The Prevalence of *Balantidium coli* Infection in Fifty-Six Mammalian Species

Kiyoshi NAKAUCHI

Ken-sei Meat Inspection Office, 584 Ichinobe, Shimodate, Ibaraki 308-0827, Japan

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ABSTRACT. A total of 375 fecal samples of 56 mammalian species belonging to 17 families of 4 orders were examined for the detection of *Balantidium coli* from December 1994 to August 1995. As a result, *B. coli* was found from 6 species belonging to 4 families of 2 orders (Primates and Artiodactyla) of host animals examined. White-handed gibbon (*Hylobates lar*), squirrel monkey (*Saimiri sciurea*) and Japanese macaque (*Macaca fuscata*) were new hosts for *B. coli*. All the wild boar (*Sus scrofa*) and chimpanzee (*Pan troglodytes*) examined were positive. The highest number of *B. coli* was obtained from a chimpanzee (1,230/g feces). No *B. coli* was detected from the animals of orders Rodentia and Carnivora including dogs and cats. The rarity of *B. coli* infection in breeding animals in Japan suggests that there is no serious problem in controlling infections.—**KEY WORDS:** *Balantidium coli*, feces, prevalence.

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Balantidium coli is widespread throughout the world and has a wide variety of hosts, including man, various domestic and wild mammals [1–8, 10–28]. Rarely the protozoa causes diarrhea or dysentery, and produces ulcerative lesions in the large intestine [3, 7, 12]. In Japan, the prevalence of *B. coli* has been reported in pigs [16, 17] and cynomolgus monkeys [18]. However, there is little information on the prevalence of *B. coli* in the other various animal species. The present paper deals with the prevalence of *B. coli* in various animals bred in Japan by fecal examination.

During the period from December 1994 to August 1995,

a total 375 fecal samples were collected from the healthy animals: 56 species belonging to 17 families of 4 orders (Table 1), including 100 stray cats (*Felis catus*), 100 stray dogs (*Canis familiaris*) and 50 Japanese macaques (*Macaca fuscata*) in a large established monkey colony (22 Japanese macaques in individual cage). Stray cats and dogs were committed to Animal Administrative Guidance Center of Ibaraki Prefecture. All animals were born and/or bred in Ibaraki Prefecture, Japan. For detection of *B. coli*, 3 g of the fresh feces were fixed and stained with 6 ml of methylgreen-formalin-saline (MFS) solution [19] as soon as

Table 1. Orders, families, species and number of animals examined

Order	Family	Species (No. of Samples)
Primates	Lemuridae	<i>Lemur catta</i> (1), <i>Lemur variegatus</i> (1), <i>Lemur mongoz</i> (1)
	Galagidae	<i>Galago crassicaudatus</i> (1)
	Cebidae	<i>Cebus apella</i> (1), <i>Saimiri sciurea</i> (2)
	Callithricidae	<i>Callithrix jacchus</i> (1), <i>Saguinus midas</i> (1), <i>Leontocebus oedipus</i> (2)
	Cercopithecidae	<i>Macaca fuscata</i> (72), <i>Macaca irus</i> (2), <i>Macaca mulatta</i> (4),
		<i>Macaca cyclopsis</i> (1), <i>Macaca nemestrina</i> (4), <i>Cynopithecus niger</i> (1), <i>Comopithecus hamadryas</i> (4), <i>Cercopithecus aethiops</i> (1), <i>Cercopithecus neglectus</i> (1), <i>Papio doguera</i> (1), <i>Cercopithecus nictitans</i> (1)
	Pongidae	<i>Hylobates lar</i> (4), <i>Hylobates concolor</i> (2), <i>Pan troglodytes</i> (3), <i>Gorilla gorilla</i> (1)
Rodentia	Hystricidae	<i>Hystrix cristata</i> (1)
	Caviidae	<i>Dolichotis patagona</i> (1)
Carnivora	Canidae	<i>Canis familiaris</i> (100), <i>Canis lupus</i> (1), <i>Alopex lagopus</i> (1), <i>Vulpes vulpes</i> (5), <i>Urocyon cinereoargenteus</i> (1), <i>Nyctereutes procyonoides</i> (4)
		<i>Selenarctos thibetanus</i> (4), <i>Ursus arctos</i> (3), <i>Thalarchos maritimus</i> (1), <i>Melursus ursinus</i> (1)
	Procyonidae	<i>Procyon lotor</i> (5), <i>Ailurus fulgens</i> (2)
	Mustelidae	<i>Martes melampus</i> (1), <i>Meles meles</i> (2), <i>Taxidea taxus</i> (1), <i>Mephitis mephitis</i> (2)
	Viverridae	<i>Paguma larvata</i> (2), <i>Civettictis civetta</i> (1), <i>Suricata suricatta</i> (1)
	Hyaenidae	<i>Crocuta crocuta</i> (1), <i>Hyaena hyaena</i> (2)
	Felidae	<i>Felis catus</i> (100), <i>Felis lynx</i> (1), <i>Prionailurus bengalensis</i> (2), <i>Panthera pardus</i> (3), <i>Panthera onca</i> (1), <i>Panthera tigris</i> (2), <i>Panthera leo</i> (5)
		<i>Phoca vitulina</i> (1)
Artiodactyla	Suidae	<i>Sus scrofa</i> (4)

