

died before his best work was done), and is called "*Trypanosoma Lewisii*." A drop of the blood of an infected rat examined under a high power of the microscope shows hundreds of the little screw-like parasites swimming and knocking the red blood-corpuscles about in a most active fashion. This is a case in which there is adjustment between the host and the parasite, for the rat is not injured by the presence of the trypanosome in its blood. After a time the trypanosome dies out, and the rat is none the worse, but has acquired such a condition of the blood that it cannot be re-infected. The rat trypanosome is carried by the rat-flea (the kind called *Ceratophyllus fasciatus*, common on European rats) from infected to uninfected rats. The parasite undergoes during six days elaborate changes and multiplication in the flea. The latter is a true host, not a mere mechanical carrier. It is being carefully studied by Professor Minchin, of the Lister Institute. The louse of the rat also can carry the trypanosome from one rat to another, but less certainly than the flea; and it seems that the rat louse is a mere carrier of this parasite, and that no important development of the trypanosome takes place in it; it is not a true host. Rats are also infested by "mites" or "acari," like the itch insect of man; and it has been shown by a beautiful series of observations that in the United States another microbian blood-parasite, called "*Hæmogregarini muris*," is carried by these mites from one rat to another, and undergoes a special and remarkable sexual process of multiplication in the body of the mite.

Whilst the rat-trypanosome of Lewis is harmless to the rats in whose blood it lives, and whilst there are other trypanosomes, such as those of the frog's blood and of the blood of many fishes, of turtles, and of birds, which are also harmless to their hosts, there are others which are known as the cause of deadly disease. The best known of these is that which is carried by the blood-sucking "tsetse fly," of the fly-belts of South Africa, and is conveyed by these flies from the blood of big, wild game animals (such as buffalo and antelopes), in which it exists without doing any harm, into the domesticated cattle, horses and dogs, which mankind has brought with him into this region. The wild animals are "reservoir hosts," from

which the flies continually spread the infection. In the domesticated introduced animals the trypanosome (which is named "*T. Brucei*," after its discoverer, Colonel Sir David Bruce) causes a fatal wasting disease called "nagana." It is not yet ascertained what changes this trypanosome *Brucei* undergoes in the tsetse fly's body, if any. It is certain that the tsetse fly acts very efficiently as a direct carrier, rapidly introducing the parasite from one animal to the next one which it bites, just as one may introduce it by means of a lancet.

Another trypanosome, called *T. Gambiense*, very like the *T. Brucei* but distinct, has been shown to be the cause of the deadly sleeping sickness of the natives of Tropical Africa (200,000 natives recently died of it in five years in Uganda), and it is carried by a similar but distinct kind of tsetse fly. Both the fly and the trypanosome are very close indeed in appearance to those concerned in the nagana disease of horses and cattle, and there is at this moment some fear that the southern tsetse fly may prove to be capable of spreading the sleeping sickness amongst the human inhabitants of Rhodesia and Southern Africa. It has proved very difficult to ascertain what happens to the trypanosome of sleeping sickness when it remains in the body of the fly, because there are often other kinds of trypanosomes present there, and confusion of one with the other is at first unavoidable. It is now certain that the parasite can remain active and capable of infecting a man for many weeks after it has been sucked up by the fly, although immediate transference to a new victim by the fly's bite is possible, if not usual.

These tsetse flies (called by scientific men "*Glossina*") are very awkward customers. They are a little bigger than a house-fly, powerful and rapid fliers. They alight on a man without his feeling it, bite at once, and are off. To escape their deadly attentions one must avoid the shady groves near lakes and streams where alone they are found—and groups of trees must be cut down on this account in the neighborhood of towns and villages in Central Africa. No "reservoir-host" or regular animal-host besides man has been discovered, as yet, for the sleeping sickness trypanosome, though not improbably one exists.