly definite histories were obtained where two or more in a party drank of the same purchase lot with the early symptoms in some and no immediate effects whatever in others, but with ultimate paralysis in all.

With the exception of the early and transient gastrointestinal disturbances in some of the cases, no effects were noted that could have been definitely attributed to the consumption of the beverage for an interval of from 5 days to 3 weeks, usually about 10 days. The first symptoms were soreness in the muscles of the legs, and only occasionally some numbness in the fingers or toes. The soreness of the leg muscles was usually complained of for several days before it was realized that the toes could not be moved. This was soon followed by bilateral foot drop. In all the cases questioned the onset of the weakness in the fingers and the wrist drop followed the foot drop by an interval of about a week or 10 days, and, upon examination, the disability in the hands and forearms was never so marked as in the feet and legs.

Clinically the victims presented bilateral wrist drop and foot drop of varying degrees of severity. The milder cases could get about with the aid of canes or crutches; the severer cases were bedridden and in many instances were unable to feed themselves. The paralysis in the upper extremities has not been seen to extend beyond the elbows, and in the lower extremities the thigh muscles were seen to be involved in the more advanced cases. There are no sensory

disturbances, no impairment of tactile, pain, or temperature sensations; the superficial reflexes are normal; the sphincters are normal; there are no visual disturbances; and there is no evidence of involvement of the cranial ganglia or nerves. In brief, the clinical picture is uniformly that of a flaccid paralysis for the most part of the distal muscles of the lower and upper extremities, clearly pointing to involvement of the lower motor neuron remarkably localized to the lower lumbar and lower cervical regions of the cord. Indeed, the only physical sign that in our experience presented any degree of inconstancy is the knee jerk, which has been found diminished or absent in the severer cases, as one would expect, normal or nearly normal in the milder cases, and markedly exaggerated in some of the milder ambulatory cases.[1]

THE PROBABLE NATURE OF THE POISON

From the description of the clinical manifestations of the disease considered in the light of the probable etiologic factor it must be evident at once that this form of motor paralysis does not fit in with the known types of multiple peripheral neuritis. It will be readily conceded that it is not pure alcoholic multiple neuritis. Its superficial resemblance to arsenical neuritis has led some observers to suggest arsenic in the ginger as the etiologic factor of this disease. The fact that none or only a trace of arsenic, such as one part per million to one part per ten million, has been found in numerous samples of ginger examined should be sufficient to render untenable the arsenic theory. If by some remote chance the implicated ginger which, for the sake of argument, escaped the chemists' notice, became heavily contaminated with arsenic, large doses of the ginger, which many victims admit having drunk, should certainly have resulted in some deaths with clinical manifestations of arsenic poisoning other than the paralysis. Lastly, the absence of sensory disturbances, cutaneous and other clinical manifestations characteristic of arsenic neuritis must be quite sufficient definitely to eliminate arsenic as the etiologic factor.

By a similar process of reasoning, lead and other heavy metals may be eliminated from the discussion, since no appreciable amounts of lead or other poisonous metals have ever been found in any of the suspected samples of ginger, nor have any of the patients shown any clinical symptoms of lead poisoning other than the paralysis.[2]

We are thus left with two possibilities which merit consideration: Either a shipment of ginger root, imported through other than the

[1] A splendid description of the clinical picture with reports of cases of "ginger paralysis" is given in recent publications by C. R. Bennett (1) and S. Harris (2).

[2] Very careful chemical examination of the urine and feces for lead by Doctor Kehoe in a series of ginger paralysis cases at the Cincinnati General Hospital gave completely negative results. Similar studies for arsenic have likewise yielded negative results. Personal communication.

regular channels, was contaminated, probably through carelessness or ignorance or both, with a root resembling ginger superficially but having remarkable pharmacologic properties of affecting the peripheral motor nerves in selected areas; or some known poison or derivative thereof got into a manufactured lot of the ginger beverage, accidently or in some other manner, and its pharmacologic properties were so altered through the ginger or alcohol, or both, so as to be no longer recognizable. In favor of the first alternative there is some information to the effect that an obscure paralytic disease of livestock, known among the natives as "derringada," occurs in some parts of South America. The plant that is probably responsible for this, and known as "derringue" or "jaqua," appears to be a tree, and it is not clear how this could be confused with ginger root. There is also a plant in Porto Rico and Cuba that has a reputation of being poisonous to cattle, commonly known as "Tibey" and scientifically as *Isotoma longiflora*.[3] From a paper by Plugge (3) on the toxic action of the alkaloid of this plant, isotomin, it appears that the toxic nature of the plant is such that it could not possibly account for the clinical picture of paralysis that the ginger has caused in man. Furthermore, the results of our pharmacological studies with the suspected ginger, in animals, which will be detailed below, pretty well eliminate *Isotoma longiflora* as the offending agent and also probably eliminate to a large extent, though not completely, the possibility of other rare plants that might bear an unknown and specific poison.

We must now consider the other possibility of some known or only partially known poison with its pharmacologic properties so altered as to produce a condition in man heretofore virtually unknown. From the very nature of the problem it would seem not improbable that the suspected ginger contained some denaturant, since denatured alcohol might very well have been and probably was used in the manufacture of some of the beverage, or that it contained some adulterant, since it is known with certainty that adulterants of various kinds have been used for several years in the manufacture of the ginger beverage. In the following we submit chemical and pharmacological evidence which, though by no means complete, seems to indicate that the latter explanation appears to be indeed the correct one, though the mechanism of action of the suspected and partially identified adulterant is as yet not clear.

PHARMACOLOGICAL AND CHEMICAL EVIDENCE

Through a careful and painstaking search for samples of ginger in any way related to the epidemic, we succeeded in securing 13 such samples, a brief description of which is given below.

[3] Personal communication from Dr. D. H. Cook, acting director, School of Tropical Medicine, San Juan, P. R.

1. Hub Distributing Co. Seized by prohibition officers April 17 in a warehouse where it was stored in bulk.

2. Queen City brand. Seized by prohibition officers. This was bottled in 2-ounce bottles.

3. Davis & Co. Seized by prohibition officers. Bottled as above.

4. Davis & Co. Shipped in bulk to H. C. Guernsey, Seminole, Okla., who drank of it and developed paralysis.

5. Queen City brand, bottled. A shipment to a dealer in Johnson City, Tenn., under date of January 18 and seized by the local prohibition officer.

6. Same as above. Shipped under date of February 18.

7. Same as above. Shipped under date of February 24.

8. Small sample, about 50 c. c. Q. C. brand obtained from the commanding officer, Soldier's Home, Johnson City. This was a sample of a lot that is said to have produced paralysis in some of the inmates.

9. Sample similar to above, Land brand, said to have been drunk by some of the inmates with no ill effects.

10. A sample of B & L received from Dr. W. M. Simpson, Miami Valley Hospital, Dayton, Ohio. This represented part of several 2-ounce bottles consumed by a patient of Dr. G. P. Tyler, jr., of Ripley, Ohio, resulting in paralysis.

11. A sample of B & L obtained from Dr. G. P. Tyler, jr., of Ripley, Ohio, who is fairly certain it produced paralysis.

12. A sample of Peer brand obtained from Doctor Tyler as probably harmless.[4]

13. A sample of B & L obtained from a colored resident in Ripley with the assurance that a friend had acquired paralysis from drinking several bottles of similar material.

It will be seen that of these 13 samples, Nos. 4, 8, 10, 11, and probably 13 may be considered as almost certainly paralytic, while Nos. 9 and 12 as almost certainly harmless. The others may be said to be uncertain with the exception of Nos. 5, 6, and 7, which from the epidemiological evidence of the prevalence of the disease in eastern Tennessee, and especially in Johnson City, would make it appear very probable that No. 5 would be the most likely and No. 7 the least likely shipment to have caused paralysis.

The chemical evidence of a positive nature which we have secured concerns the test for phenols which, so far, has resulted positively in the cases of all specimens of ginger that have caused paralysis either definitely or with a high degree of probability, and negatively in the

[4] Ripley has a population of about 1,500 with over 100 cases of paralysis, according to Dr. G. P. Tyler, jr.

cases of ginger preparations that were definitely or probably harmless. The test for phenols was carried out as follows:

Five c. c. of the sample was placed in a 250-c. c. distilling bulb. It was made alkaline by the addition of 25 c. c. N/10 NaOH, and 20 c. c. of distillate was collected. The residue in the flask was then diluted with 10 c. c. of distilled water and acidified by addition of 10 c. c. N/1 H_2SO_4. It was again boiled and 20 c. c. of distillate collected. Ten c. c. of the latter distillate, after mixing, was tested for phenols by treating with 5 c. c. of Millon's reagent.[5]

The pharmacologic evidence supporting and supplementing this chemical finding is shown by the experiments upon rabbits, wherein every sample of ginger giving a positive test for phenols has produced upon oral administration a symptom complex characterized by muscular tremors, hyperexcitability, spastic rigidity, followed by general muscular weakness, and generalized flaccid paralysis of all the extremities and finally death from respiratory failure. The condition produced in rabbits by the suspected ginger may be briefly described as that resembling systemic phenol or cresol poisoning, with the difference that the stimulating action upon the spinal cord was somewhat more pronounced than with pure phenol or tricresol in alcohol similarly administered, the end result, however, being the same in all cases—viz, generalized flaccid paralysis for several hours or days preceding death due to respiratory failure.

TABLE 1.—*The presence of a phenolic compound in certain adulterated fluid extracts of gingers, its close association with paralysis in man, and phenol-like toxicity in rabbits.*

Sample No.	Paralysis in in man	Phenol reaction	Pharmacologic action in rabbits			
			Number of rabbits	Total dose administered		Result
				Minimum	Maximum	
				C. c. per kilo	*C. c. per kilo*	
1	Not known	Positive	9	6	24	All died with typical symptoms.
2	do	Negative	5	30	48	Survived. No symptoms.
3	do	Positive	2	12	24	Died with typical symptoms.
4	Paralytic	do	2	12	18	Do.
5	Probably paralytic.	do	2	25	40	Do.
6	Doubtful	do	2	8	12	Do.
7	Probably not	Negative	2	64	64	Survived. No symptoms.
8	Paralytic	Positive	(a)			
9	Harmless	Negative	(a)			
10	Paralytic	Positive	1	12		Died with typical symptoms.
11	do	do	1	12		Do.
12	Probably harmless.	Negative	(a)			
13	Paralytic	Positive	(a)			

[a] Insufficient for pharmacological test.

[5] The Millon reagent was prepared and the test carried out in accordance with the directions given in Hygienic Laboratory Bulletin No. 110, pp. 25-33 (1917).

These preliminary findings are given in Table 1. The data therein are self-explanatory and require but little comment. The ginger was administered to the rabbits by stomach tube after dilution with water so that the alcohol concentration was about 25 per cent. Eight c. c. per kilo of 80 per cent alcohol is close to the maximum tolerated dose in the rabbit; hence the amount of ginger administered at any one time never exceeded this, and only the nontoxic gingers were administered in such large daily doses. The toxic gingers were administered in daily doses of from 2 to 6 c. c. per kilo until definite symptoms of tremors or spastic rigidity developed, when the treatment was generally discontinued.

Summarizing the results detailed in Table 1, it appears that samples of ginger which were definitely or probably paralytic in man gave a positive reaction for phenols and produced in relatively small doses a phenol-like symptom complex in rabbits terminating in medullary paralysis, while ginger samples that in so far as we know were harmless in man, gave no such phenol reaction, and had no toxic effects in rabbits when administered in moderately large doses.

THE PROBABLE NATURE OF THE PHENOLIC COMPOUND

Important information on this phase of the problem was gleaned from some experiments on monkeys and dogs. At the very outset it was felt, for obvious reasons, that the monkey would probably be the most useful experimental animal in this problem. Contrary to expectations, however, it was found that no symptoms of any description other than those produced by the alcohol could be elicited from the oral administration of the suspected gingers. If the ginger was administered daily, there soon developed a tendency toward vomiting. When administered every other day, the animals generally tolerated it well. The gingers were given in doses of 8 to 10 c. c. per kilo, or the equivalent of the maximum tolerated dose of alcohol. To our great astonishment, not the slightest symptoms could be elicited. The same results were noted in several experiments upon dogs.

Table 2 is presented to show the peculiar and almost absolute immunity of the monkey to the phenolic substance demonstrated in the suspected gingers. Only a few of the most striking experiments are given in this table, which, however, show sufficiently conclusively that for some, at that time, obscure reason the monkey was extremely refractory.[6]

[6] There was one exception to this in the series of 17 monkeys used in this work: Monkey No. 3, weighing 3.2 kilos, developed what appeared to be a typical case of flaccid paralysis of the upper and lower extremities within two days of the oral administration of two doses of 5 c. c. per kilo of ginger (sample No. 1). This condition lasted for about 10 days and was followed by nearly complete recovery. The animal was then given several more doses of 8 c. c. per kilo of the same material, but failed to show anything further. We have never known how to explain this apparent exception and the failure to reproduce the condition in the same animal with the same material.

TABLE 2.—*Comparative effects of suspected ginger in monkeys and rabbits*

Sample No.	Phenol reaction	Monkey No.	Weight, (kilograms	Total dose (c. c. per kilo)	Result	Effect in Rabbits
1	Positive	1	4.0	39	No effect	Killed rabbits with typical phenollike symptoms in doses of from 6 to 24 c. c. per kilo.
		2	3.3	49	do	
		4	3.2	42	do	
5	do	15	3.3	42	do	Killed in 25 to 40 c. c. per kilo.
6	do	11	3.0	56	do	Killed in 8 to 12 c. c. per kilo.
11	do	8	3.0	40	do	Killed in 12 c. c. per kilo.
4	do	17	3.4	72	do	Killed in 12 to 18 c. c. per kilo.

It was thought that the immunity is only a relative one, and by concentrating the ginger through the removal of alcohol it might be possible to elicit some symptoms upon the administration of relatively large doses.

Experiments were therefore performed in which the alcohol and water were removed with the greatest care to avoid as much as possible the chemical breakdown of the constituents of the "fluid extract," and concentrates, the equivalent of 500 to 1,000 c. c. of sample No. 1, were administered. There were no effects either immediate or remote.

These negative experiments then made it appear likely that the substance in the suspected ginger which is toxic in rabbits and which may or may not be identical with the substance which produced paralysis in man is in some peculiar combination, so that it can not exert its action in the monkey. Experiments were then made in an attempt to recover the suspected material by fractional distillation. A liter of ginger (sample No. 1) was freed of alcohol and water and subjected to partial vacuum distillation. A small amount, about 2 c. c., of volatile oil came over at a temperature below 195° C. This material injected intramuscularly into a monkey had no effect. On further distillation a considerable amount, about 10 c. c., came over at a temperature of from 195° to 205° C. This was followed by a drop in temperature suggesting decomposition, then another distillate of a few cubic centimeters was collected at 100° to 160° C. The last two fractions gave a strongly positive Millon reaction for phenols. The two distillates were injected intramuscularly into monkey No. 10. In about 15 minutes there were typical symptoms of systemic phenol poisoning, with fine and coarse muscle tremors, loss of reflexes, and coma. The animal recovered within 18 hours, but showed pronounced flaccid paralysis of the extremities, with great difficulty of locomotion. This condition persisted for three days, when the animal died. The histologic findings of this and many other animals that came to autopsy in this work will be reported later if the results so warrant.

This experiment was repeated with essentially the same results in monkey No. 20, which likewise developed a flaccid motor paralysis

of the upper and lower extremities. In this case the material recovered from 1,000 c. c. of the same ginger was injected subcutaneously and intramuscularly in divided doses over a period of five days so that acute symptoms of phenolic poisoning were never elicited. The paralytic symptoms developed on the fourth day following the first injection and lasted five days, when death supervened. Control experiments on monkeys with similar fractions obtained from U. S. P. ginger or adulterated ginger not giving the phenol reaction (ginger No. 2) gave negative results.

These experiments on monkeys taken in conjunction with the earlier negative ones clearly verified our assumption that the phenolic compound in the suspected ginger must be an extremely stable substance, resisting decomposition in the body of the monkey or dog and, therefore, harmless. These experiments further suggested another line of investigation with the aim of using more drastic chemical treatment but at lower temperatures, whereby more complete decomposition of the phenolic compound could be effected without at the same time obtaining organic decomposition products as the result of the high temperatures.

