states that the lesions resemble burns of the first and second degree, that is to say, there is erythema with some vesication, with a considerable amount of pain. His treatment consisted in the use of lead lotion or of zinc carbolic lotion (zinc oxide drs. 3, suspended with glycerine ozs. 1 in 1 per cent. carbolic acid solution to ozs. 8), applied on lint or sponged on. He points out that grease of any sort increases the discomfort. As the symptoms subside, which he states they rapidly do, a simple dusting powder is used, the affected parts being left uncovered in warm weather, a cradle being used to support blankets if these must be used.

Schrwald (Veratzung durch Benzin, *Deutsche Med. Wochenschrift,* 1913, August) states that benzine causes marked erosion and even necrosis if brought into contact with the skin in such a way that its evaporation is prevented or delayed. This, he points out, has been observed in cases of abdominal operations when part of the benzine used for disinfection flowed down to the sacral region, to the buttocks and behind the thighs where it could not readily evaporate. The effect was also noted when lumbar puncture wounds were covered with gauze saturated in benzine and fixed with adhesive tape; also in cleaning the lobe of the ear with benzine when some of it flowed into the ear giving rise after a few minutes to severe pain. As he points out, no therapeutic use has yet been made of this property of benzine.

SOME OBSERVATIONS ON THE PREPARATION AND EXAMINATION OF THICK FILMS FOR MALARIA PARASITES.

By R. A. MURPHY, L.R.C.P. & S.I.,
Luskerpore Valley Medical Association, Chandpur Bagan P. O., South Sylhet.

IN a country such as Assam where malaria is endemic it is imperative for the doctor to ascertain whether his patient is infected with the parasite of this disease, even although such may not be the primary cause of the illness. The information however, can only be conclusively obtained from blood films, and if these cannot be prepared and examined with confidence, the patient will suffer from the lack of a precise diagnosis.

In the days when only thin films were used, findings used to be somewhat discouraging, for hours might be expended on some preparation, and nothing found, although the diagnosis was clearly malaria, confirmed, perhaps, by films taken subsequently.

The introduction of the thick film method marked a great advance, for although it has difficulties of its own, and some experience is required to make good use of it, the infections are few in which it is not possible to ascertain within a very few minutes that parasites are present, even though the appearance may not be very typical, nor the species a certainty.

The rapidity with which parasites can be found in thick films is not entirely due to the greater quantity of blood which can be examined in a given time, but is largely due to the fact that fields can be rapidly passed over, the parasites standing out so definitely on the clear, or faintly stained background. Moreover, the parasites most likely to be missed in a thin film are the small *P. falciparum* rings, either because, on account of their minuteness, they require careful focussing to pick them up, or because they sometimes take the stain badly. But in a thick film they stain well, and the ring appearance is better preserved. Not infrequently the thick film will show the young rings of this species in large numbers, and yet in the thin film they will only be seen with great difficulty, or may appear not to have taken the stain at all. The Romanowsky stain in the hands of the expert in a laboratory may be absolutely reliable, but in general use it is fickle, and the causes are hard to find. One part of a thin film may show well-stained parasites, while in another part they are not stained at all.

One of the simplest methods, and suitable for those in general practice, is to make the thick film at one end of a slide, and make also a thin film on the same slide, about three quarters of an inch separating the two films. The thick film may be made by taking four drops of blood and joining them, as generally advised, but quite good results can be got by taking one large drop and spreading it to the correct thickness. It should be especially thinned out at the edges, and young parasites will be best seen there. To stain, the films are divided by a grease line, and after double the quantity of water has been mixed with Romanowsky stain on the thin film, it is drawn over the line on to the thick.

It cannot be over-emphasised that to get the best results with thick films they must not be too thick, and they must be clean. It is difficult to define the required thickness, but when stained the thick film should appear to the naked eye very little thicker than the thin. The care necessary for the cleanliness requisite is not easy to teach to some, but the method largely loses its value if continual halts have to be made to examine foreign matter. The films must be very carefully protected, especially while drying, against dust and insects.

In thicker parts of a film the young *P. falciparum* rings do not show up well, but may be spotted as faint blue rings. In the thinner parts they are seen with great distinctness, both nucleus and protoplasm deeply stained, making well-formed rings. The large number, early division of the nucleus, and small size help to indicate the species. Other species do not show such small delicate rings, but

P. falciparum may on occasion show up as fairly large substantial looking rings. Older forms are not uncommonly seen in thick films, and, as pointed out by Knowles, even the sporulating stage is not infrequent, and these are quickly picked up by the small compact mass of pigment. The spores may be well-stained in every detail, or only pigment and protoplasm may be apparent. These older forms can with diligence often be confirmed in the thin film, and one of the advantages of the thick film is that it quickly indicates whether a prolonged search of the thin film is likely to be rewarded. Incidentally, this also holds for *Piroplasma* infection in animals. It is well to bear in mind that the more mature forms of *P. falciparum* may be found, or they are liable to be miscalled *P. malariæ*.

