

for them to "shoot" their gear. For several years it has been customary to have sailing vessels remain at sea for weeks or months at a time engaged in towing the trawls, while a steam carrier made daily visits to the fleet and transported the catch to the market. But even this method has proved unsatisfactory. The financial return from steam trawlers has been so great that it has led to their general adoption, until now it is as much out of fashion to build a sailing vessel for trawling in England as it is in this country for a mackerel-man to take his fare with hand lines.

Through the efforts of a prominent English designer and builder of yachts, small beam trawls, with nets of silk, have been introduced on many of the American yachts, and it will be quite a common thing during the coming summer to see a crack yacht "towing her trawl" on our coast.* E. C. BRYAN.

[FROM THE THERAPEUTIC GAZETTE.]

THE NEW MODES OF TREATING TYPHOID FEVER.

By Prof. DUJARDIN-BEAUMETZ,† Paris, France.

GENTLEMEN: In the last lecture I spoke of the new modes of treating tuberculosis. I shall to-day take for my subject a disease which, next to pulmonary phthisis, is perhaps most frequently observed in ordinary practice. I allude to typhoid fever. In the treatment of this disease considerable progress has been made of late years, as I shall endeavor to show you.

I shall call your attention particularly to the antiseptic treatment of typhoid fever and to the employment of cold baths; and, lastly, to the prophylactic means available, in order to diminish the spread of typhoid fever.

If the knowledge of the *bacillus typhosus*, or bacillus of Eberth, has not yet given a complete explanation of the pathogeny of typhoid fever, it has, nevertheless, enabled us better to understand this affection and better to combat it.

As has always been the case in the discovery of the micro-organisms of disease, it is prophylaxis which has most profited by this discovery. We know to-day that the most active instrumentality in the propagation of typhoid fever is the usage of waters which have been fouled by the dejections of typhoid patients, waters which become a culture medium favorable to these micro-organisms. In all the epidemics which we observe to-day, it is always in the water that we find the contagious element; this infectious agent we can cultivate so as to make its presence unmistakable; and in the remarkable discourse which Brouardel recently delivered at the Academy of Medicine (November 11, 1890), during the discussion on depopulation, you will find facts and statistics which make this mode of propagation no longer questionable.

Is this the sole means of propagation of the disease? It will by no means do to affirm this. In an excellent monograph on "Typhoid Fever in the Army,"‡ Kelsch shows clearly the complexity of the factors concerned in this disease, and the divers conditions in which, either acting singly or in co-operation, they effect their result. To water, so often instrumental in conveying the contagion, we must add the accumulation of organic matters on the floor of barracks or in the holds of vessels; then telluric agencies, *i. e.*, the influence of the soil, as when the earth is dug up in the construction of the sewerage works of cities, and when in army life a large number of soldiers are obliged to camp on the ground. In his remarkable reports to the Academy, Lardier, of Rambervillers, has instanced undoubted cases of contagion and propagation of typhoid fever where the drinking water had no agency whatever.

So, then, while recognizing the fact that we have in contaminated water the most important factor of dothenteritis, we must admit that there are other factors quite as active. Lastly, in order that the bacillus may develop, a favorable culture soil is necessary, and the best is that state of depression of the economy produced by overwork and exhaustion.

I have already had a good deal to say on this subject in my "Prophylactic Hygiene," and I have endeavored to show that if overwork brings about a typhoid condition and favors the development of the *bacillus typhosus*, the presence of the latter is necessary to characterize typhoid fever, and that it is important to distinguish the typhoid states due to overwork from typhoid fever proper, the first being the result of a blood poisoning—*i. e.*, the penetration of toxins in the economy—the second the result of an infection, or rather of a toxic infection, as the *bacillus typhosus* secretes a very active toxine, described by Brieger under the name of *typhotoxine*.

Prophylactic hygiene has utilized all these data, and we see to-day all our cities giving particular attention to the potable water of their inhabitants. This is a matter on which I had something to say in a previous lecture (see *Therapeutic Gazette*, 1889, p. 365).