The following procedure was then adopted. Four hundred c. c. of the suspected ginger (sample No. 1) was carefully freed of its alcohol and water. The residue was acidified with H_2SO_4 and extracted with ether. The ether extract [7] was treated with 25 c. c. of a 25 per cent solution of NaOH at room temperature to remove resin acids and free phenols if present. Subsequent acidification of this aqueous solution and distillation showed, however, that there were no free phenols. The ether extract was freed of its ether and the residue saponified with 25 per cent NaOH at 100° C. for 1 to 2 hours. This was then acidified with H_2SO_4 and distilled, whereupon phenols (probably cresols) were recovered in amounts corresponding roughly to about 1 per cent of the suspected ginger. The chemical work on the identification of the phenols is still in progress. The pharmacologic evidence, however, seems conclusive, for the oral administration of this material in alcohol, divided in two doses produced in a monkey (No. 14) the immediate effects of systemic phenol poisoning, including generalized muscular tremors, muscular weakness, and coma, followed by complete recovery within 24 hours. Indeed the symptoms were identical qualitatively with those produced by the administration of 5 c. c. per kilo of a 5 per cent phenol solution in 95 per cent alcohol.

The exact nature of the phenolic compound which we have found uniformly to be present in suspected ginger and absent in unsuspected ginger is as yet unknown. From its chemical behavior it appears to

[7] In one experiment the ether extract representing 2,000 c. c. ginger was evaporated at this point, residue treated with H_2SO_4, and distilled, whereupon 4 c. c. of volatile oil was collected, probably ginger oil. This was recently injected intramuscularly to a monkey (No. 12) with no effects whatever so far.

resemble a phosphoric acid ester of one or more of the cresols. The strong alkali and heat required for its saponification and the fact that phosphate has been found in the suspected gingers would make it very probable that it may indeed be the ester suggested.

We also have the following pharmacologic evidence for the above suggestion:

1. An adulterated ginger prepared from U. S. P. fluid extract of ginger made to approximate in composition the suspected gingers behaved exactly like the suspected gingers in rabbits and monkeys. The adulterated ginger so prepared had the following composition:

	C. c.
Fluid-extract ginger, U. S. P	30
Oleo resin ginger	10
Castor oil	16
Tricresyl phosphate (technical)	24
Water	50
Alcohol	770
Total	900

The above sample of ginger was tested on 12 rabbits in daily doses of from 2 to 6 c. c. per kilo, with the result that in every case the typical symptom complex obtained with the suspected gingers followed, with ultimate death from respiratory failure. The minimum total dose of this ginger that killed rabbits was 6 c. c. per kilo, and the maximum 15 c. c. The same ginger given to a monkey (No. 11) in five doses of 10 c. c. per kilo, each given every other day, had no effects whatever.

2. A 2½ per cent solution of tricresyl phosphate (technical) in 80 per cent alcohol administered in daily doses of 5 c. c. per kilo to three rabbits produced the same typical symptom complex, ending fatally in every case. The minimum total lethal dose of this solution was 10 c. c. per kilo, and the maximum 15 c. c. per kilo.

3. Technical tricresyl phosphate administered orally to monkeys (Nos. 7 and 23) in huge doses of 10 and 15 c. c. per kilo with or without alcohol had no effects whatever.

4. The same tricresyl phosphate saponified with NaOH and heat, acidified and distilled, yielded phenols similar to those obtained from suspected gingers with similar treatment. This material administered in alcohol orally to a monkey (No. 13) in a dose equivalent to 1 c. c. per kilo of the tricresyl phosphate produced very marked typical symptoms of systemic phenolic poisoning with tremors, coma, etc. The animal died within four hours of respiratory failure.

CONCLUSIONS

If we consider the problem in the light of all the experiments performed, of which only the essential ones are detailed in this paper, the following conclusions may be drawn at this time:

1. Adulterated gingers with a reasonably certain or highly probable history of paralysis in man have yielded distillates, upon saponification and subsequent acidification, giving a positive reaction for phenols; while unsuspected adulterated gingers, as well as U. S. P. fluid-extract of ginger, treated similarly, failed to give such a reaction.

2. Suspected adulterated gingers have invariably proved toxic in rabbits in moderate doses; death, which is due to respiratory paralysis, is preceded by a symptom complex resembling very closely in its essentials, though not absolutely, systemic phenol poisoning. Unsuspected adulterated gingers in large doses, as well as U. S. P. fluid extract of ginger, failed to produce such effects.

3. All adulterated gingers examined, including the suspected ones giving a positive reaction for phenols, proved practically uniformly harmless in monkeys. A few experiments on dogs were likewise essentially negative.

4. Chemical and pharmacological evidence indicate that the phenolic substance in the suspected gingers is a stable combination of phenols, probably in the form of a phosphoric acid ester or some related substance, which resists hydrolysis and requires drastic treatment with alkali and heat to effect complete saponification. The pharmacologic experiments furthermore indicate that this stable phenolic compound breaks down with great ease in the rabbit and apparenty not at all in the monkey. The few observations we have in the dog show that it, too, is unable to liberate the phenols from this firm combination.

5. The precise relation of this phenolic compound either by itself or in combination with the other ginger constituents to the multiple neuritis in man is as yet not clear. Before we can be certain of the etiologic relationship it will be necessary to find means of reproducing the human disease in animals more faithfully than we have been able to do so far. The remarkable difference in species susceptibility we have observed tempts one to venture the suggestion that as regards susceptibility man may stand in some intermediary position between the rabbit at the one extreme and the monkey at the other. Until some satisfactory explanation of this difference in species susceptibility becomes available, the suggestion must be considered as purely speculative. We may express the hope, however, that with more chemical information on this phenolic compound and a better knowledge of its action in the animal body its etiologic relationship to the human disease may become more apparent.

Addendum.—Since the foregoing was written, an important experiment has been performed upon calves which proves almost conclusively our tentative conclusions as to the etiologic relationship of the phenolic ester to the multiple neuritis in man. A description of this experiment follows:

On June 3 three male calves of approximately the same age and weight were selected, and ginger, diluted with equal parts of water, was administered by stomach tube as follows:

Calf No. 1 (identification No. 1652), Jersey, 3 months old, weighing 60 kilos, received 5 c. c. per kilo ginger sample No. 7. This, it will be remembered, was nontoxic in rabbits and gave no phenol test chemically.

Calf No. 2 (identification No. 1651), black and white, 3 months old, weighing 80 kilos, received 5 c. c. per kilo ginger sample No. 1, which gave a positive test for phenols and proved toxic in rabbits.

Calf No. 3 (identification No. 1654), brown and white, 2 months old, weighing 86 kilos, received 5 c. c. per kilo of U. S. P. fluid extract of ginger adulterated by dilution with alcohol and the addition of 2.5 per cent technical tricresyl phosphate, castor oil, and a small amount of oleoresin ginger. (For complete formula see text.)

Moderate alcoholic intoxication followed in all cases with complete recovery within 24 hours.

On June 9 a second treatment was administered to the calves as follows:

Calf No. 1, six c. c. per kilo of ginger sample No. 7.

Calf No. 2, six c. c. per kilo of ginger sample No. 4. (This, like No. 1, gave a positive phenol test, proved toxic to rabbits, and is almost certainly known to have caused paralysis in man.)

Calf No. 3, six c. c. per kilo of U. S. P. fluid extract of ginger adulterated by dilution with alcohol and addition of 2.5 per cent tricresyl phosphate (technical) and crude resin oil instead of the oleoresin ginger and castor oil.

Calves Nos. 1 and 2 showed moderate alcoholic intoxication and recovered the following day. Calf No. 3 was markedly depressed and was unable to get up for two days. There were no tremors or other evidence of phenol poisoning. On examination on June 13 the three calves appeared normal. Nothing unusual was noted about them on June 20. The animals were not examined closely between this date and July 5. Examination on July 5 revealed distinct weakness of the hind legs in calves Nos. 2 and 3. This was noticed especially when the animals were made to run, when they would stumble frequently, with bending and dragging of the hind feet and hoofs. The anterior extremities appeared normal. The control calf No. 1 was normal. A second examination on July 7 found calves Nos. 2 and 3 in the same general condition, the weakness in

the hind legs being more pronounced. The deep reflexes of the anterior extremities appeared normal, while those of the posterior extremities were much reduced or absent.

The progress of this experiment is being followed and further experiments are being planned. Barring the remote possibility of some of the other ginger constituents or some impurity in the technical tricresyl phosphate, having something to do in a supplementary manner with the paralytic disease, it appears almost certain that the cresol-phosphoric acid-ester postulated earlier in the paper is indeed the etiologic factor of the epidemic of so-called ginger paralysis. Further pharmacologic work will be needed to elucidate the singular and highly specific action of this unique poison in man and in some of the lower animals, and its remarkably different behavior in different species of animals.

We are greatly indebted to Dr. W. E. Cotton of the Bureau of Animal Industry, Department of Agriculture, for the facilities given us to carry out the calf experiments.

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RELATION BETWEEN TRYPANOCIDAL AND SPIROCHETICIDAL ACTIVITIES OF NEOARSPHENAMINE

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The desirability of a test for therapeutic potency of the antisyphilitic remedies of the arsphenamine type has led to the development of the trypanocidal activity test, and later to the spirocheticidal test in experimental syphilis in rabbits. The early reports indicated that the former test was a satisfactory means of establishing the therapeutic efficiency of the arsenicals, but recent reports of the spirocheticidal test in rabbits have weakened this view.

Schamberg, Kolmer, and Raiziss (1), Dale and White (2), and Voegtlin (3) favored the adoption of the trypanocidal test as a routine control measure for the arsenicals. Numerous clinical workers, seeing the desirability of a potency or efficiency test, have supported this view. The recommendation of the Second International Conference on the Biological Standardization of Certain Remedies (4) that the therapeutic potency of arsenicals be tested by the trypanocidal test, as well as the official requirement of this test by England (5) and Germany (6), have materially strengthened this position. However, the maxim

laid down by Voegtlin and Dyer (19), Kolmer (7), and by Wakerlin (8) is that the final analysis of the evaluation of the antisyphilitic property of drugs must be ascertained on experimental syphilis in rabbits. It was therefore decided to ascertain the relation between the therapeutic activity of neoarsphenamine as measured by the trypanocidal test, using rats, and as indicated by the spirocheticidal test, using rabbits.

TRYPANOCIDAL ACTIVITY OF NEOARSPHENAMINE

Schamberg, Kolmer, and Raiziss (9) reported in 1920 that the smallest effective dose of different preparations of neoarsphenamine varied from 20 to more than 40 mg. per kilogram in the albino rat. The investigation included 22 preparations from six manufacturers. Voegtlin and Miller (10), 1922, reported an even greater variation in the products of five manufacturers, showing the most efficient to require 9.32 mg. while the least efficient required 30.08 mg. per kilogram.

Kolmer (11), in the comparison of the trypanocidal and spirocheticidal properties of arsphenamine and neoarsphenamine, showed variations of from 2 to 10 mg. per kilogram in six different neoarsphenamines. It is not reported whether the material was from the same or from different manufacturers. Dale and White (12), 1922, reporting on the trypanocidal activity of neoarsphenamine of British and German manufacturers, found the minimum effective dose of the former to be two to three times that of the latter.

SPIROCHETICIDAL PROPERTIES OF NEOARSPHENAMINE

Nichols and Walker (13), and Voegtlin, Armstrong, and Dyer (14), in 1923, reported the sterilizing dose of neoarsphenamine to be 15 mg. per kilogram for syphilis in rabbits after one treatment. The data reported, however, were on one animal only in each case. Pierce and Brown (15), 1922, previously reported that one treatment of 9 mg. per kilogram failed to sterilize. Kolmer (16), 1926, found the curative dose of six neoarsphenamines to vary between 8 and 12 mg. per kilogram. Voegtlin and Dyer (17), 1927, reporting on the sterilizing efficiency of arsphenamine, neoarsphenamine, and sulpharsphenamine in experimental syphilis, found that the minimum sterilizing dose was identical in terms of absolute amount of arsenic. They reported the sterilizing dose of neoarsphenamine after one treatment as 40 mg. per kilogram.

COMPARISON OF THE TRYPANOCIDAL AND SPIROCHETICIDAL PROPERTIES OF THE ARSENICALS

In 1922, Voegtlin (18) reported that the objection to the use of the trypanocidal test on the ground that it does not establish the rela-

tive efficiency of arsphenamine and neoarsphenamine with regard to *Treponema pallidum* is not justified, for the reason that the curative ratio of the two drugs as established by Ehrlich and Hata and Castelli in spirochete infections, including rabbit syphilis, is practically the same as that determined by Voegtlin and Smith, 1921, by means of the trypanocidal test.

Voegtlin (19), in light of work reported in 1925 on sulpharsphenamine, called attention to the fact that this drug in spite of a relatively low trypanocidal action, is as effective as arsphenamine and neoarsphenamine with regard to the healing of syphilitic lesions and freedom from clinical relapse.

Kolmer (20) accepts the trypanocidal tests as of distinct worth in evaluating the properties of arsphenamine and neoarsphenamine, although he states that the relation between the trypanocidal activity in the rat and the spirocheticidal activity in the rabbit is not definite and constant, but only broad and general.

The most interesting comparison of the trypanocidal activity in animals with spirocheticidal properties in man was reported by Dale and White (21) in 1922. This report compares the trypanocidal activity of neoarsphenamine with the dose necessary to free the chancre of *T. pallidum* in 18 to 20 hours. A parallelism was found to exist between the trypanocidal properties and the clinical effect on a primary lesion in man. It is reported that the results obtained justify the conclusion that the trypanocidal test is a very valuable index, if not an accurate quantitative measure, of the therapeutic activity of different samples of a preparation such as neoarsphenamine on syphilis in man.

TYPES OF NEOARSPHENAMINE

As pointed out by Dale and White (22) in 1922, there are two types of neoarsphenamine—one of slow solubility with relatively high toxicity, and the opposite type with rapid solubility and low toxicity. The trypanocidal activity of each group was found to parallel the toxicity of the product.

There has since been developed a new type of this product which has the qualities of the latter group and is as trypanocidally active as the former.

The classification of the two major types is represented by Groups E and F, respectively.

TRYPANOCIDAL ACTIVITY TEST

The procedure outlined by Voegtlin and Miller (23), using albino rats inoculated with *Trypanosoma equiperdum*, was followed, except that the amount of neoarsphenamine indicated by the reading which gave negative findings in 80 per cent of the rats and permitted 20

per cent to have a trace of infection was accepted as the minimum effective dose. It will be seen from Table 1, on the trypanocidal activity reported on 32 batches of neoarsphenamine from eight manufacturers, that the effective dose ranges from 10 to 15 mg. as the most efficacious, to 25 to 35 mg. as the least effective.

TABLE 1.—*Trypanocidal activity test—Neoarsphenamine*

Products	A	B	C	D	E	F	G	H
Number examined	3	2	4	2	7	6	3	5
M. E. D. (mg. per kg.)	15	15	15	15	10–15	25–35	15–20	15

The products represented by E and F, Table 1, were accepted as representing the most effective and the least effective trypanocidal activity of the neoarsphenamines.

