sterilised virgin soils it died out. These observations are verified and extended. The temperature at which the experiments were conducted appeared to exert only slight influence on the results. The labour of recovering the typhoid bacillus from soil not sterilised is very great, but Dr. Martin records a single experiment in which he succeeded in recovering the typhoid bacillus from an unsterilised soil, fifty days after its inoculation. This is undoubtedly a most valuable contribution, and should encourage Dr. Martin to continue his experiments.

MICROBES ASSOCIATED WITH SCARLATINA.

Dr. Klein makes a further report on the streptococcus, named *S. scarlatinæ* or *conglomeratus*, isolated by him from the throat and nasal discharge of patients suffering from scarlatina. It is not found in the desquamating skin, urine, or aural discharge. Dr. Klein expresses the opinion that it is the persistence of this organism in the throat of patients discharged as cured which gives rise to the "return cases." He emphasises his observation that it has the power of forming acid in milk and of clotting that medium in from one to three days. Illustrations of its growth in various media are appended.

GLYCERINATED CALF LYMPH.

Dr. F. R. Blaxall gives an account of a year's further experience in vaccinating the calf, collecting the lymph, and glycerinating it. The success of glycerinating was in nearly all cases complete within four weeks. Where cultures showed it to be non-sterile, at the end of that period the bacterium proved to be either *B. subtilis* or *B. m-sentericus vulgatus*. These, however, could be excluded by scrupulous attention to the cleansing of the vaccinated area. Dr. Blaxall also found that added tubercle bacilli died out at the end of a month in the glycerinated vaccine, and were incapable of infecting the guinea-pig. Also, in his experience, at the end of nine months such glycerinated lymph was invariably successful when used on infants.

THE MICROBES ASSOCIATED WITH VARIOLA.

Dr. Klein describes additional experiments which he has made on the *B. albus*, a bacillus isolated by him from the scabs of human variola; cultures of this micro-organism were injected subcutaneously into calves and monkeys. In neither animal was any marked effect, either local or constitutional, produced. The monkeys died of some form of diarrhoea, but the calves recovered, and were all found at the end of four or five weeks from the termination of the experiment to be in no way protected against typical vaccinia when vaccinated with animal vaccine lymph.

INVESTIGATIONS ON MALARIA IN ITALY.

REPORT BY PROFESSOR CELLI.

(Concluded from page 96.)

PROFESSOR CELLI stated that the parasite of spring tertian is now cultivated in the body of *Anopheles claviger*. Fermi has tested a hundred substances believed to have "culicifuge" properties, using them in the form of inunction, which is best adapted to the habits and the necessities of life in the open air of the workers in the season and in places where malaria is rife. He has thus demonstrated that two substances at least have all the necessary qualities for this purpose, and with them he proposes to make extensive prophylactic experiments on man in the coming malarial season.

This year Celli himself has been able to make an experiment on a large scale on the prophylaxis of bovine malaria in two contiguous farms worked by Lombards. In the Cervelletta farm, where the disease was formerly very prevalent, all the cows were always kept in the stalls, to prevent them being attacked by ticks, and if any of these appeared it was quickly removed. Regular treatment with arsenic was also adopted.

In the whole of this farm, which is a very large one, not a single animal suffered from malaria, while in the contiguous farm of Roca di Leoni, where no prophylaxis was carried out, and the cows were allowed to graze in the fields, in one week all were taken ill and 54 per cent. of them died from malaria;

Grassi found in one an enormous quantity of the *riphocephalus*, the same species of tick which in America propagates the same disease.

The financial importance of these experiments is evident. In comparatively recent times bovine malaria has killed in the Roman Campagna whole herds of milch cows, and destroyed extensive irrigation works, and large industries in cheese-making. To-day science can suggest means of avoiding these disasters and to repair them.

With regard to natural immunity, two years ago Celli and Santori found that inoculations of the serum of the blood of animals immune to every species of malaria sometimes succeeded in lengthening the period of incubation of experimental malaria.

The researches, continued throughout the past fever season, have given the following results:

1. The principles on which serum immunity and serum-therapy are founded are of no value for malarial infection. In fact, it is beyond question that the serum of the blood at the beginning of the fever contains a pyrogenic substance, and it is certain that the serum itself in the defervescence of the fever has not an immunising property either for the patient himself (active immunity) or for others (passive immunity), and on the latter it has no curative action, just as the serum of the blood of cases of spontaneous cure and of immune individuals has no immunising action. Celli and Santori are continuing the experiments to discover whether the cellular elements of the blood in the above-mentioned conditions contain some toxic principle, immunising or curative.

2. The inoculation, even frequently repeated, of the blood of bovine malaria does not protect man from malaria, as the serum of the blood of cattle cured of their malaria does not protect him.

3. Neither have experiments in regard to serum immunity with organic juices (brain, spleen, bone marrow) of cattle that live in a very healthy state in malarious regions, hitherto given results positively favourable for man.

4. The serum of the horse's blood treated for a long time with large progressive doses of quinine has proved to be inefficacious both as a preventive and a curative of malaria both in man and cattle. Immunity against the natural infection of malaria may be congenital or consecutive to long-continued disease. Congenital immunity may sometimes be maintained with a life of toil, with diminished feeding, with excessive work. Such immunity is more stable than when it is consecutive. It rarely resists experimental infection, that is, by inoculations of large doses of blood containing malarial parasites.

Dionisi has found parasites perfectly analogous to those of human malaria in some species of bats; that is, he has found a pigmented parasite similar to one of those of the spring fevers of man, and a parasite without pigment resembling that of æstivo-autumnal fevers of man. And Casagrandi, in his researches on malaria of animals of the Pontine marshes, has observed parasitic forms within the red corpuscle of a small mammal of the Campagna.

Dionisi also studied in the summer and autumn of last year how anæmia is established in the various malarial infections, what special characters it presents in the various febrile types, and what quantitative and qualitative alterations of the blood take place in nephritis from malaria and in hæmoglobinuria; while, on the other hand, Santori has prepared a map of malaria in the province of Rome, on the basis of the statistical and meteorological observations of the last decennium. All these investigations will be published *in extenso* in the *Transactions* of the Society.

Professor Celli concluded by referring to the fact that in India England has for the study of malaria placed such means at the disposal of Ross as to enable him to telegraph from Calcutta to Edinburgh a full account of his splendid researches. Germany has equipped, through the initiative of the Colonial Society, a grand scientific expedition with Koch at its head, who during the past summer visited Italy. Belgium has provided 50,000 francs for the study of malaria in the Congo. Italy, he said, where malaria keeps about 5 million acres uncultivated, and every year on an average attacks 2 millions of its most useful sons, and kills 85,000, cannot, must not, remain behind in this noble scientific competition.