favourable circumstances will make the attempt to see if colours can be made to afford a practical means of protection.

REFERENCES.

¹ *Practitioner*, March, 1901, p. 341. ² *Indian Medical Gazette*, April, 1901, p. 195. ³ *Arch. de Parasitologie*, May, 1901, p. 259.

A FURTHER NOTE ON THE BIOLOGICAL TEST FOR BLOOD AND ITS IMPORTANCE IN ZOOLOGICAL CLASSIFICATION.

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In a former number of the *BRITISH MEDICAL JOURNAL* I published a preliminary note regarding the results of experiments with specific antisera, a complete account of which appeared in the *Journal of Hygiene* for July. As stated in the latter publication we had gone a step further than mentioned in the preliminary note, finding it possible to detect human blood, or any other blood for which we had prepared a test serum, when that blood had been mixed with five or six other bloods, each blood in the mixture being present in the proportion of 1 to 500 or 1 to 600. In the papers above cited it was stated that 36 bloods had been tested. I have since tested 140 bloods, the result being consistent with what has been already described.

The 140 bloods tested were derived from all classes of vertebrates. None except monkey bloods gave a reaction with the antiserum for human blood. The monkey bloods tested were the following: Family *Cercopithecidae*, *Semnopithecus entellus* (India), *Cercopithecus Campbelli*, Waterh. (W. Africa), *C. patas* (W. Africa), *C. lalandi*, Is. Geoffr. (S. Africa), *C. diana* (W. Africa), *C. melogenys* (W. Africa), *C. callitricha* (W. Africa), *Macacus rhesus* (India, 3 blood samples); *M. cynomolgus* L. (India, 2 blood samples) *M. assamiensis* (India). Of the South American monkeys, family *Cebidae*, only two bloods have been tested: *Mycetes seniculus* (Colombia) and *Cebus albifrons* Geoffr. (South America).

All the bloods of the Old World monkeys gave a very marked reaction, less powerful, however, than that of human blood. They also reacted to weak antiserum. On the other hand, the South American monkeys gave but a slight reaction with human antiserum as compared with that of the other monkeys, and a weak antiserum produced no precipitation in the blood of *Mycetes seniculus*. Of course these tests require further study, but the result is in striking accord with the Darwinian theory as to the relationships existing between man and apes, the relation of the former, according to that theory, being closer to the Old World apes.

Tested on 140 bloods, the antiserum for dog's blood only gave a reaction with the blood of the jackal (*Canis mesomelas*) from South Africa. I have not as yet had an opportunity of testing the blood of other members of the canine family. None of the 140 bloods gave a reaction with the antiserum for horse blood; in this case no other members of the horse family were tried. The antisera for ox and sheep blood only gave a full reaction with their homologous bloods, besides the slight reactions already mentioned in my previous communication.

Further tests have shown that ox antiserum produces a slight reaction with the blood of the goat, and a faint clouding in that of the roebuck and Burrhel sheep (*Ovis Burrhel*, from the Himalayas, of which two samples were at my disposal). Sheep antiserum furthermore gave a marked reaction with the blood of the Burrhel sheep and of another wild species of sheep, a slight but distinct reaction with the blood of a goat, and a faint clouding with that of the roebuck.

My investigations have been greatly furthered by the kind interest of Mr. Frank E. Beddard, F.R.S., Prosector of the Zoological Society's Gardens, and his assistant, Mr. E. Ockenden, as also by friends in different parts of the world, whose assistance I shall take occasion to acknowledge more fully elsewhere. I shall be greatly indebted to any readers of this article who may aid in the prosecution of this work, which I contemplate pursuing on an extended scale. I shall

naturally fully acknowledge any aid which may be given. The object of my research is to gradually produce various antisera besides those already mentioned, and by means of them to study the reactions which take place with the bloods of various groups of animals. It seems certain that interesting results from the point of view of zoological classification will thus be brought to light. Apart from this, owing to the importance of the reaction from a medico-legal standpoint, the test should be applied to as large a number of bloods as possible. The method of collecting bloods for the above-mentioned purpose is exceedingly simple, and is as follows:

METHOD OF COLLECTING BLOOD.

Blood may be collected from dead or living animals. It does not matter which, nor does it have any effect on the test if the animals have been dead as long as twenty-four hours, except in tropical countries. The method is so simple that sportsmen can readily collect samples whilst out shooting. The method consists in soaking up the blood (avoiding clots) upon strips of pure filter paper about 3 inches wide by 5 inches long.

One end of the strip is left clean, so that the name of the animal (both common and scientific), the date, place (of collection or natural habitat) and name of the collector can be noted thereon in lead pencil. The notes should be written clearly, this being facilitated by resting the paper upon a hard surface. The strips of paper dry rapidly when suspended in the air (sunlight can be used for hastening the drying) by being pinned against the edge of a table, shelf, or upon the branch of a tree. Strips of paper saturated with different bloods should not be brought in contact with one another in a moist state. If the collector is unable to wait for the strips to dry he can place them between sheets of impervious paraffined paper. The whole outfit can be carried in an ordinary envelope. When the strips have dried thoroughly, they may be folded and placed together in an envelope for transmission, at the collector's convenience, as an ordinary letter through the mails. It does not matter if the dried strips have been preserved for a month or two before being sent.

One strip of paper saturated with each kind of blood will suffice for the purposes of the investigation. I shall be happy to forward strips of filter paper, etc., to those who may be interested or willing to collect. Blood samples may be addressed to me as noted.

If it is desired to collect bloods from living animals this can be readily accomplished by pricking the skin with a needle, and soaking up a few drops on different parts of the filter paper.

INOCULATION AND THE INCUBATION STAGE OF PLAGUE.

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DR. CALMETTE is reported to have given it as his opinion that a person in the period of incubation for a slight attack of plague would find the disease considerably aggravated if he submitted during this period to a preventive inoculation of Haffkine's vaccine. The case would almost certainly end fatally.¹

The same opinion is again urged in the third Harben Lecture,² lately delivered by Calmette in London, and the advice given to refrain from inoculating those in direct contact with a plague case, though the measure is recommended as a means of immunising a population living round a plague centre.

As Haffkine, on the contrary, has all along maintained that inoculation with his vaccine is harmless in the incubation period of plague, and that this method of protection should be pushed with the utmost vigour amongst those immediately in contact with plague cases, it becomes necessary to examine this matter afresh, in the light of the extensive experience gained in India and elsewhere in the use of the plague prophylactic.

Calmette's ideas have been derived from laboratory experiments, for he has had no opportunity of studying the effect of plague vaccination during an epidemic among human beings. In India, on the contrary, hundreds of thousands of persons have been inoculated with Haffkine's plague vaccine,