TABLE 2.—*Trypanocidal activity of neoarsphenamines E and F*

Neoarsphenamine E								Neoarsphenamine F							
Dose (mg. per kg.)	Lot							Dose (mg. per kg.)	Lot					
	1	2	3	4	5	6	7		1	2	3	4	5	6
7	2+	4+	2+	-----	-----	-----	D.	10	-----	-----	3+	2+	-----	-----
	2+	4+	2+	-----	-----	-----	D.		-----	-----	2+	2+	-----	-----
	+	−	2+	-----	-----	-----	D.		-----	-----	2+	+	-----	-----
	−	−	+	-----	-----	-----	-----		-----	-----	2+	+	-----	-----
									-----	-----	+	Tr.	-----	-----
10	+	−	Tr.	−	+	+	4+	15	D.	D.	Tr.	Tr.	D.	D.
	+	−	Tr.	Tr.	+	+	4+		D.	D.	Tr.	Tr.	4+	D.
	+	−	Tr.	Tr.	+	+	−		D.	D.	Tr.	Tr.	+	D.
	+	−	−	-----	+	+	−		D.	D.	Tr.	−	−	4+
	+	−	−	-----	+	+	−		D.	D.	Tr.	−	−	4+
15	−	−	−	-----	−	−	−	25	D.	−	−	−	−	−
	−	−	−	−	−	−	−		D.	−	−	−	−	−
	−	−	−	−	−	−	−		2+	−	−	−	−	−
	−	−	−	−	−	−	−		−	−	−	−	−	−
	−	−	−	-----	Tr.	Tr.	−		−	−	−	−	−	−
20	-----	-----	-----	-----	−	−	-----	35	−	−	-----	-----	−	−
	-----	-----	-----	-----	−	−	-----		−	−	-----	-----	−	−
	-----	-----	-----	−	−	−	-----		−	−	-----	-----	−	−
	-----	-----	-----	−	−	−	-----		−	−	-----	-----	−	−
	-----	-----	-----	-----	−	−	-----		−	−	-----	-----	−	−
M. E. D. (mg. per kg.)	15	10	15	15	15	15	15	M. E. D. (mg. per kg.)	35	25	25	25	25	25

D=dead. Tr.=trace.

The reported variations in the trypanocidal activity of neoarsphenamine is quite apparent, as indicated in the accompanying tables. There is, however, a striking uniformity in the efficacy of the products of the same manufacturer. This would indicate that the trypanocidal activity test is valuable in ascertaining the uniformity of the therapeutic efficacy of the same product.

The rabbits were inoculated in the left scrotum with 0.3 c. c. of testicular emulsion of Nichols's strain of *Treponema pallidum*. Only animals which developed a dark field positive typical primary lesion were used. The report of the size of the lesion as shown in the tables is the area of the chancre recorded in centimeters.

Treatment consisted of one intravenous injection of the dose of the arsenic preparation shown in the protocols. For convenience the observation is divided into pre-treatment and post-treatment periods, and recorded in days. The progress of the disease and the effect of the treatment are reported by measurements of the lesion, by examination by dark field, and by the quantitative Kahn test.

The evaluation of the therapeutic efficiency of the preparation was based upon the minimal dose which caused rapid disappearance of the spirochetes from the primary lesion and rapid healing of the lesion without clinical relapse—the so-called therapeutic dose. The choice of the products for the spirocheticidal test is based on the results obtained in the trypanocidal test. (Tables 1 and 2.) Neoarsphenamine brand E represented the most effective in trypanocidal activity, and brand F proved to be the least efficient.

TABLE 3.—*Spirocheticidal activity of neoarsphenamine, products E 1 and F 5*

THERAPEUTIC EFFECT AT 15 MG. PER KG.

Product	Rabbit No.	Pre-treatment [1] 56 days			Post-treatment 7 days			17 days			24 days			32 days			38 days			46 days			52 days			59 days			67 days		
		Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn
E 1	62	0.69	+	120	0.63	−	40	−	−	20	−	−	20	−	−	4	−	−	4	−	−	4	−	−	20	−	−	80	−	−	80
	78	1.38	+	80	.44	−	4	−	−	4	−	−	4	−	−	20	−	−	20	−	−	4	−	−	40	−	−	40	−	−	20
	79	.72	+	120	.34	−	40	−	−	40	−	−	20	−	−	4	−	−	4	−	−	4	(2)	(2)	(2)						
	80	1.40	+	120	.32	−	40	−	−	80	−	−	80	−	−	20	−	−	40	−	−	4	−	−	20	−	−	4	−	−	20
	82	2.41	+	40	.57	−	40	−	−	80	−	−	80	(3)	(3)	(3)															
	84	.97	+	4	.26	−	4	0.21	−	80	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4
F 5	71	.94	+	120	.28	−	4	−	−	20	−	−	20	−	−	20	−	−	20	−	−	4	−	−	4	−	−	20	−	−	20
	72	(4)	+	40	.25	−	4	−	−	20	−	−	20	−	+	20	0.63	+	20	1.16	+	80	1.57	+	80	2.32	+	40	3.14	+	40
	73	.85	+	40	.26	−	4	−	−	20	−	−	20	−	−	20	−	−	20	−	−	20	−	−	4	−	−	20	−	−	4
	75	1.38	+	200	.34	−	40	.38	−	20	−	−	4	−	−	4	−	−	4	(5)	(5)	(5)									
	76	1.63	+	240	.29	−	20	------	−	20	−	−	20	−	−	20	−	−	20	−	−	20	−	−	-----	(6)	(6)	(6)			

THERAPEUTIC EFFECT AT 10 MG. PER KG.

E 1	44	1.70	+	240	0.82	−	80	−	−	160	−	−	120	−	−	200	−	+	160	−	−	80	0.75	+	120	1.38	+	160	1.82	+	200
	47	2.17	+	200	2.07	−	240	0.21	−	40	−	−	40	−	−	80	−	−	20	−	−	20	−	−	20	−	−	20	−	−	20
	49	.88	+	-----	.69	−	200	.09	−	80	−	+	20	0.47	+	40	0.97	+	40	1.89	+	40	2.01	+	40	2.70	+	20	3.08	+	20
	51	2.01	+	120	.82	−	120	−	−	200	−	−	320	−	−	80	1.45	+	80	1.66	+	120	3.08	+	120	2.76	+	200	4.76	+	200
	65	.50	+	-----	.24	−	20	−	−	40	−	−	20	−	−	20	−	−	20	−	−	20	−	−	20	−	−	20	−	−	40
	87	.88	+	160	.24	−	40	−	−	40	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4
F 5	41	1.42	+	160	.44	−	80	.15	−	120	−	−	80	−	−	20	−	−	20	−	−	20	−	−	4	−	−	4	−	−	4
	43	1.29	+	160	.69	−	120	.23	+	160	0.31	+	200	.38	+	120	.82	+	120	1.16	+	120	.72	+	120	.98	+	160	.88	+	120
	77	(4)	+	40	.18	−	4	−	−	20	−	+	40	.66	+	40	1.10	+	40	1.26	+	80	1.33	+	80	1.72	+	120	2.26	+	120
	85	1.95	+	120	.72	−	80	.23	−	80	−	+	40	−	−	40	−	−	40	−	−	40	−	−	40	−	−	40	−	−	40
	86	1.63	+	160	1.32	−	20	.18	−	40	−	−	20	−	−	20	−	−	4	−	−	4	−	−	4	−	−	4	(7)	(7)	(7)
	89	1.04	+	80	1.26	−	40	1.17	−	20	−	−	4	−	−	4	−	−	4	−	−	4	−	−	4	(8)	(8)	(8)	------	-----	----

[1] Total period of pre-treatment, 59 days. Treated Sept. 14, 1928.
[2] Dead Nov. 2, 1928.
[3] Dead Oct. 14, 1928.
[4] Orchitis.
[5] Dead Oct. 27, 1928.
[6] Dead Nov. 6, 1928.
[7] Dead Nov. 19, 1928.
[8] Dead Nov. 11, 1928.

TABLE 3.—*Spirocheticidal activity of neoarsphenamine, products E 1 and F 5*—Continued

THERAPEUTIC EFFECT AT 5 MG. PER KG.

Product	Rabbit No.	Pre-treatment 56 days			Post-treatment 7 days			17 days			24 days			32 days			38 days			46 days			52 days			59 days			67 days		
		Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn
E 1	54	0.64	+	200	1.51	+	120	2.16	+	120	3.58	+	120	3.93	+	200	3.91	+	240	3.21	+	240	2.89	+	200	2.26	+	160	2.89	+	240
	60	1.26	+	200	.44	+	200	.69	+	120	1.51	+	120	2.08	+	280	1.76	+	240	2.67	+	200	2.42	+	160	2.67	+	160	2.07	+	160
	61	1.10	+	200	.20	+	200	.40	+	40	1.19	+	20	2.52	+	320	2.41	+	160	2.53	+	200	2.26	+	160	1.85	+	120	.75	+	120
	63	1.36	+	160	.60	−	40	.25	−	40	1.41	+	80	1.07	−	280	.91	+	120	1.73	−	160	1.82	−	120	1.82	−	120	1.67	−	120
	64	.56	+	20	.21	−	120	—	−	4	—	−	20	—	−	4	—	−	4	—	−	4	—	−	4	—	−	4	—	+	20
	90	(1)	+	20	.90	+	20	1.54	+	40	2.61	+	40	3.39	+	80	3.53	+	80	2.61	−	160	1.38	+	120	1.15	−	120	—	−	80
F 5	48	.38	+	280	.60	−	160	1.13	+	160	1.85	+	200	2.10	+	200	2.26	+	200	3.08	+	200	3.57	+	200	4.30	+	200	4.75	+	200
	52	1.62	+	120	1.64	−	120	1.51	+	240	3.72	+	320	3.51	+	240	(2)	(2)	(2)												
	57	1.85	+	120	1.16	+	120	2.41	+	80	2.83	+	120	3.39	+	160	2.82	+	200	1.26	+	160	.63	+	160	.38	+	160	.41	+	200
	58	1.57	+	200	.85	+	80	1.29	+	40	2.38	+	40	2.55	+	240	2.01	+	160	1.41	+	240	.78	+	200	—	−	80	—	−	40
	59	.72	+	160	.21	−	160	.13	−	20	—	−	40	—	+	20	—	+	20	—	−	40	—	−	20	—	−	20	—	−	20
	88	(1)	+	40	(1)	+	20	(1)	−	20	(1)	−	20	(1)	+	40	(1)	+	40	(1)	+	80	(1)	+	80	(1)	+	120	(1)	+	120
UNTREATED CONTROLS																															
	42	0.23	+	120	0.72	+	120	1.26	+	200	2.07	+	160	2.93	+	120	3.02	+	120	3.46	+	160	3.27	+	120	2.95	+	120	1.64	+	120
	46	.36	+	160	1.67	+	280	2.61	+	240	2.67	+	200	5.41	+	240	5.97	+	200	6.69	+	240	6.61	+	200	4.68	+	160	2.39	+	160
	56	.94	+	200	1.16	+	200	2.28	+	160	2.48	+	240	2.61	+	200	3.02	+	240	3.39	+	200	3.87	+	200	4.93	+	160	2.91	+	160
	45	1.01	+	280	1.16	+	400	1.03	+	200	.98	+	200	1.03	+	200	1.07	+	160	.30	+	200	.28	+	160	(1)	+	160	(1)	+	160
	66	.94	+	-----	3.02	+	400	3.61	+	280	5.15	+	240	2.83	−	200	.91	−	160	.38	−	200	—	−	160	—	+	120	—	−	160
	68	4.15	+	160	6.69	+	280	7.45	+	240	8.23	+	200	7.26	+	240	6.25	−	120	—	−	160	—	−	120	—	−	160	—	−	160
	70	1.04	+	-----	3.80	+	280	4.75	+	280	4.30	+	200	(3)	(3)	(3)															
	83	.38	+	20	1.29	+	200	1.85	+	160	1.92	+	160	2.17	+	200	1.29	−	160	.53	+	200	.19	−	160	—	−	120	—	−	200

[1] Dead Oct. 14, 1928. [2] Orchitis. [3] Dead Oct. 21, 1928.

The therapeutic effect of neoarsphenamine E 1 and F 5 at 15, 10, and 5 mg. per kilogram on experimental rabbit syphilis is reported in Table 3. The animals were given one treatment 59 days after inoculation. In this series the therapeutic dose was established at 15 mg. for both products. At this dose all animals on E 1 became dark-field negative; the chancres healed and remained negative throughout the observation period. The findings on F 5 were comparable, except that one rabbit, No. 72, had relapsed 32 days after treatment.

The results obtained with the 10 mg. dose indicate that both products are ineffective. This conclusion is inevitable from the fact that while all rabbits on lot E 1 became dark-field negative and the chancres healed, there were three relapses; and, further, that, although four animals on F 5 remained negative throughout the observation period, two showed relapses.

As would be expected, the effect of 5 mg. was very feeble. Except for one animal on each product, which was negative, the results very closely paralleled the control group.

Of the control (no treatment) group of eight rabbits, one died rather early, three became negative approximately 97 days after inoculation, about 38 days after administration of the drug in the treated group, and four were positive on discharge 126 days after inoculation.

TABLE 4.—*Spirocheticidal activity of neoarsphenamine, products E 7 and F 6*

15 MG. PER KG.

Product	Rabbit No.	Pre-treatment[1] 65 days			Post-treatment 7 days		11 days		18 days			25 days		29 days			40 days		47 days			53 days		63 days			88 days		
		Lesion	Dark field	Kahn	Lesion	Dark field	Lesion	Dark field	Lesion	Dark field	Kahn	Lesion	Dark field	Lesion	Dark field	Kahn	Lesion	Dark field	Lesion	Dark field	Kahn	Lesion	Dark field	Lesion	Dark field	Kahn	Lesion	Dark field	Kahn
E7	155	(2)	+	20	(2)	—	(2)	—	—	—	20	—	—	—	----	4	—	-----	—	----	4	—	----	—	----	4	----	----	----
	164	3.58	+	80	—	—	-----	----	-----	----	-----	-----	----	-----	----	-----	-----	-----	-----	----	-----	-----	----	-----	----	-----	----	----	-----
	165	7.26	+	80	5.57	—	(2)	—	-----	----	-----	-----	----	-----	----	-----	-----	-----	-----	----	-----	-----	----	-----	----	-----	----	----	-----
	167	5.72	+	20	2.33	—	1.38	—	0.38	—	4	—	—	—	----	4	—	-----	—	----	4	—	----	—	----	4	----	----	4
	170	2.23	+	40	1.26	—	1.16	—	.60	—	20	0.66	—	0.31	—	4	—	-----	—	----	4	—	----	—	----	4	—	----	4
	163	3.27	+	160	2.48	—	.25	—	—	—	40	—	—	—	----	20	—	-----	—	----	20	—	----	—	----	4	—	----	4
F 6	147	2.95	+	20	1.16	—	.72	—	—	—	4	—	—	—	—	4	—	-----	—	----	4	—	----	—	----	4	—	----	40
	141	3.33	+	20	2.04	—	2.11	—	.91	—	4	.28	—	.25	+	4	—	—	—	----	0	—	----	—	----	2	—	----	2
	145	5.81	+	120	5.15	—	5.21	—	3.80	—	40	.38	—	.31	—	20	—	—	—	----	20	—	----	—	----	4	—	----	4
	146	6.35	+	80	5.91	—	5.22	—	—	—	20	—	—	—	----	4	—	-----	—	----	4	—	----	—	----	4	—	----	4
	148	8.36	+	120	7.73	—	.88	—	—	—	20	-----	----	-----	----	-----	-----	-----	-----	----	-----	-----	----	-----	----	-----	----	----	-----
	181	.75	+	4	.50	—	—	—	—	—	4	—	—	—	----	4	—	-----	—	----	0	—	----	—	----	0	—	----	0

12.5 MG. PER KG.

E 7	150	2.55	+	40	0.91	—	0.41	—	—	—	20	—	—	—	----	20	—	-----	—	----	20	—	----	—	----	20	—	----	20
	174	5.19	+	40	1.54	—	.57	—	—	—	40	—	—	—	----	20	—	-----	—	----	4	—	----	—	----	4	—	----	4
	175	2.17	+	80	.91	—	.22	—	—	—	20	—	—	—	----	20	—	-----	—	----	40	—	----	—	----	4	—	----	4
	176	4.02	+	80	2.35	—	1.42	—	0.38	—	20	—	—	—	----	20	—	-----	—	----	80	—	----	—	----	20	—	----	20
	178	6.79	+	120	2.42	—	1.63	—	.56	—	80	—	—	—	----	120	—	-----	—	----	80	—	----	—	----	20	—	----	20
	179	7.95	+	20	5.22	—	1.57	—	(2)	—	4	—	—	—	----	4	—	-----	—	----	4	—	----	—	----	4	—	----	4
F 6	171	(2)	+	20	—	—	-----	----	—	—	4	-----	----	-----	----	-----	-----	-----	-----	----	-----	-----	----	-----	----	-----	----	----	-----
	149	3.33	+	120	1.38	—	.31	—	—	—	20	—	—	—	----	20	—	-----	—	----	20	—	----	—	----	4	—	----	4
	151	4.46	+	80	5.41	—	5.15	—	.72	—	40	—	—	—	----	20	—	-----	—	----	20	—	----	—	----	4	—	----	4
	156	8.23	+	40	7.26	—	7.49	—	1.57	—	20	0.31	—	—	----	4	—	-----	—	----	4	—	----	—	----	4	—	----	4
	160	1.83	+	20	.38	—	.16	—	—	—	4	—	—	—	----	4	—	-----	—	----	4	—	----	—	----	160	—	----	40
	162	3.74	+	40	.41	—	—	—	—	—	4	—	—	—	----	4	—	-----	—	----	4	—	----	—	----	20	—	----	2

	144	7.54	+	160	8.14	+	7.86	+	7.17	+	120	7.20	+	6.25	−	120	0.6	−	−	−	80	−	−	−	−	20	−	----	4
	183	5.21	+	120	3.39	+	1.07	−	------	−	80	------	−	------	−	80	_	−	------	−	40	−	−	−	−	20	−	----	4
	185	6.60	+	200	3.14	+	3.27	+	2.39	−	240	L, 72 / R,3.80	+	L, 82 / R,3.80	−	200	L, − / R, 0.66	−	L, − / R, −	−	120	−	−	−	−	40	−	----	20
	187	.47	+	40	−	−	(1)	+	(1)	+	4	1.57	+	2.17	+	40	5.39	+	4.46	+	40	4.90	−	3.58	−	40	----	----	----
	188	3.21	+	4	2.70	+	1.45	+	1.38	−	20	------	----	------	----	------	------	----	------	----	------	------	----	------	----	------	----	----	----
	182	8.05	+	120	7.64	+	8.87	+	5.81	−	120	2.67	−	2.23	+	120	1.57	+	1.57	−	120	1.73	−	------	----	------	----	----	----
	172	.19	+	20	.94	+	1.26	+	2.26	+	80	2.48	+	3.58	+	80	L, 6.06 / R, 1.57	+	L, 6.07 / R, 1.76	+	160	L, 5.41 / R, 1.63	+	L, 5.00 / R, −	+	80	−	−	4

[1] Treated on sixty-ninth day.