From these data, which may be now considered as facts of science, there flow certain practical consequences to both public and private hygiene. Public hygiene is enlightened thereby as to the necessity of furnishing pure water to the inhabitants of towns and cities. As for the application of these facts to private hygiene, individuals everywhere recognize, or should recognize, the obligation to destroy as promptly as possible the dejections of persons affected with typhoid fever, and to disinfect all places fouled by these dejections.

So, whenever you are in the presence of a case of typhoid fever, you should formulate a series of precautions, to be rigorously observed by those whose business it is to attend on the sick, or to be much with them. For the disinfection of the stools, I would recommend particularly the sulphate of copper, of which you will have two solutions—one strong, the other weak. The strong solution contains 50 grammes (about 1½ ounces) to a liter (about 1 quart) of water; the weak, 12 grammes (about 3 drachms) to the liter. The first will serve for

the stools, and you will see that the vessel which receives the dejections shall always contain a certain quantity of this solution. This same solution will serve, moreover, for the disinfection of soiled linen, and for the purification of the water closets.

The weak solution will be utilized for washing the hands and face of those who take care of the patient, as well as the parts of the cutaneous surface of the patient which have been fouled by his dejections. You will recommend to the nurses and attendants not to eat in the sick room. You will also advise them to wash their hands whenever they touch the patient. Lastly, it will be necessary to send to the disinfecting stoves (heated by steam under high pressure, which the municipalities are endeavoring to establish to-day in the different cities) all objects which have been in contact with the patient.

When people are not sure of the purity of the water which they drink, they ought to boil it, or use the sterilized water of commerce, which, owing to the facilities for its production, may now be procured at a very low price. Apparatuses for the sterilization of water are now very common; one kind much in use is portable, and can be transported at any time to the center of an infected district.

I do not speak of filtered water, and for this reason. The cylindrical water filters (called Chamberland filters) constitute an immense progress toward the obtention of water of absolute purity; but it is not enough to have simply the Chamberland filter; it must be perfectly well made, and free from all cracks and pores. These filters must, moreover, be kept perfectly clean—*i. e.*, exposed to a hot fire every week or two—a precaution rarely observed by persons who possess them, and who, confiding in the assertions of the dealers, believe that it is not necessary to cleanse the filter to have healthful water, which is a mistake. Lastly, there is a question much more grave—Do these filtering "bougies," which oppose the passage of microbes, offer a sufficient barrier to the toxins secreted by the microbes? This point has not yet been well demonstrated.

Boiled water presents none of these evils. Boiling destroys both the microbe and the toxins. It has been asserted that these boiled waters are indigestible; this objection has really little validity, and a recent work of Guinard has made this clear.* Guinard has shown that boiling really lowers the hydrotimetric † degree of the water of the Rhone and the Saone, but without depriving these waters of all their calcareous principles, though it does this with well waters; but here it is an advantage, as boiling rids the water of its carbonate of lime. Moreover, the following table shows you these differences:

Source of water.	Hydrotimetric degree.		
	Before boiling.	After fifteen minutes boiling.	Difference.
Rhone water delivered at Lyons	15.5°	12°	3.5°
Saone water.....	16°	11°	5°
Well water.....	52°	34°	18°

As for the gases of the water, ebullition, even when prolonged, does not completely expel them, and, moreover, the water very rapidly recovers these gases. The following figures, borrowed from Guinard, show this.

Before the action of the heat, 100 cubic centimeters of Rhone water contained 5.4 c. c. of gases, resolvable into

	C. C.
Carbonic acid.....	1.1
Oxygen.....	1.3
Nitrogen.....	3.0

After forty-five minutes of boiling, this water contained, still after cooling, 1.9 c. c. of gases, found to be

	C. C.
Carbonic acid.....	0.3
Oxygen.....	0.5
Nitrogen.....	1.1

The same water, after twenty-four hours of exposure to the air in an open place, had absorbed a new quantity of gases, and contained

	C. C.
Carbonic acid.....	0.3
Oxygen.....	1.1
Nitrogen.....	3.5

You see, then, that boiled water may redissolve a certain quantity of gases which it takes from the surrounding air. You see, moreover, that by prolonged boiling it is impossible to deprive water completely of its gases. So, then, in cases of doubt, advise the use of boiled water or of sterilized water.