Total No. of Species 56, Total No. of Samples 375.

Table 2. A list of animals positive for *Balantidium coli*

Order	Species	Sex	Age	No. of <i>Balantidium coli</i> (/g feces)	
				Trophozoite	Cyst
Primates	Chimpanzee (<i>Pan troglodytes</i>)	ND ^{a)}	ND	150	1080
		ND	ND	0	150
		ND	ND	300	450
	White-handed gibbon (<i>Hylobates lar</i>)	M ^{b)}	A ^{c)}	0	60
		F ^{d)}	A	0	30
	Squirrelmonkey (<i>Saimiri sciurea</i>)	ND	ND	0	30
	Sacred baboon (<i>Comopithecus hamadryas</i>)	F	A	0	30
	Japanese macaque (<i>Macaca fuscata</i>)	F	A	30	60
	Wild boar (<i>Sus scrofa</i>)	F	A	0	420
Artiodactyla		F	A	0	270
		F	A	0	120
		F	A	0	90
		F	A	0	90

a) Not defined. b) Male. c) Adult. d) Female.

possible after collection. They were then filtered through a double-folded sheet of muslin, and kept at room temperature until microscopic examination. The identification of *B. coli* was in accordance with the descriptions by Flynn [7] and Levine [12]. For counting *B. coli* organisms, a plankton-counter glass slide was used [19].

The results of animals positive for *B. coli* are shown in Table 2. Six species belonging to 4 families of 2 orders (Primates and Artiodactyla) of the animals examined were *B. coli* positive. In the present survey, *B. coli* was not detected from the orders Rodentia and Carnivora. Each animal positive for *B. coli* was kept in an individual cage at the rearing facility of zoos after wild caught or born in zoos except Japanese macaque (*Macaca fuscata*). Japanese macaque positive for *B. coli* was raised as a pet. The highest positive rate occurred in wild boar (*Sus scrofa*), 4 of 4 (100%), and chimpanzee (*Pan troglodytes*), 3 of 3 (100%), and the highest number of 1230 (trophozoite 150, cyst 1080) per gram of feces was detected in a chimpanzee. The clinical manifestations such as diarrhea were not observed in all the animals examined.