[2] Orchitis.

[3] Scab.

L=left scrotum.

R=right scrotum.

The products reported in Table 4 represent two other lot numbers of the same manufacturer's neoarsphenamine as that reported in the previous table. These lots, E 7 and F 6, were tested at 15 and 12.5 mg. per kg., with one treatment 69 days after inoculation. There is no apparent difference in the effect on the lesions, as all animals became dark-field negative, the chancres healed, and there was no clinical relapse. The therapeutic dose is indicated to be 12.5 mg. or less per kg., but it is impossible to state definitely, as lower dosage was not included in this series.

The strength of the Kahn reactions definitely paralled the early syphilitic involvement. This is very noticeable in the successfully treated group, where there is a very rapid disappearance of the chancre, accompanied by a reversal of the Kahn reaction. This parallelism of the Kahn reaction with the primary syphilitic lesion, and the reversal of the Kahn test accompanied by healing of the chancre in the treated animals, indicates no apparent difference in the serological results of the two neoarsphenamines tested. These results agree with the reported findings of Wakelin et al. (24) that there is a definite parallelism between the Kahn reaction with the intensity of the experimental syphilitic involvement.

The disappearance of the organism from the chancre does not indicate the efficacy of the drug. This will be seen in the 10-mg. dose, Table 3, which gave negative dark-field results in all animals, but clinical relapse occurred in 5 of the 12 rabbits. Even at 5 mg. 3 rabbits treated with each product were dark-field negative on the first posttreatment observation, but 2 of each group relapsed.

TABLE 5.—*Duration of chancre and presence of Treponema after certain periods of treatment (average, in days)*

Product	Number of rabbits	Dose (mg. per kg.)	Duration of (in days)—	
			Chancre	Treponema
F 5	5	15	18.4	7
F 6	6	15	25.8	7
F 6	6	12.5	16.8	7
E 1	6	15	18	7
E 7	4	15	25.2	7
E 7	6	12.5	21.5	7
Controls	7	----------	>74	>56
	6	----------	51	43

It is evident (Table 5) that there is no noteworthy difference in the power of these products to cause rapid disappearance of spirochetes from the chancre and rapid healing of the lesion without clinical relapse, though, as stated above, there is a very pronounced difference in trypanocidal activity. The chancre disappeared after an average of 19.8 days after treatment with product F and after 21.2 days

when product E was used. These figures agree with those obtained by Wakelin, Lorenz, and Lovenhart (25) in 1925, on a series of nine rabbits receiving three doses of neoarsphenamine of 1 to 4 ratio to the tolerated dose (50 to 75 mg. per kg.). They reported the average duration of the chancre from the institution of treatment as 24 days.

TABLE 6.—*The trypanocidal and spirocheticidal properties of neoarsphenamine—per cent of efficacy*

Product	Trypanocidal test				Spirocheticidal test				
	Dose (mg. per kg.)			M. E. D. (mg. per kg.)	Dose (mg. per kg.)				Effective dose (mg. per kg.)
	35	25	15		15	12.5	10	5	
	Per cent	*Per cent*	*Per cent*		*Per cent*	*Per cent*	*Per cent*	*Per cent*	
F5	100	100	40	25	80	-------	66	17	15
F6	100	100	000	25	100	100	-------	-------	>12.5
	15	10	7						
E1	100	0	25	15	100	-------	50	17	15
E7	100	60	0	15	100	100	-------	-------	>12.5

Table 6 was prepared for convenience in order that the trypanocidal and spirocheticidal activity might be readily compared. The results are evident and need no further comment.

CONCLUSION

From the limited data presented here two brands of neoarsphenamine varying markedly in their trypanocidal activity have shown approximately the same ability (1) to cause the rapid disappearance of spirochetes from the chancre, (2) to cause the rapid healing of the lesion with freedom from clinical relapse, and (3) to influence the Kahn reaction in experimental rabbit syphilis over periods of 67 to 88 days.

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COURT DECISION RELATING TO PUBLIC HEALTH

Compensation under workmen's compensation act awarded for injury through infection following vaccination.—(Texas Court of Civil Appeals; Texas Employers' Insurance Association *v.* Mitchell, 27 S. W. (2d) 600; decided Apr. 15, 1930.) In March, 1928, a number of cases of smallpox developed in the city of Sherman. The employees of a company in that city were directed by the company's manager to be vaccinated or to bring a physician's certificate stating that vaccination was unnecessary. This direction was coupled with the ultimatum that, unless they did so, they could not work for the company until after the smallpox epidemic was over. No member of the State or city board of health, acting as a public agency for the public interest, in any wise directed or caused the vaccination of the employees. One of the employees who was vaccinated suffered injury because of infection following the vaccination. Her vaccination was done by a physician who was suggested to her and the cost of the vaccination was taken out of her pay check. The physician received payment from the company.

Compensation under the workmen's compensation act was granted to the injured employee and the awarding of compensation for such injury was upheld by the court of civil appeals. The following are excerpts from the appellate court's opinion:

The order for vaccination was given on Thursday, March 22, and the vaccination was to be done "Friday," or before Monday morning, March 26. The circumstances do not reflect the purpose of the manager in so peremptorily ordering the vaccination of the employees to have been to discharge a purely moral obligation to provide for medical attention or to further the personal welfare of the employees. Neither do they reflect his intention to require the vaccination to have been an act entirely outside the range of the employees' service to their employer. The circumstances strongly point to the view that in the emergency of the smallpox epidemic the vaccination was for the purpose of furthering the work or business of the factory by having the employees made immune to smallpox as a precaution against suspension or interruption through smallpox of the regular work or business of the factory. * * * Compliance with the special order was intended to operate as an obligation of employment on the part of the employees, and noncompliance was intended to operate as an act inconsistent with the relation of master and servant and incompatible with the faithful performance of duty owing the employer. * * *

* * * In the present case the employer himself, through the manager, in furtherance of his business, and not as a State or public agency, ordered the employees to be vaccinated; and the vaccination wound received in the act of vaccination came in direct contact with infectious or poisonous matter, resulting in the injury complained of.

DEATHS DURING WEEK ENDED JULY 12, 1930

Summary of information received by telegraph from industrial insurance companies for the week ended July 12, 1930, and corresponding week of 1929. (From the Weekly Health Index, July 16, 1930, issued by the Bureau of the Census, Department of Commerce)

	Week ended July 12, 1930	Corresponding week, 1929
Policies in force	76, 067, 749	74, 515, 561
Number of death claims	13, 433	12, 174
Death claims per 1,000 policies in force, annual rate	9. 2	8. 5

Deaths from all causes in certain large cities of the United States during the week ended July 12, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, July 16, 1930, issued by the Bureau of the Census, Department of Commerce)

City	Week ended July 12, 1930		Annual death rate per 1,000, corresponding week, 1929	Deaths under 1 year		Infant mortality rate, week ended July 12, 1930 [2]
	Total deaths	Death rate [1]		Week ended July 12, 1930	Corresponding week, 1929	
Total (65 cities)	6, 507	11. 4	11. 2	616	615	[3] 55
Akron	19			3	4	27
Albany [4]	41	17. 8	13. 9	0	0	0
Atlanta	88	18. 0	14. 5	11	10	116
White	45			4	4	127
Colored	43	(5)	(5)	7	6	111
Baltimore [4]	189	11. 9	13. 1	19	20	65
White	143			14	9	60
Colored	46	(5)	(5)	5	11	81
Birmingham	59	13. 8	16. 2	5	9	47
White	28			2	6	31
Colored	31	(5)	(5)	3	3	71
Boston	170	11. 1	11. 0	19	16	54
Bridgeport	29			2	5	34
Buffalo	128	12. 0	10. 6	15	10	67
Cambridge	18	7. 5	7. 9	2	3	37
Camden	22	8. 5	10. 4	2	2	36
Canton	22	9. 8	7. 6	0	3	0
Chicago [4]	578	9. 5	10. 9	57	63	50
Cincinnati	122			10	9	59
Cleveland	175	9. 0	8. 0	19	11	57
Columbus	68	11. 9	12. 6	5	3	49
Dallas	56	13. 4	12. 2	7	5	----
White	41			7	4	----
Colored	15	(5)	(5)	0	1	----
Dayton	39	11. 0	8. 5	1	1	15
Denver	102	18. 1	10. 5	16	6	167
Des Moines	31	10. 6	11. 0	2	3	35
Detroit	256	9. 7	9. 5	36	29	56
Duluth	33	14. 7	8. 5	1	0	27
El Paso	30	13. 3	15. 9	6	11	----
Erie	45			6	1	128
Fall River [4]	22	8. 5	6. 6	2	6	46
Flint	22	7. 7	9. 5	0	6	0
Fort Worth	38	11. 6	11. 0	6	4	----
White	30			5	4	----
Colored	8	(5)	(5)	1	0	----
Grand Rapids	32	10. 2	8. 6	5	9	76
Houston	62			7	6	----
White	35			5	3	----
Colored	27	(5)	(5)	2	3	----
Indianapolis	99	13. 5	13. 5	1	8	7
White	86			1	6	9
Colored	13	(5)	(5)	0	2	0
Jersey City	58	9. 3	11. 9	5	6	43
Kansas City, Kans	31	13. 7	16. 3	5	4	118
White	24			4	3	106
Colored	7	(5)	(5)	1	1	217
Kansas City, Mo	97	12. 9	13. 9	9	11	70

See footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended July 12, 1930, infant mortality, annual death rate, and comparison with corresponding week of 1929. (From the Weekly Health Index, July 16, 1930, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended July 12, 1930		Annual death rate per 1,000, corresponding week, 1929	Deaths under 1 year		Infant mortality rate, week ended July 12, 1930 [1]
	Total deaths	Death rate [1]		Week ended July 12, 1930	Corresponding week, 1929	
Knoxville	30	14.8	18.8	3	10	70
White	24			3	7	78
Colored	6	(5)	(5)	0	3	0
Los Angeles	249			28	17	85
Louisville	74	11.7	13.9	3	3	26
White	57			3	3	30
Colored	17	(5)	(5)	0	0	0
Lowell	26			2	4	47
Lynn	11	5.4	9.9	0	3	0
Memphis	78	21.4	15.4	7	5	83
White	41			5	1	92
Colored	37	(5)	(5)	2	4	67
Milwaukee	101	9.7	8.1	10	13	50
Minneapolis	107	12.2	9.3	9	8	58
Nashville	73	27.3	22.8	3	10	46
White	41			2	9	41
Colored	32	(5)	(5)	1	1	63
New Bedford	21			5	2	128
New Haven	30	8.3	9.7	1	0	19
New Orleans	155	18.8	14.2	15	13	87
White	97			11	7	97
Colored	58	(5)	(5)	4	6	67
New York	1,248	10.8	11.0	125	93	53
Bronx Borough	178	9.8	7.3	8	15	19
Brooklyn Borough	412	9.3	9.7	51	35	54
Manhattan Borough	462	13.7	15.8	54	36	89
Queens Borough	149	9.1	7.8	7	3	20
Richmond Borough	47	16.3	16.3	5	4	93
Newark, N. J	101	11.1	10.7	9	12	47
Oakland	46	8.8	9.7	5	1	60
Oklahoma City	53			17	5	334
Omaha	65	15.2	14.0	5	4	57
Paterson	37	13.3	11.5	6	7	104
Philadelphia	391	9.9	11.7	31	46	46
Pittsburgh	152	11.8	10.8	16	15	59
Portland, Oreg	79			2	3	25
Providence	56	10.2	12.0	6	5	55
Richmond	45	12.1	16.4	2	4	30
White	29			0	1	0
Colored	16	(5)	(5)	2	3	87
Rochester	61	9.7	11.0	3	9	27
St. Louis	236	14.5	12.7	19	14	62
St. Paul	59			1	2	10
Salt Lake City [4]	31	11.7	12.8	4	4	63
San Antonio	67	16.0	12.4	16	15	
San Diego	49			1	2	21
San Francisco	179	15.9	8.9	6	7	41
Schenectady	18	10.1	13.4	1	4	31
Seattle	77	10.5	7.8	1	3	10
Somerville	21	10.7	7.1	1	2	33
Spokane	26	12.4	7.2	1	2	26
Springfield, Mass	34	11.8	11.8	6	1	95
Syracuse	27	7.1	9.9	4	2	50
Tacoma	24	11.3	8.0	3	0	77
Toledo	88	14.7	13.0	5	9	46
Trenton	30	11.3	18.4	4	4	74
Utica	25	12.5	15.0	2	3	57
Washington, D. C	142	13.4	12.2	17	16	99
White	92			7	8	60
Colored	50	(5)	(5)	10	8	177
Waterbury	19			2	1	51
Wilmington, Del	20	8.1	13.0	0	0	0
Worcester	45	11.9	12.7	1	5	13
Yonkers	14	6.0	6.0	1	1	24
Youngstown	38	11.4	8.7	9	3	141

[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 cities 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 July 12, 1930, and July 13, 1929

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended July 12, 1930, and July 13, 1929

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929
New England States:								
Maine	10	6	-------	1	42	34	1	1
New Hampshire	-------	1	-------	-------	10	12	0	0
Vermont	2	1	-------	-------	10	-------	0	0
Massachusetts	37	60	1	3	440	263	2	1
Rhode Island	2	3	-------	-------	11	44	1	0
Connecticut	1	17	1	1	20	36	1	1
Middle Atlantic States:								
New York	98	181	[1] 1	[1] 5	1,075	403	11	26
New Jersey	91	75	2	-------	535	75	2	3
Pennsylvania	71	83	-------	-------	638	427	1	8
East North Central States:								
Ohio	42	45	6	10	194	439	5	12
Indiana	10	11	-------	-------	53	43	4	1
Illinois	113	148	3	2	138	560	8	7
Michigan	54	74	1	-------	266	309	6	17
Wisconsin	12	13	2	6	54	482	0	3
West North Central States:								
Minnesota	10	11	-------	1	99	79	1	2
Iowa	4	3	-------	-------	53	21	1	3
Missouri	22	34	-------	1	43	21	3	4
North Dakota	-------	5	-------	-------	4	25	1	0
South Dakota	13	7	-------	-------	50	4	1	0
Nebraska	10	3	-------	-------	10	57	0	0
Kansas	7	3	-------	-------	63	114	0	0
South Atlantic States:								
Delaware	-------	2	-------	-------	7	2	0	0
Maryland [2]	12	9	3	5	18	12	0	0
District of Columbia	5	4	-------	1	22	7	0	0
West Virginia	4	8	9	-------	20	64	0	0
North Carolina	18	26	5	-------	30	-------	0	0
South Carolina	2	15	52	104	-------	2	2	0
Georgia	4	6	6	5	10	-------	1	3
Florida	4	3	2	1	16	4	0	3
East South Central States:								
Kentucky	-------	-------	-------	-------	-------	-------	1	0
Tennessee	3	4	8	6	24	15	3	2
Alabama	6	7	1	4	36	10	0	0
Mississippi	4	12	-------	-------	-------	-------	2	0

[1] New York City only.