I come now to the study of the new ways of treating typhoid fever.

The putridity of the intestines plays a considerable role in typhoid fever, and the denomination of *putrid fever*, formerly given to this affection, is perfectly correct in the light of modern researches.

This putridity results from the particular state of the digestive tube and the numerous ulcerations which develop there, resulting sometimes even in sphacelus of a portion of the mucosa. Hence the fetidity of the stools is a constant characteristic of typhoid fever. Physicians, of late years, have tried hard to counteract this putridity, and we are especially indebted to Bouchard for enlightenment as to the best means of intestinal antiseptics in typhoid fever.

Various agents have been tried. Bouchard first proposed charcoal, then iodoform, then naphthalin, finally naphthol, and it must be admitted that the latter agent is much superior to those first mentioned.

There are, as you know, two kinds of naphthol—one more soluble, less toxic, but more irritant, α naphthol; the other less soluble, more toxic, but less irritant, β naphthol. It is to the latter that Bouchard has given the preference, and he associates the naphthol with salicylate of bismuth, under the form of powders or granules, and gives them in such a way that the patient shall take daily from fifteen to thirty grains of naphthol.

To-day, in my judgment, naphthol should be abandoned, and salol substituted in its place, and for this reason: Naphthol is always irritant; is often badly borne. Salol, on the contrary, is much better tolerated.

Moreover, this salicylate of phenol is a medicament which is not decomposed until it reaches the intestines.

It is the disinfectant *par excellence* of the intestines, and has been so far useful from this point of view, as in patients afflicted with artificial anus, to do away with one of the most serious inconveniences attending that infirmity by destroying the odor of the fecal matters constantly flowing through the fistulous opening. It is, then, to salol that you should resort, and I add that salol is but slightly toxic.

In some experiments made in 1887 with Dubief, and detailed in the thesis of my pupil, Dr. Lombard,* we demonstrated that it is necessary to give to a rabbit salol in the proportion of one gramme per kilogramme of weight to produce death.

Salol has an odor which is sufficiently agreeable; not being soluble, it has no savor; and you can administer it in capsules, or, what is better, in suspension in an appropriate vehicle. The quantity to be given in the twenty-four hours should be between 2 and 4 grammes ($\frac{1}{2}$ to 1 drachm). You can add, if you wish, salicylate of bismuth.

To practice disinfection is not enough. You must also combat the febrile element, and this is one of the most interesting and important points in the question before us. During the last few years a great number of active antipyretic agents have been discovered, which constitute that series of antithermic medicines of which I have so often spoken. These medicaments have been applied to the treatment of typhoid fever, and we see a great number of our *confreres* attribute to them a real value. I confess that I cannot share this confidence.

The hyperthermia in dothenteritis is but one manifestation of the general state of the patient, and to believe that in lowering the temperature you are going to get rid of the gravity and intensity of the disease is a profound mistake. We see, on the one hand, very grave cases of typhoid fever without hyperthermia; and on the other hand, we can, by our antithermic medicines, keep down the temperature of the patient to the normal during the entire course of the disease without diminishing for an instant the gravity of the affection. If I add that the most of these antithermics diminish the urinary secretion, and thereby oppose the elimination of the toxins which are produced in so great quantity by the febrile state, we shall have, I believe, sufficient reasons to be very reserved in the administration of these antithermic analgesics in typhoid fever, and I fully agree in this respect with Cantani in his communication made to the Berlin Congress.†

Ought we to have the same reserve in respect to the employment of cold baths—of tepid baths? As for cold baths, I have many times given my conclusions as to their therapeutic value, both in my "Clinical Therapeutics"‡ and in this journal.§ and the recent facts which our colleagues of the hospitals have communicated, and in particular Juhel-Renoy, Merklen, Josias, etc., have not modified my opinion.

The cold bath is a good therapeutic agent; it not only opposes the hyperthermia, but especially the disturbances of the nervous system. What I have especially combated is the systematization of Brandt's method; and I shall return to this point by and by when I come to speak of the statistical results of the different methods of treatment employed.