Crescents are easily detected, but may appear foreshortened, even to the extent of a round mass of protoplasm surrounding the pigment, and then may be mistaken for sporulating parasites, but the pigment is more diffuse than in the latter. The ingested pigment of the mature schizont is shown very strikingly in the leucocytes, and the little mass with its characteristic size, shape and hue is unmistakable. In heavy infections this pigment may be so plentiful that at first glance the film might be condemned as dirty.

P. vivax appears according to type, but where a film is too thick only the protoplasm may be obvious, and in half-grown parasites this may be broken up into two or more rounded blue masses. The larger size of this species, and the fine light brown pigment, are distinctive, and the pigment contrasts strongly with the heavy black pigment of *P. malariæ*.

Diagnosis of species from thick films alone does not come easily at first, but as experience is gained most parasites can be placed correctly. If one film is used as a complement of the other, the proportion of error remaining will not be sufficient to invalidate percentages drawn from a series of observations.

ON THE RÔLE OF *ARGAS PERSICUS* OKU, IN THE TRANSMISSION OF *PASTEURELLA AVICIDA*.

By B. C. BASU, M.SC.,

Entomologist, Spirochætosis Transmission Enquiry, Calcutta School of Tropical Medicine.

Pasteurella avicida is the causative organism of chicken cholera or fowl plague, which frequently affects these birds in sudden epidemic form.

Moritz in 1869 first noticed certain "granulations" as he termed them, in the bodies of birds which had died from this disease. Nine years later Perroncito sketched the microbe. Detailed observations were not made on the disease until 1879-80, when Toussaint demonstrated that a microbe was the cause of the infectivity of the blood, and Pasteur observed that birds, when fed upon the smallest drop of a recent culture of the micro-organism, became infected via the alimentary canal, and that the infected excreta were a cause of contagion to clean fowls.

In the present paper the writer gives the results of observations made in 1928 as to the rôle of ectoparasites of fowls in the transmission of this disease. For this purpose the common fowl ticks, *Argas persicus* Oku, were collected from Calcutta fowl houses, and fed on birds infected with *Pasteurella avicida*. In order to infect the fowls, as a rule 200 million Pasteurella from a 24-hour culture were inoculated intravenously. Invariably, as tested in ten fowls, Pasteurella was isolated in blood cultures from such inoculated birds, ten hours after the intravenous injection.

Eight "clean" fowls were taken, and blood cultures taken from each to make certain that they were free from Pasteurella infection; in all, the cultures remained sterile. These eight birds were now made to ingest ticks, which had been fed from 1 to 20 days previously on fowls suffering from Pasteurella infection. After this the blood of each fowl was cultured daily till the bird died.

Of these 8 birds, 1 died the day after the injection. Of the remaining 7, 2 became infected. One bird, which had ingested 30 ticks fed 4 days previously on a Pasteurella-infected bird, became infected 3 days after swallowing the infected ticks; and the second fowl, which had ingested 50 ticks fed 1 day previously on a Pasteurella-infected bird, became infected on the second day after the feed. Fowls thus infected lived as long as 7 days after the first appearance of Pasteurella infection in the blood stream, whereas, on the other hand, birds inoculated intravenously with culture usually die within six hours or so of the injection, which proves rapidly fatal. (In all these experiments care was taken that there should be no chance of the birds becoming infected by the dejecta of infected birds contaminating their cages or food, and being swallowed.)

In Nature fowls are rather fond of picking up and eating ticks, and it seems possible that Pasteurella infection might be acquired in this manner. On the other hand naturally acquired Pasteurella infections are apt to be extremely virulent and to kill rapidly, whereas the infections contracted by ingesting infected ticks are milder and less rapidly fatal. It would appear that there is some loss of virulence of *Pasteurella avicida* in the gut of *Argas persicus*.

Cimex hemiptera, the common bed-bug is frequently found in fowl houses and feeds readily on fowls. Experiments were carried out to see whether it was possible for Pasteurella infection to be acquired by ingesting infected bed-bugs. Three clean fowls were made to swallow bed-bugs fed from 1 to 3 days previously on Pasteurella-infected birds. None of them became infected. It seems probable that