[2] Week ended Friday.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended July 12, 1930, and July 13, 1929—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929
West South Central States:								
Arkansas	1	1	7	----	4	6	0	0
Louisiana	19	12	3	5	1	8	1	3
Oklahoma [3]	6	10	4	18	16	14	1	2
Texas	10	17	1	8	14	34	1	0
Mountain States:								
Montana	1	2	----	----	2	----	1	2
Idaho	1	----	----	2	4	7	2	1
Wyoming	----	----	1	----	10	6	0	0
Colorado	6	10	----	----	68	7	0	0
New Mexico	3	----	----	----	13	7	0	1
Arizona	----	1	----	----	61	5	1	0
Utah [2]	----	----	1	2	19	4	4	10
Pacific States:								
Washington	6	7	3	----	192	56	1	2
Oregon	5	2	3	6	32	28	0	----
California	53	48	19	6	552	76	4	5

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929
New England States:								
Maine	0	0	19	11	0	0	0	6
New Hampshire	0	0	1	6	0	0	0	0
Vermont	0	0	0	0	0	1	0	0
Massachusetts	6	0	73	78	0	0	8	1
Rhode Island	0	0	6	3	0	0	1	0
Connecticut	0	0	7	19	0	0	1	2
Middle Atlantic States:								
New York	10	12	121	126	13	1	22	26
New Jersey	0	1	54	38	0	0	8	10
Pennsylvania	1	1	126	112	0	0	12	15
East North Central States:								
Ohio	1	1	121	146	51	43	21	23
Indiana	5	0	42	46	76	31	11	3
Illinois	3	1	146	111	34	27	26	16
Michigan	1	0	99	170	40	42	4	1
Wisconsin	0	0	40	52	10	8	0	2
West North Central States:								
Minnesota	6	0	38	37	1	4	2	3
Iowa	2	0	14	26	48	21	0	4
Missouri	0	0	32	14	12	6	13	11
North Dakota	0	0	3	3	10	3	4	1
South Dakota	1	0	4	2	41	13	0	0
Nebraska	0	0	5	10	10	20	0	1
Kansas	9	1	19	31	21	18	7	10
South Atlantic States:								
Delaware	0	0	9	1	0	0	1	1
Maryland [2]	0	0	18	10	0	0	8	26
District of Columbia	0	0	6	7	0	0	1	0
West Virginia	0	0	9	11	17	16	11	12
North Carolina	6	6	21	20	13	17	58	45
South Carolina	1	4	1	7	0	1	59	87
Georgia	1	1	4	12	0	0	59	54
Florida	0	0	4	1	0	0	2	3
East South Central States:								
Kentucky	0	0	18	24	0	5	22	7
Tennessee	1	4	7	3	10	1	56	43
Alabama	3	1	2	15	0	1	24	24
Mississippi	1	0	4	2	1	1	58	40

[2] Week ended Friday.

[3] Figures for 1930 are exclusive of Oklahoma City and Tulsa.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended July 12, 1930, and July 13, 1929—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929	Week ended July 12, 1930	Week ended July 13, 1929
West South Central States:								
Arkansas	1	0	4	1	12	0	39	2
Louisiana	29	0	12	9	1	1	34	29
Oklahoma [3]	14	0	8	10	34	13	16	33
Texas	1	1	5	22	24	24	16	9
Mountain States:								
Montana	4	0	23	6	5	2	1	1
Idaho	0	0	0	2	3	11	0	1
Wyoming	0	0	2	2	1	5	0	1
Colorado	0	0	8	7	5	17	3	8
New Mexico	3	1	5	9	2	0	9	5
Arizona	2	1	2	2	0	0	10	0
Utah [2]	0	0	2	3	0	4	0	4
Pacific States:								
Washington	2	0	25	10	43	12	2	10
Oregon	0	1	7	4	9	27	7	4
California	99	6	50	98	33	14	19	13

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

SUMMARY OF MONTHLY REPORTS FROM STATES

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

State	Cerebrospinal meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April, 1930										
Massachusetts	18	284	45	2	5,751		3	1,206	0	20
May, 1930										
Delaware		8			50		0	38	0	0
June, 1930										
Iowa	5	18			360		0	111	427	10
Massachusetts	16	203	8	7	4,227	2	3	603	0	17
Nebraska	2	20		1	279		0	90	140	7
New Jersey	16	341	14	1	4,268		1	467	0	23
New Mexico	6	37	2	17	156		1	20	21	6
North Dakota	2	15	1		56		4	53	87	3
Porto Rico		20	115	594	55	4	1		0	42
South Carolina		67	549	1,686	149	1,661	7	14	7	239
Tennessee	21	23	45	243	349	66	5	100	49	119
Vermont		1			196		0	25	0	0

April, 1930

Massachusetts:	Cases
Anthrax	4
Chicken pox	857
Dysentery	1
Lethargic encephalitis	2
German measels	1,106
Mumps	809
Ophthalmia neonatorum	104
Septic sore throat	40
Tetanus	1
Trachoma	3
Whooping cough	1,315

May, 1930

Delaware:	
Anthrax	1
Chicken pox	19
Mumps	2
Whooping cough	21

June, 1930

Anthrax:	
Massachusetts	1
New Jersey	1
Porto Rico	1
Chicken pox:	
Iowa	74
Massachusetts	876
Nebraska	113
New Jersey	613
New Mexico	33
North Dakota	15
South Carolina	209
Tennessee	83
Vermont	96
Dengue:	
Porto Rico	1
South Carolina	5
Diarrhea:	
Porto Rico	1
South Carolina	2,949
Dysentery:	
Massachusetts	1
New Jersey	1
Porto Rico	7
Tennessee	63
Filariasis:	
Porto Rico	1
German measles:	
Massachusetts	820
New Jersey	453
New Mexico	3
South Carolina	11
Hookworm disease:	
South Carolina	118
Impetigo contagiosa:	
Tennessee	1
Lead poisoning:	
Massachusetts	4
New Jersey	4
Leprosy:	
Porto Rico	1
Lethargic encephalitis:	
Massachusetts	3
New Mexico	1
North Dakota	2
South Carolina	2
Tennessee	1
Mumps:	
Iowa	44
Massachusetts	454
Nebraska	40
New Mexico	30
North Dakota	48
Porto Rico	6
South Carolina	87
Tennessee	32
Vermont	1
Ophthalmia neonatorum:	
Massachusetts	102
New Jersey	2
Porto Rico	4
South Carolina	7
Tennessee	1
Paratyphoid fever:	
South Carolina	5
Puerperal septicemia:	
Porto Rico	10
Tennessee	1
Rabies in animals:	
South Carolina	8
Septic sore throat:	
Massachusetts	19
Nebraska	3
Tennessee	2
Tetanus:	
Massachusetts	4
North Dakota	1
Porto Rico	8
South Carolina	1
Tetanus (infantile):	
Porto Rico	50
Trachoma:	
Massachusetts	4
New Jersey	5
Porto Rico	2
Tennessee	11
Trichinosis:	
Massachusetts	3
Tularæmia:	
Tennessee	1
Typhus fever:	
New Jersey	1
South Carolina	1
Undulant fever:	
Iowa	24
Nebraska	2
New Mexico	1
South Carolina	1
Vincent's angina:	
Iowa	3
North Dakota	14
Tennessee	3
Whooping cough:	
Iowa	58
Massachusetts	773
Nebraska	33
New Jersey	316
New Mexico	13
North Dakota	89
Porto Rico	69
South Carolina	400
Tennessee	122
Vermont	62

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 95 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 31,475,000. The estimated population of the 88 cities reporting deaths is more than 29,880,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended July 5, 1930, and July 6, 1929

	1930	1929	Estimated expectancy
Cases reported			
Diphtheria:			
46 States	650	968	
95 cities	356	543	568
Measles:			
45 States	5,538	5,001	
95 cities	1,695	1,187	
Meningococcus meningitis:			
46 States	70	137	
95 cities	23	71	
Poliomyelitis:			
46 States	173	29	
Scarlet fever:			
46 States	1,136	1,383	
95 cities	466	526	478
Smallpox:			
46 States	770	647	
95 cities	40	92	23
Typhoid fever:			
46 States	532	515	
95 cities	62	55	80
Deaths reported			
Influenza and pneumonia:			
88 cities	336	359	
Smallpox:			
88 cities	0	0	

City reports for week ended July 5, 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 nonepidemic 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	0	0	0		0	0	6	0
New Hampshire:								
Concord	0	0	0		0	0	0	0
Nashua	0	0	0		0	5	0	0
Vermont:								
Barre	0	0	0		0	5	0	2
Burlington	0	0	0		0	0	0	0

City reports for week ended July 5, 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			
NEW ENGLAND—con.								
Massachusetts:								
Boston	22	27	17		1	152	5	10
Fall River	3	2	3		0	1	0	0
Springfield	3	1	1		0	4	1	0
Worcester	2	1	0		0	43	0	0
Rhode Island:								
Pawtucket	0	0	0		0	0	0	1
Providence	9	3	2		0	17	0	2
Connecticut:								
Bridgeport	1	3	0		0	0	0	0
Hartford	0	2	0		0	0	0	0
New Haven	5	1	0		0	3	9	0
MIDDLE ATLANTIC								
New York:								
Buffalo	10	7	3		1	12	5	7
New York	65	171	76	6	4	446	47	72
Rochester	4	5	3		1	1	1	1
Syracuse	4	2	2		0	33	1	2
New Jersey:								
Camden	0	4	0		1	11	0	0
Newark	8	10	8	1	0	26	9	4
Trenton	4	1	0	1	0	9	0	0
Pennsylvania:								
Philadelphia	31	39	12		1	95	26	23
Pittsburgh	14	14	18		1	77	3	12
Reading	1	2	1		0	0	6	1
Scranton	2		1		0	3	0	0
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	0	4	2		0	37	8	5
Cleveland	89	19	7		0	8	11	6
Columbus	11	3	2	2	0	10	6	1
Toledo	23	3	0		0	3	10	0
Indiana:								
Fort Wayne	2	2	0		0	1	0	0
Indianapolis	5	2	0		0	10	0	9
South Bend	0	0	0		0	3	0	2
Terre Haute	0	0	0		0	14	0	1
Illinois:								
Chicago	40	67	100	2	1	22	44	22
Springfield	1	1	0	1	1	21	0	0
Michigan:								
Detroit	29	32	31	1	0	65	16	10
Flint	6	2	1		0	42	0	2
Grand Rapids	3	1	1		1	3	0	0
Wisconsin:								
Kenosha	4	0	0		0	2	7	0
Madison	3	0	0		0	6	0	0
Milwaukee	62	9	2		0	22	19	7
Racine	4	1	0		0	11	0	0
Superior	0	0	0		0	0	0	0
WEST NORTH CENTRAL								
Minnesota:								
Duluth	0	0	0		0	5	1	0
Minneapolis	25	9	0		0	15	0	2
St. Paul	11	6	0		0	3	3	1
Iowa:								
Des Moines	0	1	0			0	0	
Sioux City	1	0	0			5	1	
Waterloo	0	0	0			0	0	
Missouri:								
Kansas City		2						
St. Joseph	0	0	0		0	1	0	1
St. Louis	23	17	14			30	8	
North Dakota:								
Fargo	4	0	0		0	0	3	1
Grand Forks	0	0	0			0	0	

City reports for week ended July 5, 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			
WEST NORTH CENTRAL—continued								
South Dakota:								
Aberdeen	1	0	0			25	0	
Sioux Falls	0	0	0			0	0	
Nebraska:								
Omaha	1	2	1		0	2	0	8
Kansas:								
Topeka	2	0	0		0	3	2	1
Wichita	0	0	0		0	5	0	2
SOUTH ATLANTIC								
Delaware:								
Wilmington	3	1	1		0	0	0	4
Maryland:								
Baltimore	21	12	4		0	7	8	8
Cumberland	1	0	0		0	0	0	0
Frederick	0	0	0		0	0	0	0
District of Columbia:								
Washington	5	4	5		1	43	0	3
Virginia:								
Lynchburg	4	0	1		0	6	0	0
Norfolk	1	0	0		0	3	0	1
Richmond	3	1	0		0	8	1	4
Roanoke	2	0	0		1	12	2	1
West Virginia:								
Charleston	0	0	1		0	1	0	1
Wheeling	1	0	0		0	1	0	0
North Carolina:								
Raleigh	0	0	0		0	0	0	0
Wilmington	1	0	0		0	0	0	0
Winston-Salem	2	0	0		0	1	2	0
South Carolina:								
Charleston	0	0	0	10	0	0	1	1
Columbia	1	0	0		0	1	1	0
Georgia:								
Atlanta		2						
Brunswick		0						
Savannah	1	1	0		0	0	3	1
Florida:								
Miami	0	1	0		0	0	1	1
St. Petersburg		0			0			0
Tampa	0	0	0		0	6	0	2
EAST SOUTH CENTRAL								
Kentucky:								
Covington	0	0	3		0	1	0	4
Tennessee:								
Memphis	1	0	0		0	1	0	7
Nashville	2	0	0		0	12	0	1
Alabama:								
Birmingham	1	1	2	1	1	7	1	9
Mobile	0	0	0		0	0	0	1
Montgomery	1	0	1			0	1	
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith	0	0	0			0	0	
Little Rock	0	0	0		0	0	0	0
Louisiana:								
New Orleans	0	5	4	1	3	1	0	9
Shreveport	0	0	0		0	1	3	2
Oklahoma:								
Tulsa	3	0	1			0	0	
Texas:								
Dallas	0	3	2		0	2	0	4
Fort Worth	0	1	0		0	0	0	1
Galveston	0	0	0		0	0	0	0
Houston	0	2	7		0	3	0	4
San Antonio	0	1	1		1	0	0	3

City reports for week ended July 5, 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								
Montana:								
Billings	1	0	0	----------	0	2	0	0
Great Falls	0	0	0	----------	0	0	2	0
Helena	0	0	0	----------	0	1	0	0
Missoula	0	0	0	----------	0	0	1	0
Idaho:								
Boise	1	0	0	----------	0	2	0	1
Colorado:								
Denver	7	7	1	----------	0	25	3	4
Pueblo	1	1	0	----------	0	32	6	0
New Mexico:								
Albuquerque	2	0	0	----------	0	0	0	0
Arizona:								
Phoenix	0	0	0	----------	0	1	0	4
Utah:								
Salt Lake City	4	3	0	----------	0	21	4	2
Nevada:								
Reno	0	0	0	----------	0	0	0	0
PACIFIC								
Washington:								
Seattle	11	3	0	----------	----------	53	31	----------
Spokane	3	1	0	----------	----------	15	0	----------
Tacoma	5	2	0	----------	0	24	0	2
Oregon:								
Portland	7	5	2	----------	0	12	3	7
Salem	1	0	0	----------	0	0	1	0
California:								
Los Angeles	17	35	13	7	2	103	28	17
Sacramento	0	2	2	----------	0	12	0	1
San Francisco	9	10	1	1	1	16	16	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	0	3	0	0	0	3	1	0	0	12	16
New Hampshire:											
Concord	0	0	0	0	0	0	0	0	0	0	7
Nashua	0	0	0	0	0	0	0	0	0	0	0
Vermont:											
Barre	0	0	0	0	0	0	0	0	0	0	7
Burlington	0	0	0	0	0	0	0	0	0	0	6
Massachusetts:											
Boston	31	15	0	0	0	16	2	0	0	41	187
Fall River	1	2	0	0	0	2	1	0	0	4	24
Springfield	2	1	0	0	0	0	0	1	0	3	22
Worcester	3	2	0	0	0	2	0	0	0	4	43
Rhode Island:											
Pawtucket	0	0	0	0	0	1	0	0	0	0	9
Providence	3	4	0	0	0	2	0	0	0	2	53
Connecticut:											
Bridgeport	3	1	0	0	0	3	0	0	0	0	29
Hartford	2	2	0	0	0	0	0	2	0	0	36
New Haven	1	0	0	0	0	2	0	0	0	0	31
MIDDLE ATLANTIC											
New York:											
Buffalo	12	6	0	0	0	11	1	0	0	17	119
New York	83	48	0	0	0	72	16	8	1	68	1,159
Rochester	3	3	0	0	0	2	0	0	0	2	57
Syracuse	3	4	0	0	0	3	0	0	0	34	34
New Jersey:											
Camden	1	2	0	0	0	0	0	0	0	0	15
Newark	10	8	0	0	0	14	1	0	0	16	87
Trenton	1	5	0	0	0	4	0	2	0	0	27
Pennsylvania:											
Philadelphia	37	25	0	0	0	36	4	1	0	16	421
Pittsburgh	15	17	0	0	0	5	1	0	0	25	136
Reading	1	2	0	0	0	2	0	1	0	9	23
Scranton	1	1	0	0	0	0	0	0	0	5	----------