If you do not see me prescribe cold baths as a routine measure of practice in my hospital, it is because I find in lotions, wet packings, and especially in tepid baths, the same advantages as in cold baths, without the inconveniences of the latter. Tepid baths constitute an excellent method of treatment in typhoid fever, and by tepid baths I mean such as have a temperature of 30° to 32° C., and present a difference of about 10° from the body temperature of the patient. I obtain with these tepid baths sedation of the nervous disturbances, a sufficient fall of the temperature, and a state of freshness of the skin, and general comfort, which enables the patient to get the needed rest. This is the order that I generally follow when prescribing baths and ablutions:

I begin by lotions; then, if the temperature exceeds 40° C., I give tepid baths, one or two a day, according to the thermometric indications; the duration of the bath should be from 20 to 30 minutes, and, when the patient is feeble, I give him stimulating drinks while he takes his bath. If a very intense ataxo-dynamia supervenes, I wrap the patient in a wet sheet. The duration of this wet wrapping should never exceed thirty seconds.

To terminate what pertains to the fever, I shall speak of sulphate of quinine and of benzoate of sodium. Of all the medicaments applied to typhoid fever, sulphate of quinine has the best withstood the attacks which have been made against the pharmaceutical treatment of this disease.

If we have abandoned the large doses of quinine and content ourselves with only medium doses, amounting to one gramme per day, we none the less consider quinine as one of the best medicaments ever used in typhoid fever; and we see certain of our colleagues, Granicher in particular, maintain that the salts of cinchona have an action really specific in dothenteritis, especially when this disease affects children. I do not altogether adopt this view. At the same time I recognize that quinine is a medicine which finds its place in a great number of cases of typhoid fever.

Albert Robin has shown himself the most earnest advocate of the use of benzoate of sodium in typhoid fever. He has, in fact, proposed a new theory of typhoid fever based on the following circumstances: In typhoid fever there is not augmentation but diminution of the oxidations, with exaggeration of organic disintegration. The oxidations, as I have said, are lessened, and this hinders the combustion or modification of the waste matters which result from the increase of the disintegration. Moreover, the different emunctories being affected, the toxins and the waste elements of disintegration incumber the economy. According to this theory, the crises, favorable or unfavorable, result from either the more active elimination of these products or their retention. Hence all medicaments which are capable of energizing the combustion of the organic *débris* should be advised.

* The illustrations of the beam trawl and trawling operations have been taken from the admirable treatise on the subject by Captain J. W. Collins, "The Beam Trawl Fishery of Great Britain," etc., published in the Bulletin of the U. S. Fish Commission for 1888.

† From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

‡ Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris.

§ *Revue d'Hygiene*, August and September, 1890.

* Guinard, *Lyon Medical*, August 10, 1890.

† The *hydrotimeter* is an apparatus for the qualitative and quantitative analysis of water. It determines the quantity of the lime salts by the aid of a solution of soap (Robin).—Tr.

* "Researches on Salol" (*These de Paris*, 1887).

† Cantani, Congress of Berlin, 1890, and *Bulletin General de Therapeutique*, t. cxiv., 1890.

‡ "Clinical Therapeutics," Detroit ed., art. "Typhoid Fever."

§ *Therapeutic Gazette*, 1887, p. 803.

Robin mentions especially salicylic and benzoic acids; he gives daily 30 grains of benzoic acid or 60 grains of benzoate of sodium. I do not know that the method of our colleague has come into very general use, and if salicylic acid and the salicylates are still prescribed, it is rather that they may act as disinfectants. As for benzoic acid and its derivatives, it is but little employed.

All these means of which I have just spoken may furnish two orders of therapeutic agencies—the one systematic, *i. e.*, applicable to all cases; the other, to be applied according to indications.

Certain authorities have systematized the cold baths; others, like Bouchard, antiseptics, with the tepid baths; others employ only the salicylate of bismuth, etc. I am a thorough opponent of systematization.

