perfectly arrested by the pressure of thick compresses applied firmly over the tracks of the incision, supported by a suitable bandage. In six days these extensive incisions healed perfectly, without the slightest mishap, and with no more than the requisite degree of traumatic inflammation, and the young man was entirely relieved of his painful disease from the moment the operation was performed, and has never experienced a return of it, now more than ten years since.

Some two or three years after the above case was treated, a similar one came into the hands of the writer, which, after the free use of quinine and narcotics without relief, was treated by incision, and with like success.

SULPHATE OF QUININE IN THE TREATMENT OF SPONTANEOUS ERYSIPELAS OF THE FACE.

By Dr. PERROUD, Physician to the Hôtel Dieu de Lyon.
Translated from *Annales de Dermatol. et de Syphilig.*,
Deuxième Année, No. 4, by JAMES C. WHITE, M.D.,
Boston.

It is not the tonic, neurosthenic action of sulphate of quinine, nor its antiperiodic action that we have desired to take advantage of in the following experiments, but certain properties it possesses with regard to the globules of the blood, which have been the subject of interesting investigations. These investigations, as well as the researches lately made in connection with the erysipelatous process, have served us as a guide; and inasmuch as they have determined our therapeutics, it is necessary that we should recall them in a few words.

Two years ago* M. Vulpian, after Koster, Volkmann and Steudener, announced the presence of a great quantity of white blood corpuscles infiltrated throughout the skin of parts affected by erysipelas. This observation was soon confirmed, and it appears to be demonstrated to-day that the infiltration of the skin by a great quantity of leucocytes forms one of the principal elements of the erysipelatous process, and that to this is to be attributed, in great part, the swelling of the affected parts. It appears to be shown also that these leucocytes may be rapidly re-absorbed and disappear, for they are not to be found two or three days after the disappearance of the swelling; moreover, it may be seriously regarded as probable that these elements have not been formed in the parts thus affected,

but that they have penetrated thither by transudation through the walls of the vessels.

This last opinion is not incontestably admitted, we know, for many observers, among them K. Balogh, in Germany,* and Feltz, in France,† deny this transudation, because they have not been fortunate enough to witness it, but their negative observations are too few to weaken positive results, which are already numerous.

Without pretending to give a complete account, it will be remembered that in 1846 M. Waller, of London, announced in the *Philosophical Magazine* that he had seen the white corpuscles of the blood pass through the walls of the vessels where no previous rupture existed. This observation remained unnoticed until within the last few years Conheim, in Berlin, Stricker,‡ Prussach, in Vienna, and others, have investigated the subject, and arrived at the same conclusions. Other observers, too, have confirmed the results obtained by these German microscopists. Among French physicians may be mentioned Flayem and Vulpian,§ and before them Lortet|| and Ranvier,¶ the first of whom demonstrated that the white corpuscles are able to traverse animal membranes (the swimming bladder of fishes), and the second that they were able to gain entrance within the pith of the elder and its cells, and that it is even possible at times to determine their presence within epithelial cells, whither they have penetrated.

It appears to be proved, then, that leucocytes may be extravasated without previous rupture of the capillaries, and it is extremely probable, as we have above stated, that this extravasation constitutes one of the principal elements of the erysipelatous process. On the other hand, M. Lortet has taught us that the amiboid movements of the white corpuscles of the blood are necessary to their penetration through the tissues; that a young and healthy pus easily extravasates; that an old pus, the leucocytes of which are sick or dead, extravasates badly or not at all. If, then, we are able to lessen the vitality of the white corpuscles of the blood and to diminish the movements of their protoplasm by a drug, it is to be presumed that

* Balogh, *Archives de Physiologie*, 1869, p. 152.

† Feltz, *Journal de Robin*, 1870.

‡ *Journal de l'Anatomie et de Physiologie de Robin*, 1867.

§ Académie de Médecine, Séance du 15 Février, 1870.

|| Lortet, *Annales de la Société des Sciences Médicales de Lyon*, 1868.