City reports for week ended July 5, 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	6	7	0	0	0	12	1	0	0	8	102
Cleveland	20	19	0	0	0	12	2	1	0	50	151
Columbus	3	4	0	0	0	1	0	0	0	3	68
Toledo	5	9	0	2	0	5	0	1	0	0	52
Indiana:											
Fort Wayne	1	1	-------	2	0	0	0	0	1	1	20
Indianapolis	3	2	3	4	0	4	0	0	0	8	-------
South Bend	1	0	0	0	0	0	0	0	0	0	19
Terre Haute	0	0	0	0	0	0	0	0	0	0	10
Illinois:											
Chicago	55	104	2	0	0	45	3	0	1	54	590
Springfield	1	0	0	0	0	1	0	0	0	1	16
Michigan:											
Detroit	42	29	2	0	0	23	3	0	1	57	219
Flint	4	6	0	0	0	2	0	0	0	13	18
Grand Rapids	5	3	0	1	0	0	1	0	0	3	25
Wisconsin:											
Kenosha	1	0	0	0	0	0	0	0	0	13	2
Madison	0	2	0	0	0	1	0	0	0	9	26
Milwaukee	11	10	1	1	0	1	0	0	0	51	79
Racine	2	0	0	0	0	0	0	0	0	4	5
Superior	2	0	0	0	0	0	0	0	0	0	7
WEST NORTH CENTRAL											
Minnesota:											
Duluth	4	0	0	0	0	2	0	1	0	8	16
Minneapolis	15	7	1	0	0	0	1	2	0	1	71
St. Paul	9	6	0	0	0	1	1	0	0	2	34
Iowa:											
Des Moines	3	1	0	12	-------	-------	0	0	-------	0	30
Sioux City	1	1	0	1	-------	-------	0	0	-------	2	-------
Waterloo	1	0	1	3	-------	-------	0	0	-------	1	-------
Missouri:											
Kansas City	3	-------	0	-------	-------	-------	1	-------	-------	-------	-------
St. Joseph	0	6	0	0	0	1	0	0	0	0	18
St. Louis	10	22	1	1	0	6	3	0	0	21	170
North Dakota:											
Fargo	0	0	0	1	0	1	0	0	0	0	14
Grand Forks	0	0	0	4	-------	-------	0	0	-------	0	-------
South Dakota:											
Aberdeen	0	0	0	5	-------	-------	0	0	-------	3	-------
Sioux Falls	0	0	0	0	-------	-------	0	0	-------	0	6
Nebraska:											
Omaha	1	5	1	0	0	0	0	0	0	0	59
Kansas:											
Topeka	0	4	0	0	0	1	0	0	0	10	15
Wichita	1	0	0	0	0	2	0	0	0	2	41
SOUTH ATLANTIC											
Delaware:											
Wilmington	1	3	0	0	0	1	0	0	0	2	23
Maryland:											
Baltimore	10	16	0	0	0	11	3	3	1	31	158
Cumberland	0	0	0	0	0	0	0	0	0	2	12
Frederick	0	0	0	0	0	0	0	0	0	0	5
District of Columbia:											
Washington	7	4	0	0	0	12	1	0	0	9	126
Virginia:											
Lynchburg	0	0	0	0	0	0	0	3	0	2	15
Norfolk	0	0	1	0	0	1	1	0	0	4	-------
Richmond	1	0	0	0	0	5	1	4	0	0	46
Roanoke	0	0	-------	0	0	1	0	0	0	0	18
West Virginia:											
Charleston	0	0	1	0	0	0	1	0	0	4	12
Wheeling	1	1	0	0	0	0	1	1	0	0	14
North Carolina:											
Raleigh	0	0	0	1	0	0	0	0	1	0	10
Wilmington	0	0	0	0	0	0	0	0	0	0	14
Winston-Salem	0	1	1	0	0	2	1	1	1	6	26

City reports for week ended July 5, 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	1	0	0	0	5	1	0	0	0	19
Columbia	0	1	0	0	0	0	1	1	0	2	
Georgia:											
Atlanta	2		1				3				
Brunswick	0		0				0				
Savannah	0	0	0	0	0	2	2	1	0	0	26
Florida:											
Miami	0	0	0	0	0	3	1	0	0	0	29
St. Petersburg	0		0		0	0	0		0		13
Tampa	1	0	0	0	0	2	1	0	0	0	9
EAST SOUTH CENTRAL											
Kentucky:											
Covington	0	0	0	0	0	0	0	0	0	0	20
Tennessee:											
Memphis	2	0	0	0	0	5	6	4	0	9	91
Nashville	1	0	0	3	0	2	5	2	0	3	42
Alabama:											
Birmingham	0	2	1	0	0	2	3	7	2	0	88
Mobile	0	0	0	0	0	0	0	1	0	0	23
Montgomery	0	0	0	0			1	0		0	
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	0	0	0			0	0		2	
Little Rock	0	0	0	0	0	0	1	0	0	0	
Louisiana:											
New Orleans	3	10	0	0	0	9	3	8	1	4	129
Shreveport	0	0	0	0	0	4	1	1	1	0	37
Oklahoma:											
Tulsa	0	0	1	2			2	0		0	
Texas:											
Dallas	2	1	0	0	0	4	2	1	0	0	55
Fort Worth	1	0	1	0	0	1	1	0	0	0	37
Galveston	0	0	0	0	0	0	0	1	0	0	15
Houston	0	0	0	0	0	3	0	1	0	0	82
San Antonio	0	2	0	0	0	7	0	1	0	0	69
MOUNTAIN											
Montana:											
Billings	0	0	0	0	0	1	0	0	0	0	4
Great Falls	0	13	1	0	0	0	0	0	0	0	10
Helena	1	1	0	0	0	0	0	0	0	1	2
Missoula	0	0	0	0	0	0	0	0	0	3	3
Idaho:											
Boise	0	0	0	0	0	0	0	0	0	1	3
Colorado:											
Denver	6	1	0	0	0	12	0	0	0	49	81
Pueblo	0	0	0	5	0	1	0	0	0	0	7
New Mexico:											
Albuquerque	0	0	0	0	0	2	0	0	0	0	5
Arizona:											
Phoenix	0	0	0	0	0	3	0	0	2	0	22
Utah:											
Salt Lake City	1	4	0	0	0	0	0	0	0	28	27
Nevada:											
Reno	0	0	0	1	0	0	0	0	0	0	3
PACIFIC											
Washington:											
Seattle	4	1	1	2			1	0		10	
Spokane	2	0	1	3			0	0		10	
Tacoma	1	1	2	3	0	0	0	0	0	1	29
Oregon:											
Portland	2	0	7	4	0	0	0	1	0	8	62
Salem	0	0	0	0	0	0	0	0	0	1	
California:											
Los Angeles	15	8	3	6	0	29	2	1	0	27	247
Sacramento	1	1	0	2	0	0	1	1	0	1	28
San Francisco	8	8	0	0	0	15	0	0	0	4	160

City reports for week ended July 5, 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									
Connecticut:									
New Haven	1	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
Buffalo	1	1	0	0	0	0	0	0	0
New York	2	6	0	2	0	0	4	0	0
Rochester	1	0	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia	0	2	0	0	0	0	0	1	0
Pittsburgh	0	2	0	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cincinnati [1]	1	1	0	0	0	0	0	0	0
Indiana:									
Indianapolis	1	1	0	0	0	0	0	1	0
Illinois:									
Chicago	3	2	0	0	0	0	1	0	0
Michigan:									
Detroit	3	1	1	0	0	0	0	1	0
WEST NORTH CENTRAL									
Missouri:									
St. Joseph	1	0	0	0	0	0	0	0	0
St. Louis	1	1	0	0	0	0	0	1	0
North Dakota:									
Fargo	0	0	2	0	0	0	0	0	0
Nebraska:									
Omaha	1	0	0	0	0	0	0	0	0
Kansas:									
Wichita	0	0	0	0	0	0	0	1	0
SOUTH ATLANTIC									
District of Columbia:									
Washington	1	0	0	0	0	0	0	0	0
Virginia:									
Norfolk	2	0	0	0	0	0	0	1	0
Richmond	0	1	0	0	0	0	0	0	0
North Carolina:									
Wilmington	0	0	0	0	2	1	0	0	0
Winston-Salem	0	0	0	0	8	1	0	0	0
South Carolina:									
Charleston	0	0	0	0	12	0	0	0	0
Georgia:									
Savannah [2]	0	0	0	0	1	1	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	4	2	0	0	0	1	0	0	0
Nashville	0	0	0	0	1	0	0	0	0
Alabama:									
Birmingham	0	1	0	1	0	0	0	0	0
Mobile	0	0	0	0	0	2	0	0	0
WEST SOUTH CENTRAL									
Arkansas:									
Little Rock	0	0	0	0	0	1	0	0	0
Louisiana:									
New Orleans	0	0	0	0	1	1	0	0	0
Shreveport	0	1	0	0	0	4	0	2	0
Oklahoma:									
Tulsa	0	0	0	0	0	0	0	1	0

[1] Rabies (in man): 1 case and 1 death at Cincinnati, Ohio.
[2] Typhus fever: 2 cases at Savannah, Ga.

City reports for week ended July 5, 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
WEST SOUTH CENTRAL—continued									
Texas:									
Dallas	0	0	0	0	1	4	1	0	0
Fort Worth	0	0	0	0	0	4	0	0	0
Houston	0	0	0	0	0	2	0	0	0
MOUNTAIN									
Colorado:									
Denver	0	1	0	0	0	0	0	0	0
Arizona:									
Phoenix	2	0	0	0	0	0	0	0	0
PACIFIC									
California:									
Los Angeles	1	0	0	0	0	0	0	49	4
Sacramento	0	0	0	0	0	1	0	0	0

The following table gives the rates per 100,000 population for 98 cities for the 5-week period ended July 5, 1930, compared with those for a like period ended July 6, 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, June 1 to July 5, 1930—Annual rates per 100,000 population, compared with rates for the corresponding period of 1929 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	June 7, 1930	June 8, 1929	June 14, 1930	June 15, 1929	June 21, 1930	June 22, 1929	June 28, 1930	June 29, 1929	July 5, 1930	July 6, 1929
98 cities	76	110	80	106	68	112	67	110	[2] 59	89
New England	86	72	35	79	35	74	62	94	51	70
Middle Atlantic	72	148	82	131	81	125	65	144	59	101
East North Central	113	123	129	145	93	165	98	131	91	128
West North Central	51	96	59	65	34	87	70	85	[3] 33	77
South Atlantic	49	54	40	64	33	64	24	34	[4] 24	34
East South Central	13	21	13	41	13	34	13	34	40	27
West South Central	41	88	86	84	86	65	37	69	52	72
Mountain	17	61	34	35	9	26	0	26	9	26
Pacific	76	56	43	34	54	58	64	84	38	43

MEASLES CASE RATES

98 cities	955	734	833	483	656	423	500	267	[2] 281	195
New England	1,462	602	1,415	337	1,048	391	762	211	498	209
Middle Atlantic	1,076	169	1,089	143	818	123	640	99	339	76
East North Central	517	1,827	457	1,152	381	1,010	334	620	170	474
West North Central	412	1,060	362	581	658	504	264	256	[3] 154	114
South Atlantic	478	238	362	242	375	129	234	137	[4] 175	73
East South Central	418	41	182	41	270	41	256	7	142	27
West South Central	123	400	101	209	82	183	19	156	26	69
Mountain	5,518	192	3,321	261	2,617	218	1,416	148	712	148
Pacific	2,220	408	1,564	384	1,247	352	931	208	527	128

Footnotes on p. 1743.

Summary of weekly reports from cities, June 1 to July 5, 1930—Annual rates per 100,000 population, compared with rates for the corresponding period of 1929 [1]—Continued

SCARLET FEVER CASE RATES

	Week ended—									
	June 7, 1930	June 8, 1929	June 14, 1930	June 15, 1929	June 21, 1930	June 22, 1929	June 28, 1930	June 29, 1929	July 5, 1930	July 6, 1929
98 cities	213	209	192	188	145	148	109	112	[2] 77	88
New England	230	191	199	204	115	159	124	119	66	90
Middle Atlantic	196	135	155	129	118	100	89	72	57	46
East North Central	296	321	314	322	229	260	184	191	116	173
West North Central	260	165	233	110	148	77	97	104	[3] 114	38
South Atlantic	156	300	145	133	97	73	62	62	[4] 55	60
East South Central	108	96	54	75	67	89	61	34	13	55
West South Central	78	76	37	107	105	88	41	42	49	23
Mountain	189	78	129	70	197	96	60	70	163	44
Pacific	109	270	113	251	85	210	57	164	45	135

SMALLPOX CASE RATES

98 cities	20	8	15	16	10	9	13	15	[2] 7	15
New England	0	0	0	0	0	0	0	0	0	0
Middle Atlantic	1	0	0	0	0	0	0	0	0	0
East North Central	8	17	11	28	8	18	10	38	5	41
West North Central	116	12	53	12	30	6	51	19	[3] 13	13
South Atlantic	4	2	7	4	2	6	9	2	[4] 2	2
East South Atlantic	34	14	40	55	20	0	7	7	20	21
West South Central	22	8	22	42	26	4	22	4	0	11
Mountain	60	52	34	44	34	61	51	113	51	35
Pacific	68	14	57	46	43	31	50	14	38	24

TYPHOID FEVER CASE RATES

98 cities	8	8	9	9	8	8	13	12	[2] 10	10
New England	4	7	9	11	0	4	9	9	7	4
Middle Atlantic	6	5	8	3	4	2	5	7	6	6
East North Central	4	3	4	4	3	4	10	3	1	4
West North Central	9	8	6	17	8	19	13	15	[3] 7	13
South Atlantic	20	17	15	11	22	13	37	30	[4] 28	32
East South Central	13	27	27	34	54	55	67	34	94	48
West South Central	37	27	19	19	26	34	34	34	49	8
Mountain	0	0	9	9	9	9	34	52	0	17
Pacific	2	12	19	19	7	5	5	19	5	7

INFLUENZA DEATH RATES

91 cities	5	7	6	6	4	6	3	5	[2] 4	2
New England	0	2	2	7	2	2	0	2	2	0
Middle Atlantic	4	5	5	4	5	3	2	4	4	3
East North Central	4	6	6	8	4	8	3	4	2	1
West North Central	12	3	15	9	0	6	0	0	[3] 0	0
South Atlantic	9	7	2	2	2	6	5	4	[4] 4	2
East South Central	15	22	15	7	15	15	15	15	7	15
West South Central	11	16	27	12	8	16	11	4	15	4
Mountain	9	35	0	0	0	0	0	44	0	0
Pacific	3	16	6	6	0	6	3	3	9	0

PNEUMONIA DEATH RATES

91 cities	86	90	85	86	74	81	68	64	[2] 55	63
New England	73	65	82	85	69	56	49	58	29	49
Middle Atlantic	106	105	101	98	82	89	75	65	58	67
East North Central	59	96	67	82	53	76	56	69	41	56
West North Central	130	81	77	54	109	48	86	48	[3] 62	63
South Atlantic	93	67	73	88	64	84	66	62	[4] 51	69
East South Central	81	60	110	104	133	119	103	75	162	75
West South Central	84	90	107	62	69	82	92	66	84	109
Mountain	112	61	86	113	129	78	77	104	60	61
Pacific	40	69	71	60	74	104	55	38	64	31

[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] Kansas City, Mo., Atlanta and Brunswick, Ga., not included.

