

18 per cent. greater in thorianite than in Joachimsthal pitchblende, while in autunite, a phosphate of uranium, this ratio was about 20 per cent. less. She separated the radium chemically before estimating it.

This month appeared in the *Philosophical Magazine* (p. 345) a communication by Mr. F. Soddy and Miss Pirret on this subject. They find that, by determining the radium directly in the mineral, the ratio is practically the same for thorianite as for Joachimsthal pitchblende, but that in their specimen of autunite the ratio is only 44 per cent. of that of pitchblende. During the last three months I have been engaged on this problem also. I find that the ratio in thorianite from Java agrees within the limits of experimental error with that in specimens of pitchblende from Joachimsthal and from German East Africa, the latter of which is probably of primary formation. In my specimen of autunite, however (from Autun, in France), the ratio is only 27 per cent. of that of the pitchblendes. Thus, taking the ratio Ra to U in pitchblende as 1, in Middle Gleditsch's specimen of autunite it is only 0.80; in Mr. Soddy and Miss Pirret's it is 0.44, and in mine 0.27.

To explain these somewhat exceptional results, it must be assumed either (1) that the Ra has been washed out of the mineral in some way, or (2) that the mineral is very young, and that therefore the Ra is not yet present in equilibrium amount.

To throw light on these points, I hope to determine the ratios uranium to ionium and to actinium in different specimens, not only of autunite, but of the family of minerals  $R'(UO_2)(R''O_2)_2 \cdot 8H_2O$  ( $R' = Ca, Ba, Cu; R'' = P, As$ ), of which it is a member.

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August 6.

#### Elemental Weight Accurately a Function of the Evolution of Ideal Space-symmetry Ratios.

SUFFERING from a malady of the eyes, I may be excused the two following errors in my communication published in *NATURE* of July 21:—

(1) For *hex*, or the cubic line-ratio, read throughout *oct*, or the octahedral line-ratio; and for *oct* similarly read throughout *hex*.

(2) In the table at the end, No. 6, read 1.00766 as the mean, in place of 1.00765, the product in this instance (No. 4 in the references to the general formula) deviating by 0.0001 from the experiment; in the other cases the figures are exact.

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#### The Jamaica Earthquake.

MAY I point out that in the review of "Recent Earthquake Investigations" (*NATURE*, August 11, p. 165), the date of the Jamaica or Kingston earthquake (where the loss of life was 800, and of property about 2,010,000*l.*) is wrongly stated? It took place on January 14, 1907, and not on June 14, 1906.

D. MORRIS.

Boscombe, August 12.

#### CHOLERA AND ITS CONTROL.

NOTHING is more striking, even to the casual observer, than the change that has taken place in the attitude of the public, no less than of those who have charge of the public health, towards those great epidemic outbreaks that swept Europe up to the end of the eighteenth century "and after." Until the Great Fire of London in 1666—indeed, until the rise of the great school of sanitary reformers of whom Chadwick and Simon may be taken as types—panic and despair were the predominant emotions aroused in the presence of plague, cholera, and the like. With a knowledge of the results of what could be done by the adoption of efficient sanitary measures, these two paralysing influences were gradually rendered less effective, especially as the call to preventive and curative work could be made to divert men's minds from brooding and evil anticipation. Men then realised

how much could be done to ameliorate the conditions of communities attacked by these diseases, and how successful were the preventive measures adopted as regards transference not only from community to community, but from individual to individual, with the result that organisation took the place of panic and hope succeeded on despair. Still, men were working in the dark, and the mystery enshrouding the mode of spread of disease was profound until Pasteur, Koch, Lister, and their many disciples gradually evolved from the chaos of theory, fact, and fancy the germ-theory of disease, and isolated from the welter of organisms by which the patient was surrounded the one that in each case appeared to be the specific cause of the disease.

