siderable extent to make room for a railway and other buildings in connection with a route to the gold fields, 25 people, Creoles and others, who had been living here for periods of two to ten years, on examination all gave negative results. As already stated by Daniels, negroes and others after living in appropriate parts of the interior are quite liable to infection, and this was confirmed by the fact of 3 out of 5 pure-blooded negroes who lived in the forest of the Pomeroun river being infected.

St. Vincent.—The conditions and prevalence of the parasite here resemble that in St. Lucia, cases not being found in people living permanently in Kingstown, the chief town of the island, but only in some country villages and districts. In Calliaqua, a village situated on the coast on sandy soil, with swampy ground between it and the sea, scrubby bush and swamps at its sides, and a background of rising hills, 8 out of 30 people, or 26.6 per cent., were found to be infected.

PATHOLOGY.

The presence of the parental and embryonic forms of filaria Demarquaii seems to give rise to no pathological effects or clinical symptoms, the diagnosis being made only by an examination of the blood. As the habitat of the parent is in the loose connective tissue of the peritoneum, with perhaps the exception of setting up some slight local inflammation on its death, it cannot do much harm, as it does not implicate important structures, as in the case of filaria nocturna. Through the kindness of the doctors in the Colonial hospital of Georgetown, Demerara, a necropsy of an Indian, who had during life a few sharp-tailed embryos in his blood, was obtained; though a prolonged search of some hours was made the parental forms were not found.

It may be noted here in regard to the question of relationship between filaria perstans and sleeping sickness, that though the parasite, as has been shown above, abounds in the interior of British Guiana no cases of this disease were seen and the Indians were unaware of its existence. Mr. Perkins, acting commissioner of gold mines, who has travelled extensively in the interior, informed me that he had never seen or heard of such cases amongst the Indians.

THE INTERMEDIATE HOST.

On the analogy of the different species of filariae whose life-history has been completely worked out, namely, filaria nocturna, filaria immitis and filaria recondita, filaria Demarquaii must also possess an intermediate host to allow of the further development and growth of the embryos and their reintroduction into man. While in St. Lucia I found by direct infection experiments on mosquitos reared from larvae, *Culex fatigans*, *Stegomyia fasciata*, *Culex taeniatu*s, and *Anopheles albipes*, to be inefficient as intermediate hosts for this parasite and lately in British Guiana several other insects, mosquitos and others were examined in an Indian settlement on the Pomeroun river in the interior of British Guiana with negative results, 71 per cent. of the inhabitants being infected with sharp or blunt-tailed parasites. The blood-sucking insects were caught when they came to feed at night, as it was impossible to rear all those from larvae. The commonest night feeder there was a small chocolate brown mosquito with palps as long as its proboscis, not, however, resembling an *Anopheles*; it may represent a new genus altogether. Over 30 of these were dissected, but with the exception of a few dead embryos in the semi-digested stomach blood of one, none were seen in any of the other tissues, thus showing them to be inefficient. A large yellow mosquito resembling an *aedes* was another fairly common form, and it gave similar results to the former, in two instances dead and degenerated blunt and sharp-tailed embryos being seen in the stomach blood. Many other mosquitos of the rarer genera frequented the huts and fed readily on the inmates; but though nothing was found in those dissected, yet the numbers were much too small positively to exclude them. Twelve fleas (*Pulex irritans*) and many chiggers (*Pulex penetrans*) from infected cases were examined but nothing was ever noted in them.

Though these observations were all negative some blood-sucking insect must nevertheless act as an intermediate host, and from the facts stated above, in reference to the sharply-defined country or forest areas in which persons infected by

the parasite occur, it is very likely that it is an insect or insects with a similarly restricted distribution possibly only occurring at certain seasons of the year.

REFERENCES.

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THE SUCTORIAL BULB IN "CULEX."

By G. TREVOR COLLINGWOOD,
Staff Surgeon R.N.

In the following article is given a short description of the oesophageal or suctorial bulb and the apparently loose connection of its tubular part with the basal end of the epipharynx or suctorial tube in the head of *Culex*, female.

The figures are from slides. Fig. 1 shows the position of the oesophageal bulb (i) beneath the so-called occiput in the head of a female *Culex*. The fine-ringed salivary duct passing from the basal sac-like dilatation of the fine central canal or groove of the poison stylet or hypopharynx can also be seen. The ordinary mouth parts have been cut off short.

