at the present moment, and has great promise of success. The toxins are liberated from the dead bodies of the bacteria and stimulate the formation of numerous receptors or side-chains in the cell, and some of these latter are thrown off into the blood stream as antitoxin, and in a position to seize upon and unite with and neutralize the toxin molecules, not only those that have been artificially introduced, but those that are being constantly produced by the invading germ.

In many cases the diagnosis is very difficult, and in others the strains of what is apparently the same bacterium are very numerous, and though their effects may appear the same, the species or variety is not the same. I suppose the strains of streptococci and staphylococci are as numerous as the varieties of *Rubus*, and the distinction of the colours, "aureus," "citreus," "albus," etc., which their cultivations show, do not by any means represent their numbers. Antitoxins of the cocci have failed partly because of their infinite variety. The stock antitoxin did not come from the same strain as the disease. So the practice of using polyvalent serum resulted, making antitoxins of every conceivable strain of coccus, mixing them together like a plum-pudding and throwing them at the patient, hoping that one at least might hit the mark; like firing a shot gun at a grouse, hoping some of the pellets will go home.

But in this, as in other diseases, vaccines have proved more useful than the antitoxin, but even here there is the difficulty in getting the right strain. There are also cases where a strange organism is found, or one that has been regarded as non-pathogenic is in a particular case found to be pathogenic. In fact, we must recognize the possibility, or even the probability, that natural selection is frequently producing new species, causing new diseases, or very definite modification of recognized disease. We do not know when any given germ attains its specificity for the first time—certainly not all of them in prehistoric times.

In all these cases where the stock vaccines do not appear to be of avail, the practice is to take some of the diseased organ or its secretion or contents, make pure cultures of the germ, and use one or more of these cultures as vaccines, giving back to the patient vaccines from the exact organism that has attacked him. This is a method of precision as keen as could be attained and the most scientific in its practice, and, *a priori*, most hopeful in its outlook. It is comparable in all its details for scientific spirit and method to the best work in chemical or physical research.

While much of this work will lie in the hands of the pathologist, the final utilization will rest in the hands of the physician; and it is to this line of vaccine-therapy that we must look as the most promising line of the future that will redeem the physician from the somewhat secondary place to which I fear public opinion has relegated him, as compared with his brilliant colleague the surgeon.

ON FEVER CAUSED BY THE BITE OF THE SANDFLY (*PHLEBOTOMUS PAPATASII*).

BY
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Definition.

A NON-FATAL, three days' fever, with a week's convalescence and certain sequelae, due to the bite of the *Phlebotomus papatasi*.

Distribution.

It is known to exist in Egypt, part of Austria, Malta, and in Italy; and it will probably be found widely distributed.

Symptoms.

These are local and general.

Local.—The bite is followed by intense itching and irritation of the part, which persists, and which is followed by the formation of a raised lump with a small watery head, and with a surrounding zone of inflammation. As the flies bite at night, sleep may be prevented for some hours.

General.—The illness begins with a feeling of tiredness, loss of appetite, malaise, headache, aching in limbs, chilliness, disinclination to do things; rigors are uncommon;

vomiting takes place sometimes. The temperature rises sharply to 101° or 104° F. (less in recurrent attacks). There is a disordered digestion, furred tongue; constipation is marked, occasionally there may be diarrhoea; the hands and feet are hot, the pulse is bounding and increased in rapidity. Blood pressure is probably raised from the beginning. Later there is well-marked anaemia and rapid loss of weight.

Special Symptoms.

There is a tendency to inflammation of synovial and pleural cavities, and to neuritis and headache. The micro-organism is probably not got rid of easily, and months after an attack chill or exposure to wet may bring on another attack of fever, accompanied by effusion into synovial or pleural cavities, or neuritis.

Blood Examination.

I have failed to find any organism.

Residence.

Newcomers are more affected by the bite of these insects, both immediately and more remotely, than those who have been in the country for years.

History.

For many years these symptoms had been noted, but were variously attributed to other causes and described under the name of dengue, influenza, malaria, and Egyptian fever, but upon careful observation the above diseases will be found to have different clinical symptoms, the nearest being influenza. There is, however, usually the definite history of the bites, and an absence of catarrh of the air passages. It differs from malaria in that there are no definite stages of the rigor, and no parasites to be found in the blood.

In dengue fever the severe rheumatic pains in joints, bones, and muscles, with injection of the eyes and slow, tedious convalescence, help the diagnosis.

Influence of Season.

The fever is prevalent during the hottest and driest part of the year, from April to November, when the flies are most prevalent.

Etiology.

Bite of the sandfly, *Phlebotomus papatasi*.

Incubation Period.

About four days. Three days' fever in cattle is well known in Egypt; and it is possible that the disease may be conveyed from them to human beings, as the flies are found in large numbers in the vicinity of dwellings and stables.

Habitat.

I could not find the larvae, but they will probably be found in latrines, human and other excrement, which is cast so freely round villages. From the nature of the fly it is manifest that, wherever the larvae may be found, the eggs must be laid in moist material, and the breeding time of the fly is during the hot, dry months of the year, beginning in April. For some years past it has been noticed that rooms nearest to the rough latrines of the Arab servants were the ones most infested. Last summer there were a large number of native workmen engaged in altering a premises. No latrines were provided; they used the desert, and sand-flies swarmed. The banks of the Suez Canal, alongside of which the sweetwater canal runs, are favourite haunts of the sandfly.

