

distinguishable from *Bal. coli*. Cysts occurred only very rarely. Although these ciliates have swarmed in the intestines of the animals, at least since examinations first began, and have been passed in great numbers, presumably in every stool, the chimpanzees are healthy and show no visible signs of suffering from their infection. The stools have been more often soft than well formed, and have occasionally been diarrhoeic, but consistency has varied with the animals' diet. In stools kept at room temperature the ciliates have remained alive for several hours, some as long as 32 hours after leaving the host.

Balantidia in anthropoids have been studied by Brooks,¹ Noc,² Brumpt,³ Joyeaux,⁴ Christeller,⁵ Hegner and Holmes,⁶ Ziemann⁷ and Cunha and Muniz.⁸ As a result of their observations it appears that the ciliates may parasitize orangutans, macaques, capuchins, baboons and chimpanzees; and that the animals are in most cases carriers, not apparently suffering from the presence of the parasites, but may in some cases develop ulcerative dysentery. Dobell and O'Connor state that these animals react to *Balantidium* in much the same way as does man and Hegner⁹ says "it has long been known that the organism is pathogenic to primates." Most of the authors have supposed that the species with which they dealt was *Bal. coli*. Hegner and Holmes, however, point out some differences between the *Balantidium* of *Cebus variegatus* and *Bal. coli*, while Cunha and Muniz describe a new species, *Balantidium aragaoi*, from *Cebus caraya* in Brazil. Brumpt parasitized a macaque (*Macacus cynomolgus*) with *Balantidium* from a pig, and Walker¹⁰ infected monkeys with ciliates from both pigs and man. Ziemann twice tried to infect himself by ingesting trophozoites and cysts from chimpanzees, but was unsuccessful.

In these animals, as well as in man, *Balantidium* may sometimes invade the tissues and produce intestinal ulcers. The ulcers have been studied, and in them ciliates demonstrated, by Brumpt, Walker, Noc and Christeller. In many of Walker's experimentally para-

¹ Brooks, H., *Proc. N. Y. Path. Soc.*, n. s., 1903, iii, 28.

² Noc, F., *C. R. Soc. Biol.*, 1908, xlv, 878.

³ Brumpt, E., *C. R. Soc. Biol.*, 1909, lxxvii, 103.

⁴ Joyeaux, C., *Bull. Soc. Path. Exot.*, 1913, vi, 612.

⁵ Christeller, E., *Virchow's Arch. Path. Anat.*, 1922, ccxxxviii, 396.

⁶ Hegner, R. W., and Holmes, F. O., *Am. J. Hyg.*, 1923, iii, 252.

⁷ Ziemann, H., *Arch. Schiff. Tropenhyg.*, 1925, xxix, Beih. 1, 434.

⁸ Cunha, A. M. Da, and Muniz, J., *C. R. Soc. Biol.*, 1927, xcvii, 823.

⁹ Hegner, R. W., *Arch. Path. Lab. Med.*, 1927, iii, 1009.

¹⁰ Walker, E. L., *Phil. J. Sci.*, 1913, viii, sec. B, 333.

sitized monkeys the tissues were not invaded. Several fatal cases of balantidiasis in anthropoids have been reported. Thus a family of orang-utans in the New York Zoological Park (Brooks), a macaque at the Pasteur Institute (Noc), and two chimpanzees at the Berlin Zoological Gardens (Christeller, Ziemann) were said to have died of the disease. Diarrhoeic symptoms have frequently been found associated with the presence of *Balantidium*, without evidence that the ciliate was the cause of the condition. Ziemann suggests that infested animals may for a long time be carriers, until *Balantidium* becomes actively pathogenic through lowering of the host's resistance or change in the pH of the intestinal mucus. In the chimpanzees at Yale there are heavy infections apparently unaccompanied by pathological conditions.

Besides *Balantidium* 2 other Protozoa have been found in these chimpanzees. The ciliate, *Troglodytella abrossarti*, was very abundant in fresh feces when the animals were first examined, but a few weeks later it became scarce and during many subsequent examinations was not seen. Recently, 20 months after the first observation, there were still a few present in 2 of the animals. *Troglodytella* perishes much more quickly than does *Balantidium*, especially at room temperature, but a few have remained alive after eight hours in feces kept at 36° C.

In the mouths of 2 chimpanzees a species of *Entamoeba* was found. This closely resembled *E. gingivalis*, and was especially remarkable for its eruptive manner of forming pseudopodia, a characteristic which has seldom, if ever, been recorded for *E. gingivalis*. In the infected mouths there were evidences of pyorrhea, with pockets in which the amoebae were plentiful. Several attempts to cultivate them in the media used for *E. gingivalis* were unsuccessful.

In addition to the Protozoa mentioned above, several intestinal worms have been present. A fragment of a cestode, *Bertiella studeri* (determined by C. W. Stiles) was passed by one ape when the examinations first began, and in the faeces of another eggs of *Trichuris* and *Ascaris* were found.