In no case is this more marked than in that of cholera, and at the present time one may see in different parts of Europe reproduced different phases of the history of the evolution of our methods of dealing with cholera epidemics at different periods. In Russia and in some parts of Italy, where fatalism and apathy prevail, and where sanitary science has not yet reared its head, cholera still arouses panic, only to be followed by the lethargy of despair. In other parts of Europe efforts—in many cases very inadequate—are made to combat the spread of the disease, whilst in northern Europe, including such places as Amsterdam and London, the announcement that cholera may invade the country, or that it has already gained a foothold, simply means a call to renewed sanitary efforts directed by intelligent experience and skill, which will prevent the disease from entering the country except as carried by isolated patients, and the treatment of patients in such fashion that there will be no further extension beyond a very limited area.

At the present juncture, when cholera may spread from Russia, Italy, Roumania, or elsewhere, the crisp instructions issued to port medical officers no less than timely account of the outbreak of cholera in Rotterdam last year about this time (see the *Times*, August 19), should give comfort and courage, both to those who have to deal with cholera in our ports, and to those who at one time would inevitably have been attacked in large numbers. Between August 20, 1909 (when cholera was found in three children in one family, who died suddenly with the clinical symptoms of cholera, the nature of the disease being at once confirmed by full bacteriological examination) and September 11, what might have expanded into a great epidemic in Rotterdam began and was crushed. The facilities for the spread of the diseases are perhaps greater in Rotterdam than in any other seaport town in the world, but by careful isolation, not only of the patient, but of "contacts," *i.e.* people who have come in contact with the patients at any time after the outbreak of the disease, in "isolation" wards, and "observation" sheds, by warning the people against the use of unfiltered water, the eating of green fruit, and excessive indulgence in the use of alcoholic liquors, the epidemic was cut short. Fines and imprisonment were awarded to those who interfered in any way with the authorities in carrying on their work, either by obstructing them or by failing to notify cases where the illness showed any symptoms of cholera. Careful observation of suspected cases, disinfection of houses, bed linen, clothing, of patients and contacts alike, were all resorted to; but, on the other hand, all who helped were well treated, receiving whatever wages they would have earned normally; indeed, we are told, they were so well treated generally that "many presented themselves as contacts in the hope of receiving food, clothing, and wages without working." It may be said that these methods were, on one hand, harassing, and, on the other,

expensive; but as compared with the work and expense involved in outbreaks such as at one time or another have attacked our north European ports, the work and expense involved are absolutely trifling.

All this, of course, is exceedingly reassuring, but we have, on the other hand, as the outcome of our knowledge of the life-history of the cholera bacillus and its relation to the human subject, a fact which, disregarded, may be a source of great danger, though, knowing of its existence, precautionary measures may be taken which may render it harmless. Of 108 patients, presumably "contact patients," or patients who had recovered, examined at Rotterdam in 1909, nearly 4 per cent. were found to be bacilli-carriers, corresponding to the so-called typhoid-carriers which, only recently recognised, seem to play such an important part in the dissemination of the typhoid fever germ. The cholera bacillus was found in these carriers for periods of from five to twelve days after they came under observation. It is pointed out that, this being the case, out of more than 100 people leaving a cholera-infected port four (approximately), according to the above statistics, may carry these germs for twelve days, so that any port within twelve days' distance at which these carriers land might be infected by cholera. How far this observation accords with the experience of port officials it is impossible to say at present, but no doubt the matter will be carefully gone into now that attention has been directed to it.

A very interesting outcome of the curative treatment of the cases of cholera that occurred in the Rotterdam outbreak is that, although the epidemic death-rate in Holland during 1909 was about 45 per cent., the death-rate in the municipal hospitals, where special treatment was carried out, was only 13 per cent. Here the doctors resorted to the hypodermic injection of a normal saline solution, sometimes in quantities of several quarts a day, the effect of this mild saline solution, as pointed out by the *Times* correspondent, being not only a replacing of the moisture which the system loses as the result of the extreme watery diarrhoea, but "a direct stimulation of the heart and also an indirect stimulation of the heart by diluting the blood and thus reducing friction."