[3] Kansas City, Mo., not included.

[4] Atlanta and Brunswick, Ga., not included.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended June 28, 1930.—The Department of Pensions and National Health reports cases of certain communicable diseases in Canada for the week ended June 28, 1930, as follows:

Province	Cerebro-spinal fever	Influenza	Poliomyelitis	Smallpox	Typhoid fever
Prince Edward Island [1]					
Nova Scotia		4			
New Brunswick					5
Quebec	1				11
Ontario	2	4	1	10	4
Manitoba					1
Saskatchewan					1
Alberta	1				
British Columbia					1
Total	4	8	1	10	23

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

Quebec Province—Communicable diseases—Week ended July 5, 1930.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended July 5, 1930, as follows:

Disease	Cases	Disease	Cases
Chicken pox	34	Ophthalmia neonatorum	2
Diphtheria	31	Poliomyelitis	1
German measles	3	Scarlet fever	30
Influenza	1	Smallpox	3
Lethargic encephalitis	1	Tuberculosis	60
Measles	36	Typhoid fever	9
Mumps	15	Whooping cough	12

Ontario Province—Communicable diseases (comparative)—Four weeks ended June 26, 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 four weeks ended June 26, 1930, as compared with the corresponding period of 1929:

Disease	4 weeks, 1929		4 weeks, 1930	
	Cases	Deaths	Cases	Deaths
Cerebrospinal meningitis	4	5	11	5
Chancroid	6	0	6	0
Chicken pox	1,366	0	836	0
Diphtheria	239	14	237	7
Erysipelas	2		2	
German measles	36		429	
Goitre	1		1	
Gonorrhea	189		130	
Influenza	17	2	13	2
Lethargic encephalitis	2	1	1	1
Measles	3,077	2	1,319	0
Mumps	463	0	130	0
Paratyphoid fever	2		5	
Pneumonia		158		130
Poliomyelitis	2	2	2	
Puerperal septicemia		1	0	2
Scarlet fever	446	2	511	2
Septic sore throat			1	
Smallpox	87	0	[1] 47	0
Syphilis	158	2	122	
Tetanus				1
Trachoma			1	
Tuberculosis	171	44	129	48
Typhoid fever	66		30	
Undulant fever			11	
Whooping cough	550	1	232	

[1] Cases of smallpox for this period were distributed as follows: Ottawa, 19; Nairn, 12; Sudbury, 6; Toronto, 3; Welland, 3; 1 case in each of the following places, Guelph, Espanola, Sullivan, Napean.

CUBA

Habana—Communicable diseases—June, 1930.—During the month of June, 1930, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Death
Chicken pox	11		Measles	1	
Diphtheria	12	1	Scarlet fever	8	
Leprosy	2		Tuberculosis	41	9
Malaria	13		Typhoid fever	15	2

Provinces—Notifiable diseases—Four weeks ended June 7, 1930.—During the four weeks ended June 7, 1930, cases of certain diseases were reported in Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer			4	1			5
Chicken pox	36	41		6	4	3	90
Diphtheria	1	17		1	1	1	21
Malaria		7		1	7	39	54
Measles		6		10			16
Paratyphoid fever	2	7		1		7	17
Scarlet fever		22	2				24
Tetanus (infantile)			1	1			2
Typhoid fever	7	29	9	41	7	12	105

MEXICO

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

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria		1	Measles	4	4
Enteritis (various)		51	Smallpox	2	
Influenza	3		Tuberculosis	25	21
Leprosy	1		Typhoid fever		5
Malaria	63	13	Whooping cough	2	

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		Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930			May, 1930					June, 1930				July, 1930	
					12	19	26	3	10	17	24	31	7	14	21	28	5	12
Afghanistan	C																	[1] P
China:																		
Canton	C									1	1	1		2				
Manchuria—Dairen	C		1															
Swatow	C											3	4	3				
India	C	6,461	5,914	10,817	4,947	7,436	15,870	13,209	15,596	14,600	12,468							
	D	3,606	3,371	5,866	2,924	4,345	10,403	10,234	12,782	11,882	9,756							
Bassein	C				3	1	1	2	3	4								
	D				2	1	1	1	3	2								
Bombay	C			4														
Calcutta	C	202	269	354	137	165	165	180	194	175	142	98	78	73	94	77		
	D	110	153	220	85	118	118	93	125	107	83	57	44	36	36	63		
Negapatam	C	12												1				
	D	4												1				
Rangoon	C	3	3	2				1		5	2	2	1	1	2	2		
	D	3	1	2				1		1		2	1	1	1	1		
Tuticorin	C	3																
	D	1																
India (French):																		
Chandernagor	C		4	1	1	2		3	2	2	2					2		
	D		2	3			4	1	1	4	1					1		
Karikal	C		4	12		1												
	D		1	9		1												
Indo-China (see also table below):																		
Pnompenh	C	11	9				2		1				5	10	11	14		
	D	8	7	6						2	2	1	1	4	7	6		
Saigon and Cholon	C	2	5	14	17	12	19	28	59	40	48	13	17	19	7	5		
	D	2	4	6	10	10	13	22	43	27	24	7	11	10	2			

[1] An outbreak of cholera was reported in June, 1930, in Afghanistan.

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

CHOLERA—Continued

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

Place		Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930			May, 1930					June, 1930				July, 1930	
					12	19	26	3	10	17	24	31	7	14	21	28	5	12
Philippine Islands:																		
Bulacan Province—																		
Malolos	C												1			1		
	D												1					
Santa Maria	C															1		
Cebu—																		
Bantayan	C												3	10	86	86	134	94
	D												3	9	39	43	8	41
Barili	C															1	1	
	D																1	
Bogo	C													1	3	1	23	21
	D													1	1	1	11	9
Cebu	C															20	14	13
	D															9	6	7
Madridejos	C															15	13	3
	D															8	5	1
Medellin	C															1	18	38
	D																6	9
San Remigio	C														3	8	38	23
	D														2	4	8	5
Santa Fe	C												1					
	D												1					
Tobogon	C																	13
	D																	6
Iloilo Province—																		
La Paz	C																	2
	D																	3
Miagao	C															1	1	
	D																2	
La Union Province—Rosario	C																	1
Leyte Province—Maripipi	C													1	15	20		
	D														11	9		
Manila	C										1							

Masbate Province—																		
Catbabayn	C																	4
	D																	1
Cataingan	C															10	20	21
	D															3	4	14
Misami Province—San Miguel	C																	2
	D																	2
Negros—																		
Bacolod	C														9			4
	D														8			4
Binalbagan	C																	9
	D																	8
Cadiz	C											10	2	10	10	3	8	1
	D											7	1	3	5	3	4	1
Escalante	C												1					22
	D												1					7
Calatrava	C														3			1
	D														2			1
Isabella	C																	11
La Carlotla	C															3	1	
	D															1	1	
La Castellana	C															4	3	5
	D															2	3	8
Murcia	D																	8
Pontevada	C																	7
	D																	3
Polupandan	C																	1
	D																	1
Sagay	D																1	
San Carlos	C																	6
	D																	8
San Enrique	C																	5
	D																	8
Silay	C																	6
	D																	6
Talisay	C														7	4		6
	D														7	1		4
Valladelid	C																	3
	D																	4
Villa Hermosa	D																	1
Pampanga Province—																		
Angeles	C														1			
Bacolor	C															1		
Lubao	C																2	
Pangasinan Province—Binmaley	C																2	
Rizal Province—Navotas	C											1						
	D											1						
San Antonio	C													1				
	D													1				

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

CHOLERA—Continued

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

Place		Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930			May, 1930					June, 1930				July, 1930	
					12	19	26	3	10	17	24	31	7	14	21	28	5	12
Siam	C	3	7	1	8	7	6	8	12	4	6	4	------	1	6	------	------	------
	D	------	4	------	6	3	2	2	10	2	2	2	------	1	4	------	------	------
Bangkok	C	3	2	2	1	5	4	5	------	------	6	3	5	3	3	1	------	------
	D	------	------	1	1	2	1	------	------	------	2	1	------	3	------	2	------	------
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	------	------	------	------	------

Place		December, 1929	January, 1930	February, 1930	March, 1930			April, 1930			May, 1930			June, 1930	
					1–10	11–20	21–31	1–10	11–20	21–30	1–10	11–20	21–31	1–10	11–20
Indo-China (French) (see also table above):															
Annam [1]	C	------	1	4	------	52	------	------	------	60	------	20	3	2	14
Cambodia [1]	C	41	147	90	49	32	------	18	6	------	5	31	52	56	88
Cochin-China [1]	C	46	177	65	5	22	55	48	------	------	188	224	259	147	126

[1] Reports incomplete.

PLAGUE

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

Place		Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930			May, 1930					June, 1930				July, 1930	
					12	19	26	3	10	17	24	31	7	14	21	28	5	12
Algeria:																		
Algiers	C																1	1
Constantine	C												1					1
Argentina:																		
Andalgala.[1]																		
Rosario	C	P																
Sante Fe	C	6																
Villa Lia	D		2															
Azores: Ponta Delgada	C					1	7											
	D						5											
Belgian Congo	C																2	
	D																2	
Brazil:																		
Rio de Janeiro	C	1																
	D	1																
Sao Paulo.[2]																		
British East Africa (see also table below):																		
Tanganyika	C		7			11	33											
	D					10	10											
Uganda	C	82	47	98	27	20	23	47	54	89								
	D	70	43	87	27	19	21	38	48	75								
Ceylon:																		
Colombo	C	4	3	4			1		4	1		1	1					
	D	4	3	4			1		3	1		1	1					
Plague-infected rats		1	3	2	2			2					1					
Chile: Antofagasta	C	1	1	1				1										
	D			2				1										
Dutch East Indies:																		
Batavia and West Java	C	167	153	124	27	16	20	24	18	33	17							
	D	164	150	122	27	16	20	24	18	33	17							
Plague-infected rats		3	3	3		6	2				3	2	3	1				
Celebes—Makassar	C	1																
	D	1																
Java and Madura	D	317	296	223	59	40	35	48	28	74	36							

[1] On Mar. 11, 3 deaths from bubonic plague were reported in Andalgala, Catamarca Province, Argentina, since Feb. 5, 1930.
[2] 21 cases of plague with 8 deaths 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		Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930 12	19	26	May, 1930 3	10	17	24	31	June, 1930 7	14	21	28	July, 1930 5	12
Ecuador (see table below).																		
Egypt:																		
Alexandria	C	4	1	4			1	1	2	3	3	5	3	6	6	4	8	
	D	1		1			1	1			1	2	2		2	5	2	
Assiout	C						7	7	3	9	2	6	4	2	3		1	
	D						3	2		3	1	1		1		2		
Beheira	C	2		4														
Beni Suef	C			4														
Dakahlieh	C		8	5	2		1	2	3	1	2	5	1					
	D			1						1	1							
Gharbieh	C	1					1											
	D						1											
Girga	C				1													
Minieh	C										6	1	1	1	4	4	2	
	D											1		1				
Port Said	C				1					1	1		1			1		
Greece (see also table below):																		
Patras	C			1											1			
Piraeus	C	1																
Pyrgos	C			1														
Hawaii Territory, Hamaqua, Hawaii: Plague-infected rats															1			
India	C	4,814	5,639	4,087	917	343	535	420	281	188	117							
	D	3,308	3,940	3,344	753	229	517	461	271	205	103							
Bassein	C	1		3														
	D	1		1														
Bombay	C	1	1	7		4			4	1		1	1		2			
	D	1	1	5	1	3	4		1	4					1	1		
Plague-infected rats		28	31	86	20	28	25	35	23	39		19	6	7	8	5		
Madras Presidency	C	27	230	157	12	15	9	8	2		6				2			
	D	13	140	87	6	8	4	1		1	4							
Rangoon	C	3	7	3		3		2		1	3					1		
	D	2	6	3		2	1	1	1	1	1					1		
Plague-infected rats		1	7	3	1	2		1	1	3	1				1			
India (Portuguese)	D								7									

Indo-China (see also table below):																		
Pnompenh	C	1			2			1	1			2	6					
	D	2	13	13	2	1	1				1		5	1		1		
Saigon and Cholon	C	2		1					1				1		1			
	D	2		1														
Iraq: Baghdad	C	6	6	7		2		4	7	11	7	12	12	4	8	4	10	
	D	2	1	4				2	3	5	4	6	7	3	5		5	
Japan: Osaka (vicinity of)—Plague-infected rats		7	6	4	1	1	1											
Kwang-Chow-Wan	C	25	25	7				37		20		14	23		8			
Madagascar: Tamatave (see also table below)	C					1							1					
Morocco	C	4	48	55	14	41	34	32	19	22	18	12	2		1			
	D		13	18	6	26	12	11	11	14	6	3	4					
Nigeria: Lagos	C	6	7	13					1	1			1		3			
	D	6	7	5					1	1			1		3			
Plague-infected rats		44	42	25	3	3	1		2	6	5	4	1					
Senegal (see table below).																		
Siam	C	8	17	16	4		1			1	1	3						
	D	6	13	15	4		2			1		3						
Bangkok	C		1	5						1	1	3						
	D		1	4						1		3						
Nagara Pathom	C	7	5	1	4	3	2	1										
	D	7	6	1	4	3	1	1										
Nagara Rajsima	C	2	2	1		1												
	D			1		1												
Syria: Beirut	C													2	1	1		
Tunisia:																		
Sfax district	C	18	22				1		17			4	6		3			
Tunis	C	6	5	1				4				1		1				
	D												1					
Union of Socialist Soviet Republics:																		
Saisk Region	C												1			1		
	D												1					
Stavropol Region	C												1					
	D												1					
Union of South Africa:																		
Cape Province	C	1	2	1					P									
	D		1	1														
Orange Free State	C	15	11	5	1													
	D	9	3	3														
Transvaal	C	8	2	1														
	D	3		1														
On vessel:																		
At Rio de Janeiro, Brazil, from Argentina	C	1																

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

PLAGUE—Continued

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

Place		January, 1930	February, 1930	March, 1930	April, 1930	May, 1930	June, 1930
British East Africa (see also table above):							
Kenya	C	34	------	------	------	------	------
Uganda	C	184	109	------	------	------	------
	D	155	99	------	------	------	------
Ecuador: Guayaquil	C	4	2	2	0	------	------
	D	2	2	------	0	------	------
Plague-infected rats		4	2	2	0	------	------
Ecuador (outside of Guayaquil)	C	4	------	------	------	------	------
	D	2	------	------	------	------	------
Greece (see also table above)	C	------	------	------	1	------	1
Indo-China (see also table above)	C	10	30	27	4	------	11
Madagascar (see also table above)	C	282	------	------	------	------	------
	D	258	------	------	------	------	------
Ambositra Province	C	128	49	25	14	------	------
	D	111	41	20	12	------	------
Antisirabe Province	C	26	22	38	46	------	------
	D	25	22	36	45	------	------
Itasy Province	C	31	------	4	------	------	------
	D	31	------	4	------	------	------
Miarinarivo Province	C	------	25	14	1	------	------
	D	------	25	14	1	------	------
Moramanga Province	C	22	7		3	------	------
	D	21	4	5	3	------	------
Tamatave Province	C	3	------	------	------	------	------
	D	1	------	------	------	------	------
Tananarive Province	C	88	110	52	39	------	------
	D	83	107	52	38	------	------
Senegal:							
Baol [1]	C	------	------	18	24	13	------
	D	------	------	8	12	11	------
Dakar [1]	C	------	------	------	2	52	------
	D	------	------	------	2	42	------
Louga [1]	C	------	2	------	33	54	------
	D	------	------	------	10	27	------
Thies [1]	C	3	------	3	12	21	------
	D	------	------	2	9	8	------
Tivaouane [1]	C	1	------	11	71	135	------
	D	------	------	8	38	69	------

[1] Incomplete reports.

