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Experimental Studies on Trypanosoma cruzi in California.

FAE DONAT WOOD. (Introduced by C. A. Kofoid.)

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The reduviid, *Triatoma protracta* Uhler, was reported to be a carrier of *Trypanosoma cruzi* Chagas, the haematozoon causing American human trypanosomiasis.[1] Examinations have revealed that the feces of 40 out of 73, or 54%, of a group of *Triatoma* from San Diego County were infected with *T. cruzi*. *Triatoma* from the vicinities of Berkeley and Los Angeles have not shown trypanosomes in their digestive tracts.

The San Diego wood rat has been incriminated as a reservoir host of *T. cruzi*. Of 43 rats examined only one was infected. This was a light infection and was detected by examination of centrifuged, citrated heart blood. The trypanosome infecting this rat was identical in morphology and behavior with that found in animals infected experimentally from *Triatoma* feces, and also with a known strain of *T. cruzi* from Professor Brumpt's Paris laboratory.

The southern parasitic mouse, the San Diego desert mouse, and the Virginia opossum, all associated with San Diego wood rats in nature, are more susceptible to the infection in the laboratory than the rats themselves, so it is possible that they, too, may be natural carriers of this trypanosome.

Portola wood rats, from Berkeley, harbor a trypanosome of the "lewisi" type which should not be confused with *T. cruzi*.

One hundred thirty-four animals, including 16 species, have been inoculated with the California strain of *T. cruzi*. The following list gives the species and number of animals inoculated, the number in parenthesis indicating how many animals became infected: 53 (30) albino Norway rats, 23 (7) albino mice, 2 (1) puppies, 2 (1) Virginia opossums, 4 (3) rhesus monkeys, 12 (7) San Diego wood rats, 3 (1) Portola wood rats, 5 species of white-footed mice [4 (4) parasitic, 9 (8) southern parasitic, 3 (3) San Diego desert, 5 (1) Gambel, 3 (1) Gilbert], 2 (0) rabbits, 6 (0) guinea pigs, 3 (0) kittens, and 1 (0) desert antelope ground squirrel.

Infection has been produced by the following methods of inoculation: infective *Triatoma* feces intraperitoneally, subcutaneously, intramuscularly, in the eyes, mouth, or on scarified skin; citrated

[1] Kofoid, C. A., and Donat, F., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 489.

blood intraperitoneally, subcutaneously, or intramuscularly; and culture forms intraperitoneally.

Groups of leishmaniform bodies have been found in bone marrow and cardiac and voluntary muscles of infected animals. Lesions composed of infiltrating lymphocytes, monocytes, and plasma cells were seen in cardiac and voluntary muscles, cerebrum, and meninges. Some cases have shown fatty degeneration of the liver.

The parasites, both in the blood and in the tissues, have been very scarce in most cases. The only animal to show any symptoms, namely retarded growth and the temporary paralysis of the hind legs, was the southern parasitic mouse. In no case was the disease fatal.

Attempts were made to intensify the infection by lowering the host's resistance by splenectomy, by injection of testicle extract, and by keeping the animals at a higher temperature.

Previously[1] splenectomy seemed to stimulate the appearance of *T. cruzi* in latent infections. Further experiments with a larger number of animals indicate that splenectomy has no real effect. Eight (57%) out of 14 splenectomized, and 22 (56%) out of 39 non-splenectomized, albino rats became infected after inoculation. The difference of 1% can hardly be considered significant.

Duran-Reynals[2] reported that injection of testicle extract increased the invasiveness of a neurovirus in rabbits. Experiments indicate that testicle extract has no such stimulating effect upon *T. cruzi.*

Six albino mice placed in an incubator at 34 to 36° C. did not take heavier infections than controls kept at room temperature.

Successive passages through different host species (puppy, albino rat, San Diego wood rat, albino rat), covering a period of 103 days indicated a stimulating effect upon the trypanosomes in that the incubation period progressively decreased (35, 26, 22, 20 days). In 2 control experiments in which the trypanosome was passed through animals of the same species, *i .e.,* young albino rats or mice, the parasites failed to appear after the eighth and fourth passages, respectively.

T. cruzi has been successfully cultured and subcultured on semi-solid blood-agar. Material from the original cultures and from the first subcultures has produced typical infections in white-footed mice.

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[2] Duran-Reynals, F., *J. Exp. Med.*, 1929, **50**, 327.