For a disease like typhoid fever, which presents itself under the most variable forms, we cannot admit a therapeutic formula which applies indiscriminately to all cases, and our treatment should vary according to the patient whom we have before us. We may truly say that there is no treatment of typhoid fever, but a treatment of typhoid patients, and this I shall endeavor to prove to you by the recent statistics furnished by the practice of our Paris hospitals.

In a very interesting communication made by Merklen* to the Society of the Hospitals, on the results of the divers treatments of typhoid fever in the hospitals of Paris, you will find statistics of great value, and the first point to which I would call your attention is that, taken in its entirety, the mortality varies according to the periods; sometimes it rises, sometimes it falls. Thus, in the period extending from 1868 to 1882, the mortality in the hospitals from typhoid fever was twenty-one per cent. From 1882 to 1888 it fell to fourteen per cent., and in 1889 it was thirteen per cent., and this whatever kind of treatment was employed. We may even say that in 1890 it is still lower, being not more than twelve per cent.

This mortality does not affect equally both sexes, and as Hayem has remarked, the figure of the mortality of women is much larger. Juhel-Renoy makes this difference—viz., twelve per cent. for women, five per cent. for men. The mortality of women, then, is more than double that of men.

Has the treatment, then, any influence on this fall of mortality? The difference is very slight, that is, as far as our hospitals are concerned.

If we take as the basis, for instance, the year 1889, we find for the total mortality—military hospitals, general hospitals, and children's hospitals—with the symptomatic treatment, 11.33 per cent.; and with the systematic treatment by cold baths, 11.28 per cent. The lowest mortality was obtained in 1889 by the combined employment of quinine and tepid baths, being 7.33 per cent. But Debove has shown how careful we should be in drawing such conclusions, since by almost absolute expectancy, only a hygienic treatment being employed, the practitioner at the Hospital Audral has had a mortality of only 9.2 per cent.†

Moreover, in a recent communication, Merklen has brought clearly to view a fact on which I had long dwelt in my "Clinical Therapeutics," viz., the difficulty of basing therapeutic conclusions on statistics, and you will permit me to repeat what I said ten years ago in the first edition of that work. After citing the remark of Forget—"Statistics are like an obliging girl who gives herself up to the first comer—I added, with reference to typhoid fever, "Do you believe that one typhoid patient is exactly like another typhoid patient?" The age of the patient, the state of his vital forces, the relative severity of the epidemic, the period of the year, the nature of the locality even, have a great influence on this pathological aggregate, and modify its march and its fatality. It is here especially that we see the influence of what I have called the morbid genius of epidemics, where one sees epidemics relatively benign succeed epidemics that were relatively malignant; and according as you employ the same method of treatment to the first or to the second, you will have supplied multiplied successes or failures.‡

I find a confirmation of these views in the discussion which took place at the Society of the Hospitals, where Merklen showed the variations of the mortality according to epidemics.§

With regard to this variable mortality of epidemics of typhoid fever, is it in contradiction with the recent data which we have acquired concerning this disease? By no means. What, in fact, does bacteriology show us? It puts in clear light this fact, that the virulence of the products secreted by the microbes is variable according to multiple circumstances, and it is probable that under certain conditions, of which the knowledge still escapes us, the *bacillus typhosus* acquires extraordinary virulence. If, we add, in accordance with the teachings of Koch, the gravity varying according to the soil on which this microbe is cultivated, debility of the organism, overwork and exhaustion, insufficiency of alimentation, etc., we shall have the explanation of this variation in the mortality by typhoid fever, which we have before ascribed to the "morbid genius," confessedly a vague and indeterminate word.

What conclusions shall we draw from all this? This—namely, that nothing in the facts of the case warrants the advocates of systematic medications in affirming the superiority of their method over the symptomatic modes of treatment, and that here, as in many other things, it is the attention which the physician shall give to the patient whom he treats, it is the promptness and the rigor with which the treatment shall be applied, it is the celerity with which he shall combat the varied symptoms which appear in the course of typhoid fever, which constitute the success of the treatment employed, whether the latter be systematized or not.

