veyed from man to man solely through the agency of an intermediary host (the Stegomyia fasciata), it becomes at once necessary to inquire what bearing the acceptance of these findings in their entirety will have upon the question of precautions to be taken against the admission of yellow fever into our ports.

Vessels should be inspected now before they leave the yellow-fever port and all mosquitoes destroyed.

The Public Health and Marine Hospital Service, fully alive to the importance of the facts above stated, has stationed officers at foreign ports to do this work wherever it can be done without conflict with the laws and regulations of the place. It will not do to assume that vessels cannot carry mosquitoes, as some have asserted; as a matter of fact, they do carry them. Thus, for example, one vessel, the *Maria Blanquier*, arrived at Sapelo Sound, Georgia, after a voyage of about forty days from Rio, with myriads of Stegomyia fasciata aboard, and it only needed that she should have had one case of yellow fever in Rio to have had every soul on board stricken en route, and the vessel (short-handed) be perhaps a castaway.

To sum up, then, we find that the disinfection of vessels from a yellow-fever port, and only a few days out from such port, is still necessary, and that such disinfection should compass the *entire* destruction of all mosquitoes on board the ship. The best means to this end will be a gaseous disinfection by SO_2 of not less than four per cent. volume strength for a period of at least six hours, and better twelve. This disinfection should be carried out simultaneously in all parts of the vessel, and scrupulous care should be taken to see that the fumes reach *all* dead air spaces, and particularly all parts of the living apartments.

If a vessel has been away from a yellow-fever port for more than ten days,—*i.e.*, several days beyond the incubative period of yellow fever,—and if at the same time a well-authenticated history of no sickness en route has been obtained, it would be very natural to assume, especially if the Stegomyia had not been found in the vessel, that she was not infected and that consequently she might safely be allowed to pass on without subjecting her to a process of disinfection. The records, however, show plainly that it is not always safe to reason in this manner. Thus, for example, Surgeon H. R. Carter, of the Public Health and Marine Hospital Service, has published in Bulletin IX. of the Yellow-Fever Institute, July, 1902, a report of a number of instances in which yellow fever was apparently contracted on board an infected ship. Owing to the lack of space I shall be able to quote only one of the instances mentioned in this report.

"III. British ship *Avon*, in rock ballast; twenty-two in crew, four immune to yellow fever. Sailed from Rio de Janeiro April 20th. All well in port and en route until thirty-eight days out, when a boy in port watch sickened with yellow fever. Taken to hospital, Gulf Quarantine, on third day, and died on sixth day. Another case developed two weeks later in a quarantine attendant who helped me clean up the room, sail locker, in which the boy was sick aboard ship.

"It is remarkable that there should have been only one case of yellow fever among the crew aboard this vessel. At the time, it was ascribed to the fact that this boy, the only one on the port watch, helped a man, shipped in Rio de Janeiro and immune to yellow fever, overhaul his chest a few days before the boy was taken sick. Whether there was an infected mosquito in the chest which had survived this length of time, or whether there was any relation between the chest and the fever, may be a question. It in no wise affects the present question that the disease was contracted aboard. It was the first case seen at this station that year."

Cholera.—The period of incubation of this disease is from a few hours to five days; more often it is about three days. The cause is the comma bacillus of Koch, now generally known as the Spirillum choleræ asiaticæ. (For details in regard to this disease see the article on *Asiatic Cholera* in The Appendix.)

The manner of spread of this disease, the introduction of which into the human system is by the alimentary canal, is through the medium of dirty hands, polluted food, polluted water. Both food and water may be polluted, and probably are, by flies, which, having come into contact with cholera dejecta, subsequently make their way to the food supply. These insects probably played an important part in the great epidemic of cholera in Hamburg in 1892, after the disease became general in the city, though in the beginning it undoubtedly arose from the presence of the spirillum in the main water supply of the city, the Elbe River, and it was the ultimate correction of this water supply which had more to do, than any other one factor, with the wiping out of the disease. In fact, it appears doubtful whether more than occasional cases of cholera would occur in any community where the water supply is guarded with great care. It is not simply through drinking it, however, that individuals may contract cholera from infected water; they may also acquire the disease by eating fruits and vegetables which have been washed in such infected water.