SMALLPOX

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930 12	19	26	May, 1930 3	10	17	24	31	June, 1930 7	14	21	28	July, 1930 5	12
Algeria:																			
Algiers	C	-------	6	1	5	1	-------	-------	-------	-------	1	-------	2	-------	-------	1	-------	-------	-------
Constantine	C	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Oran	C	-------	5	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Arabia: Aden	C	1	1	2	3	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Bolivia: La Paz.[1]																			
Brazil: Rio de Janeiro	C	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
British Borneo: Sarawak	C	-------	4	19	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
British East Africa (see also table below):																			
Tanganyika	C	27	5	49	103	-------	-------	26	31	33	45	55	276	-------	-------	-------	-------	-------	-------
	D	5	-------	8	7	-------	-------	10	4	3	5	8	54	-------	-------	-------	-------	-------	-------
British South Africa:																			
Northern Rhodesia	C	-------	-------	-------	9	-------	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	-------	-------	-------	-------	-------	-------	-------	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Southern Rhodesia	C	33	1	6	-------	-------	-------	66	-------	53	-------	42	60	75	-------	-------	-------	-------	-------
	D	6	-------	-------	-------	-------	-------	1	-------	4	-------	8	1	-------	-------	-------	-------	-------	-------
Canada:																			
Alberta	C	16	22	4	10	3	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Edmonton	C	15	19	1	4	3	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
British Columbia—Vancouver	C	17	16	16	20	8	1	5	3	-------	-------	2	2	1	1	-------	-------	-------	-------
Manitoba	C	8	6	2	4	2	-------	-------	2	-------	-------	7	3	-------	-------	4	-------	-------	-------
Ontario	C	51	63	86	100	17	30	18	12	14	24	24	20	14	10	13	10	-------	-------
Fort William	C	-------	4	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
North Bay	C	-------	2	1	-------	-------	-------	-------	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------
Ottawa	C	7	10	11	19	8	4	7	2	3	10	7	5	6	-------	8	1	1	1
Toronto	C	-------	2	-------	-------	-------	-------	-------	-------	-------	-------	3	1	2	1	1	-------	-------	1
Quebec	C	3	11	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	4	3	-------
Montreal	C	-------	1	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Saskatchewan	C	61	86	76	47	3	10	7	21	20	6	10	3	-------	12	10	-------	-------	-------
Regina	C	31	-------	-------	-------	-------	-------	-------	-------	1	-------	3	-------	-------	-------	-------	-------	-------	-------
Ceylon:																			
Angoda, Western Province	C	-------	-------	10	-------	-------	-------	-------	6	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	-------	-------	1	-------	-------	-------	-------	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Colombo	C	1	1	3	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	D	-------	-------	2	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

[1] From Jan. 1 to May 31, 1930, 44 deaths from smallpox were reported in La Paz, Bolivia.

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	Mar. 9–Apr. 5, 1930	Week ended— April, 1930			May, 1930					June, 1930				July, 1930	
						12	19	26	3	10	17	24	31	7	14	21	28	5	12
China:																			
Canton	C	5	7	11	6		2	1						1					
	D		2	3	2	1	1		1										
Chungking	C	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	38	20	7		1	5	5	2		2	1	1			
	D	73	109	51	25	11	9	3		4	2	3		1		1	1		
Manchuria—																			
Harbin	C	1	3				1				10	10							
Kwantung—Dairen	C	1	6	5			1		1	1		7			11	5		8	
	D											4				1			
Nanking	C	P	P	P	P	P			P	P			P	P	P				
Shanghai—																			
Foreigners only	C	7	5	2	2	2	1				1	1		1	1	1	2	1	
Including natives	D	6	8	7	10	4	3	2	1		1	2	2	1		1	1		
Swatow	D	2	3	6	6	2			1	1		1	4	1					
Tientsin	C	2	1	1	2	1			1	1									
Chosen (see table below).																			
Colombia:																			
Baranquilla	C	1		102	2	1													
Buenaventura	C	13		1		7	5	2	1	2		1	1	1	1				
Costa Rica:																			
Port Limon	C					1	1	2	2				2	2					
San Jose [1]	C				10	7													
Curacao (alastrim)	C				14			1	1	2					1				
Dahomey (see table below).																			
Dutch East Indies:																			
Belawan Deli	C	1																	
Borneo	C		1		185	17	43	20	10		10	4							
	D		1		12	16	12	2	1	1									
Java—																			
Batavia and West Java	C	17	14	14	78	30	25	8	1	1		5	1		1				
	D	10	7	7	6	6	1	3	1	1		3	2		1				
East Java and Madura	C							4											

Sanggi Islands	C	17	25	12	5		43	51	66	14	12								
	D	3			1		2	9	13	1	4								
Sumatra	C	1	2		48														
	D				5														
Egypt: Port Said	C		2			1					1								
Great Britain:																			
England and Wales	C	1,005	1,455	1,530	1,700	423	345	353	306	462	324	304	327	237	266	241	182		
Ashton under Lyne	C	3	4	29	15	9	3	4	2	6	3	4	4			3	4		
Bradford	C	8	5	2		1			2		1		1						
Cardiff	C				2	1	2												
Leeds	C		6	11	16	1	1												
London	C	480	597	699	710	169	169	129	137	222	138	148	129	130	136	125	107		
London and Great Towns	C	799	1,101	1,156	1,239	308	264	265	229	339	250	235	254	197	208	190	158		
	D		2	5	3	2	1	1											
Sheffield	C				8	1	1												
Stoke-on-Trent	C	12	12	41	122	17	23	33	12	19	9	13	21	3	10	15	4		
Scotland	C													1		3			
Greece: Patras	C	1																	
Hedjaz	C	11	11																
India	C	12,789	26,524	36,036	39,329	10,319	7,786	8,385	8,353	6,533	6,549	5,416							
	D	3,730	6,186	7,710	9,109	2,064	1,543	1,779	1,597	1,449	1,814	1,196							
Bombay	C	119	342	638	718	143	114	89	84	52	68	58	40	36	35	23	19		
	D	57	164	314	431	88	78	64	44	33	49	44	35	27	23	19	10		
Calcutta	C	88	185	399	361	153	116	122		109	70	52	71	56	45	45	25		
	D	62	130	287	305	124	97	103		94	72	40	52	50	37	29	30		
Cochin	C	234	234	184	291	56	49	58	20	13	8	7	9	4	1	10	1		
	D	20	27	29	35	3	4	6	2	5	1	2		2	1	1			
Karachi	C	17	30	38	33	10	9	7	4		6	7	1	5		1	1		
	D	11	9	16	47	10	3	2	2	2		1	1	2		1			
Madras	C	85	105	159	173	55	26	27	25	24	13	15	20	9	10	8	8		
	D	16	16	29	36	6	6	5	10	4	5	6		6	3	1			
Moulmein	C	18	65	143	146	10		33		27	29	20	13		9	6	6		
	D	9	18	40	41	4		3		4	6	5	6		3	3	1		
Negapatam	C			1								1			1		1		
Rangoon	C	2	7	7	10		1	1	2	2		3	1	1	5	1	2		
	D		4	2	5					1						1	1		
Tuticorin	C		3									5				1			
Vizagapatam	C	2	5	9	69	1		2	3	3	1	1			1				
	D			1	18	1			1		3								
India (French):																			
Chandernagor	C		3	11	6	4		6		6	2	8	8	4	8				
	D			5	2			2		2	4	1							
Karikal	C		3	12	24	8	9	2		6	5	1		4	3				
	D		3	8	7	3	3	2		2	1			2	2				
Pondicherry Province	C	20	22	52	21	12	1	11		9	13	10	8	4	4				
	D	19	19	40	13	11	1	8		7	12	10	7	4	4				
India (Portuguese)	C		16	50	38	5	6	15	17	2	27	5	13						
	D			6	2			5	3		3	1	4						

[3] 5 cases of smallpox were reported Apr. 14, 1930, in Costa Rica outside of city of San Jose.

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	Mar. 9–Apr. 5, 1930	Week ended— April, 1930 12	19	26	May, 1930 3	10	17	24	31	June, 1930 7	14	21	28	July, 1930 5	12
Indo-China (see also table below):																			
Pnompenh	C									1		1	1						
	D		1				1	1						1					
Saigon and Cholon	C	4	3	4	3			4	1	1	1		1	1					
	D	2	3	2	1		1	3	1		1		1						
Iraq:																			
Baghdad	C	16	7	3		1	2	3	2	1				1				1	
	D	5	3	1					1	1									
Basra	C			1					1										
Mossoul Liwa	C	80	26	12			22			13		8			1		3	47	
	D	3	7	2			3			2		1			1			19	
Ivory Coast (see table below).																			
Jamaica	C												2						
Japan: Tokyo	C								1										
	D								1										
Macao	D			2	3	1			1	1									
Mexico (see also table below):																			
Jalisco (State): Guadalajara	D	9	9	14	22	6	4	8	2			6	1	4		5	6	3	
Juarez	C	3	2	3	2											6			
	D	2	1	1												1			
Mexico City and surrounding territory [5]	C	25	30	38	106	36	19	20	24	30	15	17	18						
	D	4	7	21	31	14	8	14	11	6	12	8	6						
Morelos State.[4]																			
Progreso	C											1							
	D											1				1			
San Luis Potosi	C			1															
	D			1															
Morocco (see table below).																			
Netherlands: Rotterdam	C	1																	
Nigeria (see also table below): Lagos	C	2	5	2	1	1											1		
	D	1	2																
Persia (see table below):																			
Philippine Islands: Sarangani and Balut Islands [6]	D	40	18	3															
Poland	C	2		2				2	5		1		2						
Portugal: Lisbon	C	6	4	7	7	2	3	3		6		2		1		2	7		
Rumania	C		1	1	2														

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	6														
Spain	C															4			
Straits Settlements	C		2		5	2	1		2	1	3	2	5	5		1	3		
	D		1		1	1			1		1	1	1	1		1			
Sudan (Anglo-Egyptian)	C	290	230	79	60	2	9	31			5	13	1	4	8	1	54	8	1
	D	65	34	6	5	1		3				1	1				3		1
Sudan (French) (see table below).																			
Syria (see table below).																			
Tunisia: Tunis	C	20	7	3	3			1	3		1		1			2			
Turkey (see table below).																			
Union of South Africa:																			
Cape Province	C	P	P	P	P	P		P		P	P	P	P						
Orange Free State	C	P	P	P	P														
Transvaal	C	P	P	P	P														
Upper Volta	C			26	2	2		1					1						
Zanzibar	C				13														
On vessel:																			
S. S. Tairoa, at Liverpool, from London	C			1															
S. S. Karagola, at Zanzibar, from India	C		4																
S. S. Karagola, at Lourenco Marques, from India	C			1															
S. S. Elysia, at Port Sudan, from Bombay	C						1												
S. S. Naldera, at Port Said	C									1									
S. S. Manoa, from Honolulu to San Francisco	C																1		

Place		December, 1929	January, 1930	February, 1930	March, 1930			April, 1930			May, 1930			June, 1930	
					1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20
Belgian Congo	C	74													
	D	4													
Dahomey	C	19													
Indo-China (see also table above)	C	142	460	434			26	261				173	132	80	133
Ivory Coast	C					7									
Sudan (French)	C	17	229	213		200	409	371		150	40	56	178		
	D		25	11		18	31	30		6	7	7	18		
Syria: Beirut	C	25	70	18	4	8	5	10	2	7				6	1
Taiwan: Taihoku	C			43	31	12	15	10	2						

[3] During the month of March, 1930, 100 cases of smallpox were reported in Mexico City, Mexico, and surrounding territory.
[4] Newspaper reports of Feb. 4 show an epidemic of smallpox in Ionacatepec, Morelos State, Mexico, and vicinity, giving 600 deaths in preceding 2 weeks.
[5] 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

SMALLPOX—Continued

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

Place		December, 1929	January, 1930	February, 1930	March, 1930	April, 1930	May, 1930
British East Africa (see also table above):							
Kenya	C	168	12	12	175	174	------
Uganda	C	------	184	109	------	------	78
	D	------	155	99	------	------	69
Chosen	C	------	1	4	------	5	------
	D	------	------	1	------	1	------
France	C	9	9	23	8	------	3
Mexico: Durango (see also table above)	D	4	12	6	5	4	4
Morocco	C	84	29	74	------	10	18
Nigeria	C	293	------	------	------	------	------
	D	70	------	------	------	------	------
Persia	C	P	------	------	------	------	------
Turkey	C	883	215	114	------	3	16
	D	457	66	42	------	------	------

TYPHUS FEVER

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

Place		Dec. 15, 1929–Jan. 11, 1930	Jan. 12–Feb. 8, 1930	Feb. 9–Mar. 8, 1930	Mar. 9–Apr. 5, 1930	Week ended— April, 1930			May, 1930					June, 1930				July 5, 1930
						12	19	26	3	10	17	24	31	7	14	21	28	
Algeria:																		
Algiers	C	14	3	4	6	2	3	2	1	1	2	4	8	2	------	1	------	------
Constantine Department	C	2	4	5	11	4	9	2	------	------	4	------	2	11	------	1	------	------
Oran	C	------	2	------	------	------	------	------	------	------	------	------	3	------	------	------	4	------
Arabia: Aden	C	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
	D	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
Bolivia: La Paz.[1]																		
Brazil: Porto Alegre	C	1	------	2	------	------	------	------	------	1	------	------	------	------	------	------	------	------
Bulgaria	C	41	------	13	9	15	------	------	------	1	------	5	------	1	------	9	6	------
	D	2	------	1	------	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								1		1	
Assuan	C	9																	
	D	1																	
Beheira Province	C	7	14	18	2			2		9	21	9	10	17	16	7	5		
	D			5						4	4	4	1	1	1		2		
Cairo	C			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		1				
Dingle—Kerry County	C							3	2										
Mohill—Leitrim County	C																9		
Shillelagh—Wicklow County	C														1		3		
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	6	12	9	4	2	1		1		2		4						
	D	2	4		1	2	1		1				3						
Morocco	C	6	23	21	38	6	5	3	1	3	6	1	1	1		6	8		
	D				7	2	1												3
Palestine	C			1	6		1				2			2					
Poland	C	61	296	183	223	59	64	53	67	64	45	34	28			26	37		
	D	4	21	8	13	4	2	3	6	2	2		1			2	3		
Portugal:																			
Lisbon	C								4										
Oporto	C			1	2	1													
Rumania	C	82	241	293	185	71	46												
	D	5	25	23	12	1	9												
Spain: Valencia	C														2				
Tunisia	C	2		3						2	2	1	1			2			
Turkey (see table below).																			
Union of South Africa:																			
Cape Province	C	P	P	P	P	P	P			P	P	P	P						
Natal	C	P	1	3	P	P	P	P		P	P		P						
Orange Free State	C	P	P	P	P					P	P	P	P						
Transvaal	C					P	P	P											
Yugoslovia (see table below).																			

[1] 12 deaths from typhus fever were reported in La Paz, Bolivia, from Jan. 1 to May 31, 1930.

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

TYPHUS FEVER—Continued

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

Place		December, 1929	January, 1930	February, 1930	March, 1930	April, 1930	May, 1930
Chosen: Seoul	C	1		17		3	
Czechoslovakia	C		10	2	42	29	
France	C	1					
Greece: Athens	C	6	12	6	3	1	3
Latvia	C	2	18				
Lithuania	C	5	2	70	62	73	27
	D	1		5	4	4	
Turkey	C	4	2	3	1	3	16
Yugoslavia	C	6	26	33	46	22	16
	D	1	3	5	2	4	1

YELLOW FEVER

Brazil:

	Cases
Mage, on the Leopoldina Railway, between Rio de Janeiro and Nictheroy, Apr. 22, 1930	2
Campos, Rio de Janeiro Province, May 23, 1930	1
Para, June 23, 1930	2

Gold Coast:

	Cases
Dec. 21, 1929	1
July 10, 1930	1
Liberia, Monrovia, June 3, 1930	1

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