But, however important the part which you may assign to this systematization, do not forget that there are still three elements of success which ought always predominately to enter into your therapeutics—the disinfection of the intestinal contents, the promotion of an abundant diuresis, and a most scrupulous attention to the hygienic needs of the patient.

As to the first point, I need not repeat what I have already said. Salol is the medicament which seems to me best to fulfill this indication.

As for the matter of diuresis, I adopt in this regard the views of Albert Robin, and believe that it is useful to favor as much as possible the elimination of the products of organic disintegration; and as the most active channel for this elimination is the kidney, it is necessary to give our patients abundant drinks to favor diuresis. I believe even that the success obtained by Debove by expectancy is due to the fact that he always requires his patients to drink abundantly. Unhappily, in grave cases, the bad condition of the mouth, and the fuliginosities which encumber it, joined to the state of prostration and delirium into which the patient is plunged, often render the administration of beverages very difficult. The drink which I prefer is fresh vinous lemonade, which may be iced if one wish.

Lastly, this great question of hygienic attentions dominates the entire therapeutics of diphtheritis, and explains the marked difference which exists between the mortality of the hospitals and that of private practice. Despite the painstaking and devotion of our hospital nurses and attendants, it is impossible to give our patients in those public institutions the scrupulous attention which we can exact in private practice, especially among rich people. In private practice, such factors as the ablutions, the constant cleansing of the mouth, the disinfection of the excreta, the excellent ventilation of the sick room, the plentiful supply of nurses—new and fresh ones taking the place of those that are tired out, and the patient never being left an instant unattended—all this constitutes so many chances of success, which gives the patients of the better classes in private practice the advantage over hospital patients.

Such are the considerations which I desired to present in connection with the treatment of typhoid fever. They show on this special point the indubitable progress of therapeutics. In the next lecture, which will finish the conferences of this year, I shall take up a subject on which there has been a great deal of discussion of late, and which may be considered as being yet far from settled. I refer to "Hypnotic Suggestion in Therapeutics."

DIPHTHERIA GERMICIDES.

IN a communication upon the therapy of diphtheria, Professor F. Loeffler has put on record the results of experiments made to determine the relative effect upon the characteristic bacillus of a very large number of substances that have been recommended for the local treatment of that disease (*Deutsch. med. Wochens.*, March 5, p. 353). The method adopted was to allow the substance in solution or as vapor to come into contact with a blood serum mixture inoculated with the bacilli of diphtheria. This was done both soon after the inoculation, while a "sowing" was still superficial, and when a "cultivation" had had time to develop, since it was found that the same substance, or even the same degree of concentration, was not always equally effective in both stages.

It was found that of the inorganic compounds a solution of corrosive sublimate 1 in 10,000 destroyed instantaneously all the germs in a superficial sowing, and one of 1 in 20,000 left comparatively only a few germs intact, but from these vigorous colonies developed in a day or two. This agent, however, produced essentially less effect upon a cultivation, a solution of 1 in 2,000 not penetrating to the deeper layers of bacilli in twenty seconds; one of 1 in 1,000 left very few germs undestroyed at the end of twenty seconds, and with still stronger solutions the work was complete. Mercuric cyanide proved less effective, the germs on a sown serum surface being first instantaneously destroyed by a 1 in 800 solution, while it required a 1 in 200 solution to kill all the germs in a cultivation in twenty seconds. Silver nitrate solution of less strength than 1 in 150 was insufficient to render a superficial sowing sterile, while it was without effect upon a cultivation in twenty seconds. Silver chloride dissolved in sodium hyposulphite was practically not much more effective. With potassium permanganate a 2 per cent. solution sterilized a surface sowing, and a 5 per cent. solution a cultivation in twenty seconds. Potassium chlorate (5 p. c.) saturated lime water, hydrogen peroxide (1 p. c.), sulphuric acid (2-25 p. c.), formic acid (1 p. c.) and lactic acid (1 p. c.) were perfectly inactive in ten seconds' contact. Iodine in aqueous solution was inactive, but iodine 5 parts and potassium iodide 10 parts in water 300 parts killed cultivations in twenty seconds. Bromine in 1 in 1,000 solution acted powerfully upon a sowing, but only a saturated solution (25 p. c.) killed cultivations in twenty seconds. Chlorine water (1 in 1,100) killed sowings in ten seconds, and ten times that strength sterilized cultivations in twenty seconds. A saturated filtered solution of chloride of lime was equally effective upon cultivations, while it still destroyed superficial sowings when diluted twenty-five times. Iodine trichloride in 1 in 1,000 solution sterilized sowings, but did not produce the same effect on cultivations with certainty in 1 in 100 solution.