Bubonic Plague.—The period of incubation of this disease rarely exceeds seven days, and is more generally from three to five days. The cause is the Bacillus pestis, a short rod which is capable of bipolar staining with aniline dyes, and whose viability and general characteristics have been well stated by Dr. M. J. Rosenau in his work on "Disinfection and Disinfectants." It will suffice here to state that it survives in moist and albuminous surroundings for quite a long time, and in test tubes in laboratory work for months and even years. It dies quickly when dried, but retains life longer when dried upon textiles and other similar fomites than in any other form of dryness, especially if the temperature is under 19° C. It is, therefore, to be borne in mind that the colder the climate the greater is the danger to be feared from infected fomites, and the more thorough should be the procedures adopted for effecting disinfection. A dry atmosphere and sunlight kill the bacillus quickly, and inversely, darkness and damp atmospheres promote its vitality. It is not a water-borne infection, though it may live for a time in water. It is largely spread to man through the agency of rats, fleas, flies, and other small animal life. It therefore follows that, to disinfect for plague, it is necessary to use such agents as will destroy this small animal life, as well as the plague organism itself.

The past history of this disease, although it has been written in a very unsatisfactory manner, is nevertheless sufficiently full to indicate that it has probably obtained a foothold in communities, in almost every instance, for a relatively long time before it has been recognized. It may be that it has existed among the rats and other animals for many months before any human being has become infected thereby, and a study of all the great epidemics of plague will indicate that it has existed among men for a very considerable period of time before it has been recognized as plague, and before measures have been taken to prevent its spread. There is little doubt that the great plague in London did not occur within one month or one year after the disease first gained a foothold in that city. It appears very probable that it had already been there for several years, slowly and steadily gaining a foothold for the great outbreak. Again, it is apparent that in the beginning of an outbreak this disease is more mild in character than later on in the epidemic. This characteristic has been observed in the case of yellow fever also. There are apt to be mild, so-called ambulatory cases, which would not be recognized as plague under any other condition than that of an active epidemic, and these may spread the disease just as surely as a virulent case; and it is these which doubtless do spread the disease from person to person and from place to place long before there is any general recognition of its existence.

Smallpox.—The incubative period of this disease has been variously stated as being from five to thirty days. These wide limits, however, are exceptional, and most authors agree upon an incubative period of from ten to twelve days in a majority of cases. An experience extending over many hundreds of cases justifies the statement that in at least ninety per cent. of all cases, the initial fever of the disease will begin in approximately ten days from the time of exposure, and will hardly vary twenty-four hours from this time. The causative agency of this disease is not known. Its mode of transmission is generally through actual contact with a person who has the disease in the eruptive stage. It is not denied that intermediate contact, such as the carrying of the disease by a careless doctor from a smallpox patient to a healthy family at a distance, may be possible, but such occurrences are so rare as to be hardly worthy of consideration in actual practice. In other words, while such carelessness might result in carrying some of the contagium upon the clothing of the person, and thus the question of intermediate fomites be brought into play, it is very much more generally true that when the disease is carried by fomites, it is carried by clothing actually worn and used by a person infected with smallpox, and subsequently taken to a healthy person. There has been much discussion as to the period when smallpox becomes contagious. While, generally speaking, it may be safe to take precautions with regard to an exposure to a smallpox patient in the febrile stage, it has been found that almost without exception—and, so far as the writer is aware, absolutely without exception—no infection has ever resulted from exposure to either the febrile or the papular stage of smallpox. It is only after desquamation has begun that the patient is liable to communicate the disease to others; and this contagiousness will continue until desquamation has thoroughly ceased. Consequently, it is important, before discharging a convalescent from smallpox, to ascertain if every single scale has been cast off from the scalp and from the palmar surfaces of the hands and feet; for it should be borne in mind that the desquamation from the scalp is retarded by the hair, and that this is particularly so with regard to the negro, while the thick epidermis of the palmar surfaces makes them the last to desquamate.

Typhus Fever.—The incubative period of typhus fever is ordinarily stated at about two weeks; it is probably a little less than this, some authors giving it as twelve days. The exact cause of the disease is unknown. It is exceedingly contagious, probably the most pronouncedly contagious of all the quarantinable diseases.

To quote Dr. Rosenau: "Typhus fever is believed to be 'contagious' in the sense that it is communicated by contact between the sick and the well. When the disease exists in epidemic form it is the most highly contagious of all the diseases of man. The nurses, physicians, and those who come in contact with the patient are the first to take the disease. Few escape.