¶ Ranvier, *Comptes Rendus de la Société de Biologie*, 1868.

* *Archives de Physiologie*, 1868.

their extravasation would become impossible, and that the erysipelatous process would find itself by this means blocked, or even completely arrested.

The problem reduces itself, then, to find a substance capable of destroying the amiboid movements of the leucocytes in such doses that it may not be poisonous to the patient.

M. Binz* has devoted himself to this class of researches, and has studied the influence of various solutions, not only upon the vitality of infusoria, but of leucocytes held in suspension in serum, and has thus come to class the salts of quinine among the most poisonous. A solution of hydrochlorate of quinine one part in 800 immediately kills large infusoria, one part in 2000 causes them to perish in a few minutes, and one in 20,000 in a few hours. The effect upon the white corpuscles is the same; if one adds to perfectly pure serum a drop of blood taken from an animal in full digestion, the amiboid movements may be seen to take place without hindrance; but if this experiment is repeated with serum containing $\frac{1}{2000}$ of hydrochlorate of quinine the movements of the white corpuscles are seen to be arrested without the least alteration in the red globules.

These data would naturally lead to the employment of quinine whenever a pathological tendency to the extravasation of leucocytes exists, in a great number of inflammations for example, and especially in erysipelas. But in what dose shall it be administered?

M. Binz, without approaching the question of erysipelas, thinks that in order to arrest the progress of a suppurative peritonitis it would be necessary to give 12 to 15 grammes of hydrochlorate of quinine in twenty-four hours; but it seems to us that, in erysipelas at least, so large a dose is unnecessary. We know that a solution one part in 2000 will at once put a stop to the amiboid movement of the leucocytes, and that one part in 20,000 will arrest it after some hours. We know, too, that the quantity of blood in a person is about one kilogramme to 10 or 13 kilogrammes of the solid parts, and consequently that a person weighing 70 kilogrammes has 7 kilogrammes of blood. A dose of quinine expressed by the fraction $\frac{1}{2000}$ or even $\frac{1}{20000}$ ought, then, to be enough to influence the white corpuscles sufficiently and to render their extravasation difficult or even impossible.

It is upon these data that we have based

* Binz, Sur la Mode d'Action de la Quinine, dans les Archives de Physiologie, 1868.

our administration of quinine in the dose of 30 to 40 centigrammes daily, a spoonful every half hour, in order to keep the patient under the persistent and prolonged action of the remedy. We have not used the hydrochlorate of quinine, however, for this salt, although the most soluble and most easily absorbed, we have been unable to procure, and have employed the sulphate so much employed in hospitals. Sulphate of quinine not being destroyed in the circulating stream and being found again in the urine, we might expect a direct action on its part upon the leucocytes during its passage through the blood, and consequently a happy influence upon the course of the erysipelas. These expectations have not been disappointed.*

From all these facts it follows that sulphate of quinine, like all treatment, has its indications and counter-indications in erysipelas. We have tried to show some of the circumstances which interfere with its action; but we have also wished to show that it possesses other than its neurosthenic and antiperiodic properties which may be used to advantage. Is it now really its antidiffusant action upon leucocytes which makes it so valuable in erysipelas? We are unable to affirm this at present. We need more observations and to apply a sort of counter-proof with other substances of reputed poisonous action upon the white corpuscles of the blood; but it may be affirmed that this hypothesis is in no way improbable, that pathological anatomy and physiological experiment give it an incontestable support, and that clinical observation is not unfavorable to it.