The bulb if carefully separated out from a fresh specimen under a hand microscope, and then put under a cover glass with glycerine and subjected to gentle pressure will frequently divide into three parts, as shown in Fig. 2. It is therefore apparently an organ with three sides. Under a high power the edges of each piece will be seen to be striated whilst the central parts are quite plain.

Fig. 1.—a, labium, lower lip; b, hypopharynx (small piece only seen); m, central canal; c, epipharynx; d, labium, upper lip; e, antenna; f, basal support of antenna; g, basal dilatation of epipharynx; h, tubular part of bulb; i, bulb oesophageal; j, sac-like dilatation of hypopharynx; k, ringed salivary duct; l, maxillary palpi. The mandibles and maxillae are not shown; the compound eyes have been smashed up in the preparation.

Fig. 2.—Three plates into which the bulb separates.

In front the bulb is tubular, and is adjacent to, though apparently not structurally continuous with, the expanded basal end of the epipharynx (suctorial tube) which in this position is peculiarly constructed; and also apparently fringed as if to act as a sort of strainer. The delicately-fringed appearance of the bulb behind is apparently not

caused by its being torn away from any other structure. It is always present in fresh specimens. Its function I do not know.

I believe the function of this bulb has not been definitely settled; still its position and structure would lead one to suppose that it was suctorial. In Bermuda I frequently caught specimens that had just fed, and mounting them quickly, found blood corpuscles in the epipharynx, but I never found any in the bulb itself.

This bulb is also present in the head of the male *Culex*, but is perhaps not quite so well developed. In the male the hypopharynx lies on the sheath or labium, and more or less coalesces with it, especially at the pointed distal part between the lateral labellae. The mandibles and maxillae are practically absent. The fine central canal or groove in the hypopharynx terminates, as in the female, in a small sac at its basal end, from which runs a fine-ringed salivary duct. It would therefore, I think, be very interesting to know the minute anatomy of those few male species that are credited with the power of biting and sucking blood, for if the same arrangement of the mouth parts exists in them as in the male specimens (*Culex*) that I have examined, I should not think that they could possibly perform the operation satisfactorily.

NOTES ON LIGHTNING-STROKE IN SOUTH AFRICA.

By CAPTAIN J. G. BERNE, R.A.M.C.,
Eastern Transvaal.

THE frequency with which men and animals have been struck by lightning in South Africa is in my experience remarkable. Thunderstorms are frequent and very violent during the wet or summer months in South Africa—November to April—and it may be taken as a general rule that the more mountainous the country the more frequent and severe the lightning. For instance, the districts of Wepener and Rouxville in the Free State, skirting the borders of Basutoland, are the scenes of very frequent thunderstorms; and in the Transvaal, the Wakkerstroom and Piet Retief districts, which lie close to the Swaziland border, are subject to the same atmospheric disturbances. Natal, a very mountainous colony, is notorious for its thunderstorms.

During General Plumer's operations in the neighbourhood of Wepener in September, 1901, a tent was struck by lightning, and four men out of six were injured. These men were seen by me shortly after the accident. They were sleeping in the tent with their feet towards the centre pole, and it appeared that the lightning struck the tent and passed down the wooden pole. In two cases the current seemed to have passed along the legs of the men, and to have passed out about the buttocks, causing severe burning of the superficial tissues. In the third case, the man described the injury as like a severe blow on the head, and complained of a severe headache. A circular wound was found at the occiput about the size of a florin, with a burnt track half an inch wide leading down towards the neck as far as the termination of the hair. The fourth case was slight, and beyond a feeling of an electric shock, the man was quite well. These three cases presented symptoms of shock, and there was extensive burning of the underclothing. I am unable to give details of the further progress of the men, as they were transferred to the civil hospital at Mafeking, in Basutoland, two days later.

A point which I wish to bring to notice is the peculiar smell which is always present when lightning is at all severe; it was very marked in this instance when I came into the tent, not the smell of burnt clothes or charred flesh, but a smell like dilute sulphuric acid.

The following are the notes of a case which occurred in the Eastern Transvaal:

On the evening of November 17th a patrol of about 500 men were returning to camp after a night march, when between 5 and 6 P.M. the worst thunderstorm which I have seen in South Africa broke over our heads. Fortunately for us, it was accompanied by a tropical downpour of rain, which must have saved a good many of us from being struck. In this storm, one officer and two men were badly hit, and several of

us experienced slight shocks. Lieutenant-Colonel Porter, R.A.M.C., describes his symptoms and experiences during the storm as follows:

I saw the flash of lightning coming towards me rather high up; it then seemed to me to come straight down over my head. The flash was rather circular in shape and pink in colour. I received a blow on the top of the head, just as if I had been struck by a mallet. I was knocked forward on my horse, and at that time my horse gave a jump forward, and he no doubt received the shock. For several days I had pain all over the scalp and down the back of my neck: pains were severe and neuralgic in character.