"It is evident that sanitation is much more needed to prevent the spread of this disease than disinfection; in fact, while disinfection is practised for typhus fever, there is nothing to indicate that it is efficacious in preventing the spread of the disease."

Disinfection of Vessels for Various Diseases.

Yellow Fever.—As stated in the discussion of yellow fever, the disinfection of a vessel infected with this disease necessarily involves the destruction of all the mosquitoes aboard such a vessel; and while this is probably all that should be done, it is nevertheless still the custom—and one which probably will continue until all health authorities are fully convinced that there is no other means of transmission than that afforded by the mosquito—to carry this disinfection somewhat further. To compass the destruction of the mosquito, it is simply necessary to introduce simultaneously into each and every part of the vessel—cabin, forecastle, between-decks, hold, and any other compartments in the vessel—sulphur dioxide gas of a minimum strength of four per cent. per volume for each thousand cubic feet of air space of the vessel. In an empty vessel it is desirable to continue introducing the gas for from six to twelve hours; in a vessel containing cargo it will be necessary to provide channels through the cargo, in order that the gas may permeate as far as possible, and to continue the introduction of the gas for twenty-four hours, in order to insure the destruction of all the insects. If the disinfection of baggage and textiles of other kinds is to be undertaken, this is done for the different articles, according to their class, in the manner described in detail in the article on *Disinfection*.

From a sanitary standpoint the vessel and its inanimate contents may now, after such a thorough disinfection, be considered no longer a source of danger, and the owner may be permitted to remove his ship from quarantine.

As regards those who were on board the vessel at the time of her arrival, it will be necessary, before carrying out the measures for disinfection described above, to dispose of them on shore, at the station. The sooner any infected persons are isolated or segregated, in order to prevent a further spread of infection, the better it will be for all parties concerned. The sick should be taken to a hospital so thoroughly provided with screens as to prevent the ingress or egress of mosquitoes; the healthy persons should be placed in barracks similarly provided, in order to prevent the spread, to the remaining healthy patients, of infection from any one of them who may subsequently be taken sick. This screening must be so absolutely perfect in character that it shall not only exclude the most of the mosquitoes, but all of them; and in the event that some solitary mosquito should find access to any of the rooms, steps should be taken to insure its destruction. To prevent the harm which might result from the accidental contamination, by one or two of these insects, of any ward or barrack building, it will be necessary every day to burn a certain quantity of the so-called Persian insect powder in every apartment, and then afterward to sweep up and kill the stupefied insects which will fall to the floor upon the inhalation of the fumes.

Finally, any person effectually isolated from infection, and remaining healthy more than five days, may be released.

Cholera.—Upon the arrival of a vessel at a quarantine station with cholera on board, or having had cholera on board at a recent period during the voyage, it is advisable, when possible, to remove from the vessel all of her *personnel* (both crew and passengers), isolating and segregating these people ashore very much after the method prescribed in dealing with a yellow-fever ship. In addition to the precautions to be taken against insects in the case of yellow fever, it is necessary to provide, in the case of the cholera suspects, recently cooked food which shall not have been contaminated by an insect, and a water supply of undoubted purity. It will also be necessary to make arrangements for either the disinfection or destruction by fire of all the dejecta of all persons kept under observation; for it should not be forgotten that the apparently healthy person may carry within his alimentary canal the cholera spirillum, and may infect sewage, which in its turn may ultimately infect a water supply.

For the ship itself, the measures to be taken are as follows: 1st. A thorough mechanical cleansing, such as is very admirably done by the Hamburg-American and North German steamship companies on their passenger steamers when they arrive at the home port. This consists in washing the vessel with what they know as Seifenlager, a very strong solution of soap and water, plus a certain amount of caustic potash. When every part of the vessel, which may properly be so treated, has been cleansed in this manner, and when the ornamental wood and bright work finish, which cannot be so treated, has been washed with a solution of carbolic acid or other agent which will not damage it, thorough dryness, so far as practicable, should be obtained, and the gaseous disinfection applied simultaneously to every part of the vessel. This gaseous disinfection should be preferably of sulphur dioxide, four per cent, twelve hours' exposure, as elsewhere stated; but, in certain compartments on the finer class of vessels, this style of disinfection would result in damage, which can be obviated by using instead, in such apartments, a six-per-cent. volume of formaldehyde gas for a period of from six to twelve hours. All

textiles which will not be damaged thereby should be subjected to live steam for a period of thirty minutes; and such as will not bear this treatment should be disinfected by the conjoint use of a vacuum and formaldehyde gas, six per cent. volume, for an exposure of one hour's duration. All textiles which have been polluted by cholera dejecta should without exception be burned, and no attempt should be made to disinfect and re-use such articles. The detained *personnel* may be released when five days have elapsed since their last possible exposure to infection.