The whole treatment, both preventive and curative, of cholera is the outcome of modern methods of medical research, a fact that may be commended to those who, either through prejudice or ignorance, or both, would limit the study of bacteriology and experimental medicine to the field the bounds of which are those of their own narrow vision.

#### MALARIA PROPHYLAXIS IN INDIA.<sup>1</sup>

"A PROBLEM of Imperial magnitude." "Epidemics of smallpox, cholera, and plague are grievous afflictions, but neither singly nor even collectively are they responsible for so much economic inefficiency, and what is worse, actual human misery, as the recurrent scourge of malaria." These words of the Viceroy and the Lieutenant-Governor of the Punjab respectively impress us with the magnitude and seriousness of the problem that the conference had to consider. If we attempt to translate these words into figures, we are met with difficulties, owing to the fact that the registrar of deaths in India is often the ignorant village chowkidar, but as a rough approximation, it may be assumed that the mean

death-rate is about 5 per 1000, *i.e.* over a million deaths annually throughout the country as a whole; whereas in the jails, owing to the care with which prisoners are treated, the mean death-rate from malaria is only 1 per 1000.

But even if the figures for the country as a whole be correct, an analysis of them does not reveal where the real mischief lies. If we assume, for example, that we know the malarial death-rate of a particular town or district the figures available still do not show us whether, as not uncommonly is the case, some parts of the town or district may not be quite free from malaria. It is evident, then, if prophylactic measures are to be applied economically and from financial considerations, this is a prime necessity: one of the first and most important steps must be to determine accurately what areas are malarial, or are so to such an extent as materially to affect the whole of the inhabitants; for it is obviously unnecessary to apply prophylactic measures to those areas which do not need them; but unfortunately there appears to be evidence that this has already been done, not to mention the "fatuous" instance recorded of oiling drains, under instructions, where minute examination showed that no anopheline larvæ existed. But on the other hand, there is already work waiting to be done. What is the nature of this work, and how is it to be done?

It is these questions that mainly occupied the attention of the delegates to the conference. It was pointed out that a multitude of different conditions exist in India, but that small villages surrounded by swamps are in the enormous majority, and again it was stated that the mitigation of malaria in India is chiefly the problem of its mitigation in small villages. For scattered populations, small villages, and rural areas we have the opinion of Major Ross quoted that we must generally fall back upon quinine, yet, rightly, the conference put mosquito destruction in the forefront of its policy, for no doubt—and this is also Ross's opinion—this is the fundamental method; the question is, to what extent is it financially possible?

The resolutions of the conference on this point are expressed in an apparently contradictory sentence. They state "that it will not be possible to protect rural areas by any scheme of drainage which is financially practicable, but it has been found that in some highly malarious tracts the level of subsoil water has been materially lowered with great permanent benefit by drainage operations, the cost of which was not prohibitive." This question of drainage was discussed at length by the conference, and very contradictory views were expressed, not only as to its practicability owing to expense, but as to its benefit, evidence being adduced to show that even in well-drained areas there had, in some cases, been no reduction in malaria.

It is a somewhat discouraging fact that no instance of a drainage scheme with successful result was put before the conference, but that already many unrecorded failures have occurred. It seems to us a matter of importance, then, to inquire into the cause of these failures, so as to ascertain if anything was left undone that could now be better done. Ill thought-out schemes are not uncommon. We ourselves know of a case where a large, shallow tidal area of water, quite free from anophelines, was converted into an ideal breeding-ground by partial filling with earth and by the consequent formation of many hundreds of pools. The danger, too, was pointed out of draining a permanently flooded area, whereby a comparatively healthy was converted into an unhealthy tract, with numerous pools in the rainy season. Some difference of opinion was expressed as to the effect

<sup>1</sup> Proceedings of the Imperial Malaria Conference held at Simla in October, 1909. Pp. vi+107. (Simla: Government Central Branch Press, 1910.)