Description of the Fly.

It is said to be called by the natives "akhl-uskut," silent eater. This is hardly true, as the fly makes a high-pitched noise similar to that of the *Culex* mosquito, only much higher pitched. The fly is light brown in colour, so small that it can pass through the meshes of a mosquito curtain. The wings are held up away from the body, and are covered with hairs. The head is joined to the body by a narrow neck. The eyes are very large and prominent. The proboscis is about twice the length of the head, and contains a fine stilett. The antennae are three times the length of the proboscis, and are covered with hair. The body of the fly is of the same colour—light brown—and hairy. The thorax gives the impression of humpback. The abdomen is narrow, but when the fly is fed it becomes very prominent and darker in colour from the ingested

blood. The genital organs show an extraordinary difference between male and female; the male being provided with large and powerful claspings apparatus. The legs of the fly are long, hairy, and provided with a terminal hook, which enable it to hold on and obtain purchase for driving in its proboscis. The proboscis of the male is somewhat shorter than that of the female. The fly runs quickly, and is possessed of much intelligence in hiding or endeavouring to escape. The female phlebotomus bites. It is not certain at present whether the male does or not. The flies are usually to be found in pairs.

Preventive Treatment.

Human and other excrement should be destroyed or buried. Latrines should be sprayed with paraffin twice in a week. Although the fever does not tend to a fatal termination, the sequelae may be troublesome or even serious, and there is no doubt that it incapacitates a considerable percentage of the population.

The clinical observations have been made upon a number of cases, and confirmed by observations upon myself. I have a peculiar attraction for these flies. Last year, after a sea voyage, and when in the best of health, after carefully excluding the possibility of bites from other insects, I was bitten by six of these flies. Within forty-eight hours symptoms set in and followed the usual course.

I much regret that, owing to an accident, my experiments in breeding the flies were brought to a premature close. I hope, however, to continue them shortly.

I append a description of the fly, kindly sent to me by Mr. Newstead, of the Liverpool School of Tropical Medicine.

The members of the genus *Phlebotomus* may be recognized by the following characteristics: Small hairy flies; thorax humped, wings long and narrow with ten veins, all of which, including the costal vein and hind margin, are clothed with long hairs. There are no cross veins as in mosquitos or other allied flies, and the veins are never clothed with scales. Legs long and slender. Antennae setose of fifteen segments in male. Palpi of four segments. Proboscis twice the length of the head, consists of mandibles, maxilla, labrum, labium, and hypopharynx. The buccal organs of the male are shorter than those of the female; the colour is a light brown with hardly any variation.

I much regret that I have been unable to read the recent publications of Drs. K. Franz and Taussig on this subject.

Treatment.

This is symptomatic, there being no specific. When the digestion improves, iron and arsenic are useful to combat the resultant anaemia.

SKIAGRAMS OF MULTIPLE RENAL CALCULI AND OF FRACTURES DUE TO MUSCULAR VIOLENCE.

BY

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THE two skiagrams illustrated were obtained with exposures of two minutes, no compression being used, and the breathing being natural. The print showing the renal calculi is of special interest to radiographers, inasmuch as the small calculi were so clearly defined, in spite of the movements of the diaphragm, that 27 of the 28 stones found at the operation could be counted on the plate. In this, and in many other cases, an exact outline of calculi has been obtained by exposures of about two minutes, and though in some subjects the kidney was abnormally well fixed, in others where the condition was not of long standing there was practically no movement of the kidney.

CASE I.

This skiagram is of the kidney regions of a middle-aged collier, who was under the care of Mr. William Sheen at Cardiff Infirmary. In the right kidney Mr. Sheen found the large calculus seen in the print and twenty-eight small faceted stones. The large calculus weighed 123½ grams, and measured 7 cm. in its longest and 5.4 cm. in its shortest diameter; it had an almost smooth surface. In the left kidney there was a single stone, about as large as a pigeon's egg. All were phosphatic deposits

CASE I.—Two-minute exposure. Print shows—Right kidney: One large calculus, weighing 123½ grams, and 28 small ones. Left kidney: One calculus.

The print does not show another interesting appearance which is easily seen on the plate, and which is also seen in the skiagram of Case II. This is an apparent separation of half of the right transverse process of the first dorsal vertebra. This man had had no injury to the back.

CASE II.

This man was a collier, aged 32, who strained his back five years ago. The strain was caused by his lifting a tram of coal off his mate, who had fallen below it. He lifted this weight with his hands behind him underneath the tram, and his back against its side, and remained for some time supporting the weight until help arrived. He walked home, and worked for some days afterwards, but ever since has complained of pain in the left loin, and has not been able to do very heavy work. I took a skiagram of his left loin some months ago, when renal calculus was suspected, but did not notice any abnormality. He lately came to the out-patient department under Dr. Herbert Cook, and was again radiographed for stone. This plate showed both kidney regions clear, but several fractures of the right transverse processes of the lumbar vertebrae. The second, third, and fourth are separated from their bases and lying far below, and external to their normal position, though at the usual distance from each other. The tips of the processes remain blunt, while the inner ends of the separated part are thinned, or appear so in the plate. The tip of the fifth right transverse process has also been separated, but not displaced.

This man had received no blow, so that the fractures are