Plague.—Measures to be taken in the treatment of a vessel infected with plague are identical with those used in the case of a cholera-infected ship, except that on account of the peculiar methods of transmission of this disease (partly through small animals), it is necessary to use a germicidal agent which will destroy animal life as well as bacteria; and for this purpose formaldehyde is not strictly reliable; consequently, all gaseous disinfection done on a plague-infected vessel must and should be done with sulphur dioxide. The segregation and careful attention to the individuals, including the adoption of stringent measures capable of preventing the pollution of either dejecta or sewage, apply to this disease as strongly as to cholera; and for the reason that small insect life has a bearing in the transmission of the disease, the screening provided for cholera and yellow fever, while not so absolutely essential, is nevertheless advisable, and, wherever possible, should be used. Manifestly the persons under detention may be released at the expiration of from seven to eight days since their last possible exposure to infection.

Smallpox.—Here we have to deal with a disease which does not require such rigid measures as have been applied to any of the other quarantinable diseases. If a person in any given apartment of a vessel has been afflicted with smallpox, it does not necessarily follow that all the persons on the vessel are to be detained in quarantine, nor that the whole ship is to be disinfected. It will be sufficient if we disinfect with scrupulous care all possibly infected personal belongings, and, in the same manner as is applied for yellow fever, all portions of the vessel which have been invaded by the disease. At the same time it is important to keep under observation those persons who have been in direct contact with the afflicted party, or who have not been vaccinated. The usual custom is to vaccinate immediately all exposed persons and hold them under observation for fourteen days; to release at once all those who have not been exposed and who are vaccinated; and to disinfect such parts of the vessel as have been in touch with the actual case, releasing the vessel at once, and holding only the suspects. Should the infection on the smallpox vessel be so general as to justify the opinion that all on the vessel have been more or less exposed, then it becomes necessary to disinfect the vessel in the same manner in which it would be done for yellow fever, and to disinfect it throughout, holding under observation for fourteen days all of its *personnel*.

Typhus Fever.—In view of the little that is known of typhus fever, *i.e.*, as to its manner of transmission, period of incubation, etc., it is exceedingly fortunate that we seldom or never find a general infection of typhus fever aboard ship. Should such a calamity supervene, all the *personnel* should be immediately segregated ashore, and the groups placed far enough apart, if sufficient ground is obtainable, to prevent the infection of one by the other, it having been claimed that aerial infection plays a part in this disease. The vessel should be disinfected in the same manner as for cholera, and the *personnel* kept under observation for a period of fourteen days from their last exposure to possible infection.

Leprosy.—The quarantine regulations of the United States demand the retention at quarantine of any alien leper, and his replacement upon the vessel when outward bound.

Minor Communicable Diseases.—There are, in addition to the diseases above discussed, several others which at times call for treatment, but which are not generally classed as quarantinable diseases. These diseases—scarlet fever, measles, diphtheria, and even some others—are as a rule passed up to the local board of health for proper handling.

When treated at quarantine, they call for the same measures as are applied to smallpox (except of course vaccination).

Land Quarantine.

Because of lack of space only brief notice can be given this subject, which after all is simply a common-sense application of maritime rules to exactly the same diseases on land. The people are to be handled in precisely the same manner as at a maritime station, and if we simply transfer our disinfecting agents from a ship to a house, the methods remain the same. The difficulties of administration are greater because, while at a maritime station the quarantine officer is practically supreme, in land quarantine he has to meet the whims and foibles of local lay authority, or even of individuals.

Joseph H. White.

QUASSIA.—*Quassiæ lignum* or *Lignum Quassiæ. Jamaica Quassia, Bitter-wood, Bitter-ash.* The dried wood of *Picrasma excelsa* (Swz.) Planch (*Quassia e.* Swz.; *Picræna e.* Lindl.; *Simaruba e.* DeC.—Fam., *Simarubaceæ*), U. S. P.