Of organic compounds, absolute alcohol destroyed sowings by momentary contact almost completely, but a 50 per cent. by volume spirit showed quite a weak action. Ether behaved similarly. A mixture of alcohol 50 parts, ether 25 parts, and water 25 parts, was very effective in ten seconds' contact. Cultivations were sterilized by absolute alcohol or by ether in twenty seconds. Allyl alcohol, which in extraordinary small quantities inhibits the growth of the anthrax bacillus, showed in 5 per cent. solution only a slight effect upon sowings of the diphtheritic bacillus in ten seconds. Benzyl alcohol, on the other hand, in aqueous solution sterilized the surface with certainty in ten seconds, and chloroform water showed itself remarkably active upon sowings. Carbolic acid was in 1 per cent. solution inactive; in 2 per cent. solution it showed a distinct action; but it first became capable of destroying sowings instantaneously in 3 to 4 per cent. solution. By the addition of 30 to 40 per cent. of alcohol the action of a 2 per cent. solution was rendered complete. Cultivations were completely sterilized by 5 per cent. solution of carbolic acid in twenty seconds, and if 30 per cent. alcohol were used as a solvent the same effect was produced by a 3 per cent. solution. Lysol in 2 per cent. solution sterilized sowings in ten seconds, but in its effects upon cultivations it

came far behind carbolic acid. The three methylphenols, *o*, *m*- and *p*-cresol, approximated closely to carbolic acid in their action, and resembled it in the concentration effective against sowings being near to that effective against cultivations. The cresolsulphonic acids proved to be much less effective than the phenols, and the same may be said of salicylic acid. Of the three dioxybenzols, resorcin was least effective, a 10 per cent. solution not sterilizing a sowing in ten seconds; pyrocatechin came next, and hydroquinone is thought worthy of further experiment. The trioxybenzol phloroglucin showed in 2 per cent. solution a slight action, but a saturated aqueous solution of tropæolin was without effect.

A large number of essential oils were also tested as to their action upon the diphtheritic bacillus, the plan adopted being to moisten with the oil to be tested the under surface of the wadding placed in the neck of the flask containing the inoculated serum mixture, and closing the whole with an India-rubber cap. The oils showed a remarkable difference in their behavior, for while some hindered more or less the growth of the bacilli, others seemed actually to favor it. With the oils of sweet orange peel, lemon, eucalyptus, spike, thyme, mustard and garlic, as well as with allyl sulphide and anhydrocoriander, a substance prepared from coriander oil, no growth was perceptible in the flasks after two days. But upon removal of the India-rubber cap, development of the cultivation commenced in all the flasks, except that containing allyl sulphide, the growth taking place mostly at edges of the drops of condensed water. Since these results appeared to point to the activity being due to hydrocarbons, the experiments were continued with a number of hydrocarbons of the aromatic series and their ethers.

These were benzol, anisol, phenetol, toluol, *o*-, *m*- and *p*-xytol, pseudocumene, cymene, cumene, thymol, creosol and oil of turpentine. All these bodies, except solid thymol, a piece of which was fastened under the India-rubber cap, and creosol, showed a remarkable inhibitory action, which with some was not limited to the surface, but penetrated deeper, as was shown by the non-development when the serum was inoculated by puncture. Anisol, phenetol, toluol and benzol proved especially active, since the surface of the serum in those flasks remained sterile after removal of the caps. It follows that the germs must have been killed by the vapor of these substances. When, however, one of these substances was poured upon a cultivation, it did not by twenty seconds' contact destroy its power of development, and the action was not increased by an addition of alcohol.