We believe, therefore, that we are able to conclude, from the preceding facts, that

1st. Sulphate of quinine, administered in moderate and fractional doses, promptly and completely arrests the course of non-traumatic erysipelas of the face, and extinguishes it most frequently on the second or third day of its employment;

2d. The effects of this drug are less evident in erratic cases of the disease and in those which are influenced by other constitutional affections, like rheumatism;

3d. The recent investigations of microscopists upon the diffusion of leucocytes suggest that it is by opposing this diffusion that sulphate of quinine acts upon erysipelas;

4th. It will be interesting to study clini-

* Here follow the details of numerous cases of erysipelas treated in this manner, and observations on the effect of quinine upon the pulse in this disease, illustrated by syphygmographic cuts, at too great length for insertion in the Journal.—TRANSLATOR.

cally, as a means of controlling this hypothesis, the action of other substances which experimentation has shown to be unfavorable to the diffusion of the white corpuscles of the blood. We reserve, however, for the present the publication of the researches we have undertaken in reference to this point with perchloride of iron.

RESULTS OF THE INJECTION OF PARASITIC SPORES INTO THE BLOOD OF ANIMALS.

By A. H. NICHOLS, M.D., Boston.

THE interesting discoveries of Hellier, Zürn, Chanveau and Davaine, that there is contained in the blood in several contagious diseases numerous parasitic growths, known as micrococcus, mycothrix, leptothrix, &c., has stimulated further investigations in this comparatively new field, among the more recent of which are those of E. Semmer, Prosector at the Veterinary Institute at Dorpat, reported at length in *Virchow's Archiv* for April 16, 1870. His experiments consisted first in the repeated examinations of the blood of animals which had died of contagious diseases, with the view of detecting therein any parasitic growths, and his results may be briefly summed up as follows.

In cases of glanders, micrococcus cells and bacteridiæ are found in the blood, lymph and pus of animals which have died of this disease.

In charbon (malignant vesicle) and septicæmia, the blood is found to contain numerous micrococcus cells, and bacteridiæ (mycothrix and leptothrix), both in the form of simple filaments and also arranged together so as to form a chain, the latter growths having been long known under different names.

That these infusoria, having the form of slender cylindrical filaments, really are parasitic growths, was proved in the case of five pigs, which had died of septicæmia.

In the blood of these animals, the actual growth of the filaments from the micrococcus cells was demonstrated under the microscope. The bacteridiæ seen in cases of charbon are for the most part shorter, more slender, and have a less distinct outline, than those found in septicæmia, where they vary in length, and consist of a single well-defined filament, and are at the same time less numerous than in the former disease.

These filaments, however, are not always of the same form, even in charbon, for here also variations are noticed, so that at times

the parasitic growths in this disease resemble both in form and size those found in septicæmia.

These parasites, moreover, are found in other diseases characterized by blood poisoning, and even in the blood of some healthy animals a few micrococcus cells (penicellium glaucum) have been found, and in other cases both leptothrix and micrococcus (bacteridiæ) have been seen in the liver and intestines.

In order next to determine whether the contagious diseases above referred to are really caused by the parasites found in the blood, the author has tried a series of experiments with the following results.

Penicellium spores of the size of a red blood corpuscle were mixed with distilled water, and then injected by means of a small subcutaneous syringe into the jugular veins of two colts. The animals remained perfectly well, however, after the injection.

Several weeks later, micrococcus cells were injected into the same animals, and here again the injections were not followed by any symptoms of disease.

Injections of anthrococcus cells were likewise followed by negative results.

A second series of injections was next made with large masses of the spores of penicellium glaucum. In these cases slight feverish symptoms were created, which soon disappeared, however, and upon an examination of the animals after they had been killed, all the organs and textures of the body were found to be quite normal.

The author next injected bacteridiæ from the blood of an animal affected with charbon, using in this instance a bottle with a glass tube attached, as recommended by Hallier.

The spores of this parasite were put into distilled water, and a few drops of this mixture were then forced into the jugular vein of a colt. At the end of five days the animal remained to all appearance quite well.

Five days after the first injection, two ounces of the same fluid, containing bacteridiæ and micrococcus cells, were thrown into the jugular vein of the same animal, by means of a large syringe, armed with a small needle-like canula. This was followed by symptoms of fever, without loss of appetite, and the animal appeared soon to recover. On the tenth day after the inoculation, however, fever again set in, the appetite failed, the animal exhibited an unsteady gait, and died during the night.