The Jamaica quassia tree is said closely to resemble a small or medium-sized ash tree. It occurs chiefly in Jamaica, but to some extent in other parts of the West Indies. Quassia was originally derived from a different plant, considered below, but was later replaced by this one. The wood occurs in billets of various sizes, dense, tough, of medium hardness, and of a nearly uniform yellowish-white color; internally porous, with a minute pith, indistinct rings, and medullary rays which, on tangential section, exhibit from two to five vertical rows of cells; inodorous and intensely bitter.

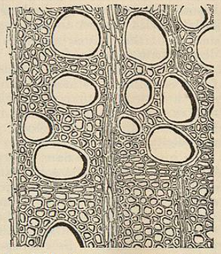

Fig. 3224.—Section of Quassia Wood. (Baillon.)

It is usually met with in the form of chips or raspings.

The powdered wood is devoid of stone cells, contains crystals of calcium oxalate, and exhibits the tangential appearance of the medullary rays described above.

Quassia contains neither tannin nor starch, and, if pure, yields not more than four per cent. of ash. Its bitter principle is the crystalline substance *quassiin*, freely soluble in alcohol and chlorofom. Although it requires 1,200 parts of water for solution, the dose is so very small that water constitutes a satisfactory menstruum. Quassiin is further resolvable into two crystalline bodies, called respectively *α-picrasmin* and *β-picrasmin*. A minute amount of alkaloid has been reported, but is probably of no medicinal importance.

Action and Uses.—Quassia is generally regarded as a pure or simple bitter tonic, like gentian, and is mostly used as such, being given, either alone or in combination with aromatics and stimulants, as a stomachic and appetizer. In debility, in convalescence from fevers, in dyspepsia, it has been, and is still, in considerable use. Its taste is, however, more bitter and disagreeable than that of gentian or quinine.

Quassiin is a powerful irritant and convulsive poison when concentrated or used in overdoses, and is apt after long administration to set up a gastric irritation. Its use is therefore better alternated with that of other medicines.

It is particularly poisonous to the lower animals, on account of which it is much used as a rectal injection for the destruction of ascarides. For the latter purpose, from a half-pint to a pint of the ten-per-cent. infusion is employed. The death of an infant has followed such use. The freedom of quassia from tannin renders it a desirable bitter for mixing, in prescription, with the iron preparations. The Pharmacopœia provides an extract (*Extractum Quassiæ*), the dose of which is 0.03–0.2 gm. (gr. ss.–iij.), but this is the least desirable preparation for use, since the patient fails to receive the beneficial effect of the bitter taste. The dose of the official fluid extract is 1–4 c.c. (fl. ʒ ¼–i.) and of the tincture, which is by far the most efficient of all preparations, 2–8 c.c. (fl. ʒ ss.–ij.). The infusion is a popular form of administration, and should be of five-per-cent. strength. Another excellent method is to introduce cold water into cups made of quassia wood. The water becomes almost at once intensely bitter, the patient receiving the full benefit of the bitter taste, with little systemic effect.

Surinam Quassia.—This, the original quassia, is still the one chiefly employed in Southern Europe, and is official in nearly all pharmacopœias. It is the product of *Quassia amara* L., of the same family, a shrub or small tree of Northern South America, whence it extends up into Central America and into the West Indies. The billets are much smaller, usually from one to three inches in diameter, crooked, and still bearing the bark, which is of an ashy gray color and nearly smooth. The wood is somewhat heavier than that of the Jamaica variety, and exhibits medullary rays only one row of cells wide on tangential section. The bark is full of large stone cells, which are seen in the powder, since bark and wood are usually ground together. The active principle of this variety is practically identical with that of the other, and the properties, uses, and doses are the same.

The same statements may be made concerning East Indian quassia and Japanese quassia, derived from other species of *Picrasma*.

Henry H. Rusby.

QUEBRACHINOFORM. See *Formaldehyde.*

QUEENS ROOT. See *Stillingia.*

QUERCIFORM. See *Formaldehyde.*

QUINAMINE. See *Cinchona.*

QUINCE SEED.—*Cydonium* (U. S. P., 1880).—The dried ripe seeds of the common quince, *Cydonia Cydonia* (L.) Lyons (*Pyrus Cydonia* L.; *Cydonia vulgaris* Pers. fam. *Rosaceæ*) together with the gum in which they are naturally embedded.