On the other hand, while thymol vapor was inactive, a 1 in 500 solution of thymol in 20 per cent. alcohol destroyed sowings almost immediately, and aniline, which was also without effect in the vapor form, was very energetic when mixed with water. The vapor of metallic mercury also was fatal to sowings.

From the foregoing results, the author arrives at the conclusion that for prophylactic purposes, when there is danger of infection, the best of all treatment consists in using as a gargle for five or ten seconds every three or four hours a 1 in 10,000 to 1 in 15,000 solution of mercuric chloride, or, perhaps better, a 1 in 8,000 to 1 in 10,000 solution of mercuric cyanide, because of its less disagreeable metallic taste.

Other gargles that might be used with advantage are those of chloroform water containing only a small quantity of chloroform, chlorine water containing 1 part of chlorine in 1,100 of water, or a solution of 1 part of thymol in 500 parts of 20 per cent. alcohol. Of the substances active in the vapor form might be used the oils of sweet orange peel (oil of Portugal), lemon, eucalyptus and spike, as well as anisol, phenetol, benzol, and toluol.

In the treatment of actual cases of diphtheria Dr. Loeffler considers that, in addition to gargling every two hours with one of the above named weaker solutions, a gargle of one of the stronger preparations, shown to be capable of sterilizing cultivations, might be used every three or four hours. Which of them is most suitable will have to be determined by actual experiments, but the author suggests a 1 in 1,000 solution of mercuric chloride, a 3 per cent. solution of carbolic acid in 30 per cent. alcohol, or alcohol and oil of turpentine each with 2 per cent. of carbolic acid.—*Pharm. Jour.*

COCOA-NUT BEETLES.

THE destruction of cocoa-nuts in the Straits settlements by insects has been so great that of late much attention has been given to the question. Perhaps the most important contribution that has yet been made to our knowledge of these pests is a recent report by Mr. H. N. Ridley, director of forests and gardens, Singapore, on the destruction of cocoa-nut palms by beetles, which has been printed by the government and issued from the colonial secretary's office. There are, Mr. Ridley says, two species of beetles which are especially destructive to cocoa-nut palms. The first is the *Oryctes rhinoceros*, commonly known as the rhinoceros, elephant, or black beetle, and the other the *Rhynchophorus ferrugineus*, known as the red beetle. Two other larger species of Calandra attack some palms at Singapore, but Mr. Ridley has not received any notice of their attacking cocoa nuts.

The *Oryctes rhinoceros* belongs to the group of Lamellicornia. The parent beetle usually deposits its eggs in decaying cocoa-nut trees. The identification of the larvæ is very difficult, for the grubs of all the larger Lamellicorn beetles are very much alike. The larvæ is white and fleshy, and when full grown is about three inches long; the head is round and hard, and is of a dark chestnut color. It is covered with short bristles, the legs are about half an inch long, the antennæ are short and hairless, and the jaws thick and strong. The chrysalis has the form of the perfect insect, but the insect is very rarely found in this state. The beetle itself is sometimes two and a half inches long; it is very broad, and is of a dark brown or black color, and its chitinous coat is very hard. The head of the male is small, and has a horn, about half an inch long, curved toward the back. The wing cases do not quite cover the body, they are broad and oblong, and covered over with minute punctures. The legs are strong, and the second joint is armed with teeth, by means of which the beetle cuts its way into the tree. The female is usually much smaller, and is readily distinguishable from the male. The grub is quite harmless, but the

* Merklen, "The Treatments and the Mortality of Typhoid Fever in the Hospitals of Paris" (*Bull. et Mem. de la Soc. des Hop.*, July 9, 1890, p. 628).

† Debove, "On the Mortality from Typhoid Fever" (*Bull. et Mem. de la Soc. Med. des Hop. de Paris*, July 25, 1890).

‡ "Clinical Therapeutics," G. S. Davis, Detroit, Mich., p. 381.

§ Merklen, "The Variations in the Mortality of Typhoid Fever" (*Bull. et Mem. de la Soc. Med. des Hop.*, October 30, 1890).