A number of men were struck quite close to me, one of whom was carrying a log of wood on his right shoulder. The wood was split, and he was knocked from his horse. He was found to be afterwards suffering from paralysis of the right side, almost complete (both sensory and motor); next day he had somewhat recovered, and had slight power of grip in hand.

Sensation was gradually returning when I saw him last, and power of movement—arm and leg—had slightly improved. All the other men who received the shock recovered in a few hours. Prior to the flash there had been heavy rain for about two hours, and at the time we were struck the horses were over their hoofs in water. Had the ground been dry at the time, I think in all probability we would have had some fatal cases amongst those struck.

The slighter cases are of interest in the fact that some of us, including myself, had a distinct sensation of a most peculiar taste in the mouth. In my own case I cannot describe it better than that of the inhalation of burning sulphur.

Probably in the first instance the fact that the men who were struck in the tent were dry, and in the second instance all the men were thoroughly soaked, may help to explain the difference in the individual cases. The potential force of the electric current, of course, varies in different cases, and this may also account for the differences in results observed.

INOCULATION IN THE INCUBATION STAGE OF PLAGUE.

By ALICE M. CORTHORN, M.B., B.S.,
Special Medical Officer on Plague Duty, General Plague Hospital, Poona.

In reference to Major Bannerman's article and letter on inoculation in the incubation stage of plague, I think the following 4 cases which came under my notice in the epidemic of 1900 in this city may be of interest.

The first two cases occurred among the police force, which, in the epidemic of 1899 suffered very severely from the disease, having 147 attacks with 109 deaths.

In the epidemic of 1900 the district superintendent determined to have recourse to inoculation, and practically the whole force submitted to the operation. Seven cases with 6 deaths occurred among the non-inoculated before the completion of the operations, and 7 cases with 2 deaths only among the inoculated. Two of these were inoculated, if not with plague upon them, at a very late stage of incubation.

CASE I.—N. T., aged 25, police constable, inoculated October 3rd, 1900, was admitted into hospital October 9th with a history of six days fever and large fluctuating bubo in the right femoral region, which was opened the day after admission. He had slight fever for three days after admission, but was never acutely ill. He was discharged October 25th.

CASE II.—D. B., aged 36, police constable, inoculated October 16th, 1900. At this time dead rats were being found in Shanval Wada. He was admitted into hospital with plague October 20th, with a history of four days fever and a bubo in the right femoral region. He had six days fever after admission and albuminuria to $\frac{1}{4}$ for the same period, but was never delirious. The bubo suppurated with extensive sloughing, and his convalescence was slow. He was discharged cured December 17th, 1900.

CASE III.—M. T., Maratha, aged 30, was the hospital carpenter. He at first refused inoculation, but on October 3rd brought his wife suffering from plague into the hospital, and asked me the following day to inoculate him. This was done on October 5th. On the same day he also brought in his sister from the same address, also suffering from plague. On October 7th he was himself attacked, and had a very mild attack, with no delirium, and only a trace of albumen. He had a right femoral bubo which suppurated, but healed rapidly. He was discharged cured October 23rd. His wife and sister both had very severe attacks, with prolonged fever, delirium, and badly sloughing buboes, but eventually recovered. He said that six people lived in his house, all uninoculated except himself. No. 1, his mother, died; Nos. 2 and 3, his wife and sister, had severe plague and recovered; No. 4, himself, was inoculated in the incubation stage, and had a mild attack; Nos. 5 and 6 escaped. In the house on the right-hand side, 5 uninoculated persons died of plague, and in that on the left-hand side 3 died of plague.

CASE IV.—R. H., aged 30, shoemaker, was one of the most interesting of the series, but I have unfortunately mislaid the notes, and can only give a general account. 1447, Shukrawar Peter, where he resided, includes a number of single-room dwellings opening into a small court, of which the total population was about 60 people. The first case of plague here occurred in a woman who aborted and died on September 7th, 1900, in the room next to R. H.'s, from which it was divided by a canvas partition only. On September 10th, 1900, R. H., with five others, were inoculated. Plague continued to occur among the non-inoculated inhabitants