The quince is a native of Southwestern Asia and adjacent Europe, but the seeds are wholly the product of cultivated plants. They occur agglutinated in masses of eight to ten or more, being embedded in a colorless, transparent gum, of which about twenty per cent. is obtainable, and for which they are valued. One part of this gum makes about 100 parts of mucilage. This has little adhesive power, but is excellent for the ordinary medicinal uses of mucilage, such as the making of collyria, demulcent drinks, etc. When the drug was official, it was directed that the official mucilage be made by taking 2 parts of the seeds with 98 parts of water.

Henry H. Rusby.

QUINETUM. See *Cinchona.*

QUINIDINE. See *Cinchona.*

QUININE. See *Cinchona.*

QUININE, NEW COMPOUNDS OF.—In the following preparations, the dose, unless specified, is that of quinine sulphate.

Acetyl-salicylate—for rheumatism.

Arsenite—sixty-nine per cent. quinine. Dose 0.005–0.03 gm. (gr. $\frac{1}{12}$ to gr. ss.).

Bichloride—very soluble. Improvement in recurrent cancer followed daily injections of 0.5–1 gm. (gr. viij.–xv.) by Jaboulay in France and Trible in America.

Borate—a yellow insoluble powder, antiseptic.

Caseinate.

Chloro-carbonate—freely soluble, almost free from bitter taste.

Chloro-phosphate—fifty per cent. quinine; soluble in two parts of water.

Chloro-sulphate—seventy-four per cent. quinine; soluble in one part of water.

Dibromguaiacolate—guaiaquinol.

Dihydrobromate, dihydrochloride, dihydroiodate—all readily soluble and used by hypodermic injection for whooping-cough. Dose, 0.06–0.2 gm. (gr. i.–iij.).

Dihydrochloride-carbamate—muriate of quinine and urea. Seventy per cent. quinine; very soluble.

Ethyl carbonic ester—Euquinine (see Vol. IV.).

Ferri-chlorid—dark reddish-brown crystals used in two-per-cent. solution as a hæmostatic in internal hemorrhage and in uterine hemorrhage.

Glycerophosphate — kinewin, especially employed in neuralgia. Dose, 0.1 gm. (gr. iss.).

Guaiacol bisulfonate—guaiaquin, an odorless, non-caustic substitute for guaiacol.

Hydroquinone-hydrochloride—antipyretic.

Ichthyol-sulfonate—sulpho-ichthyolate, employed in tuberculosis.

Iodo-hydroiodate—insoluble in water. Used as substitute for iodides in syphilis, and in the same dosage.

Lactate—readily soluble.

Lygosinate—antiseptic compound of di-ortho-cumarketone (lygosin).

Methyl-di-hydrazin-perchlorate—compound of quinine hydrochlorate, caffeine, and antipyrin.

Phospho-hydrochloride—soluble.

Phosphoric acid ester—phosphorylquinine.

Salicylic acid ester—salicyl quinine or saloquinine (see *Saloquinine*).

Salicyl-salicylate—(see *Rheumatin*).

Silico-fluoride—soluble in water.

Sulpho-creosotate—used in tuberculosis.

Urethane—very soluble, made by mixing 3 parts of quinine hydrochloride, 1.5 parts of urethane, and 3 parts of water.

W. A. Bastedo.

QUININE. (TOXICOLOGICAL.)—Any high degree of toxicity can hardly be said to exist in the ordinary use of cinchona and its alkaloids or their salts. There are certainly symptoms very commonly associated with their therapeutic uses, even in most moderate doses, which are characteristic and indicate some functional disturbance of various organs. Such are the sense of constriction about the forehead, the ringing of the ears, and occasionally nausea. In many persons these are not sufficiently marked to attract attention unless the doses given are very large or long continued. Of these the sense of fulness and the deafness are the commonest, and are looked upon as necessary accompaniments of the administration of the drug, not giving rise to uneasiness either in the patient's or in the physician's mind, and expected to disappear promptly when the medication is stopped. They are the physiological evidence of mild cinchonism. The susceptibility of individuals varies greatly as to the amount of the drug which will produce such manifestations. Some persons are occasionally met with who suffer so promptly and acutely from these troubles that treatment to counteract them has to be instituted in order that enough of the required drug may be taken into the system to produce the desired effect upon the primary disease. Many, on the other hand, show so little susceptibility that astonishingly large and rapidly repeated doses may be given with only beneficial results.

Liebermeister (quoted by Kunkel) says: "I have up to this time employed quinine in large doses in more than fifteen hundred patients with abdominal typhus, and also in hundreds of pneumonias and other diseases. The number of single doses, of from 1 to 2, up to 3 gm.,