B. coli is common parasites of several nonhuman primates, including the African green monkey [22], baboon [14], capuchin [7, 27], chimpanzee [11, 26], cynomolgus monkey [18], gorilla [24], howler monkey [7], Indian monkey [21], orangutan [4], rhesus monkey [8, 9, 28], and spider monkey [7] throughout the world. In the present survey, *B. coli* was found from 5 species out of 24 nonhuman primate species. White-handed gibbon (*Hylobates lar*), squirrel monkey (*Saimiri sciurea*) and Japanese macaque (*Macaca fuscata*) are new hosts for *B. coli*. While in the feces of Japanese macaque in a large established monkey colony *B. coli* was not detected. On the other hand, all fecal samples of the chimpanzee examined were *B. coli* positive. *B. coli* is a commonly-found protozoan parasite of chimpanzees [11]. It was

reported that the prevalence of *B. coli* infection in 49 chimpanzees was 33% [26]. In another report, high incidence (84 %) of *B. coli* infection has been reported in the chimpanzee [7]. The parasite has been also detected from 9.0% of the cynomolgus monkey [18] and 1.5% of African green monkey [22]. Therefore, it is assumed that the susceptibility of chimpanzee to *B. coli* infection is higher than that of the other nonhuman primates.

B. coli is often found from domestic and wild hogs [1, 3]. In the present study, all the wild boars examined were also positive for *B. coli*. The high prevalence of this parasite in domestic pigs was described by many authors [1, 16, 17, 20, 25]. At the same time, it is reported that *B. coli* infection occurs in their early stage of life in pigs [17]. Since pig and wild boar are the same species of animal, it is considered that the wild boars are also infected with *B. coli* in their early life stage similarly in pigs.

B. coli has been also reported from the orders Rodentia and Carnivora, such as capybara [13], cat [2], dog [2, 5, 6, 10], hamster [23], and rat [1, 15]. Awakian [1] reported that *B. coli* was found in 29% of Moscow rats. In the present results, *B. coli* was detected in neither orders, Rodentia nor Carnivora including dogs and cats.

The rarity of *B. coli* infection in healthy animals bred in Japan suggests that there is no serious problem in controlling infections.

REFERENCES

- Awakian, A. 1937. *Trans. R. Soc. Trop. Med. Hyg.* 31: 93–98.
- Bailey, W. S. and Williams, A. G. 1949. *J. Am. Vet. Med. Assoc.* 114: 238.
- Beaver, P. C., Jung, R. C. and Cupp, E.W. 1984. pp. 213–217. In: *Clinical Parasitology*, 9th ed., Lea & Febiger, Philadelphia.
- Brooks, H. 1903. *Proc. New York Pathol. Soc.* 3: 28.
- Dinkmans, G. 1948. *Proc. Helm. Soc. Washington* 15: 40–41.

6. Ewing, S.A. and Bull, R.W. 1966. *J. Am. Vet. Med. Assoc.* 149: 519–520.
7. Flynn, R. J. 1973. *Parasites of Laboratory Animals*, Iowa State Univ. Press, Ames, Iowa.
8. Gisler, D. B., Benson, R. E. and Young, R. J. 1960. *Ann. New York Acad. Sci.* 85: 758–768.
9. Habermann, R. T. and Williams, F. P. Jr. 1957. *Am. J. Vet. Res.* 18: 419–426.
10. Hayes, F. A. and Jordan, H. E. 1956. *J. Am. Vet. Med. Assoc.* 129: 161.
11. Kim, J. C. S., Abee, C. R. and Wolf, R. W. 1978. *Lab. Anim.* 12: 231–233.
12. Levine, N. D. 1973. pp. 369–371. *In: Protozoan Parasites of Domestic Animals and of Man*, 2nd ed., Burgess Publ. Co., Minneapolis.
13. Moulton, J. E., Heuschele, W. P. and Sheridan, B. W. 1961. *Cornell Vet.* 51: 350–358.
14. Myers, B. J. and Kuntz, R. E. 1968. *J. Protozool.* 15: 363–365.
15. Nagahama, M. 1932. *J. Chosen Med. Assoc.* 22: 75–77.
16. Nakauchi, K. 1990. *Jpn. J. Parasitol.* 39: 351–355.
17. Nakauchi, K. 1991. *J. Vet. Med. Sci.* 53: 967–968.
18. Nakauchi, K., Nakajima, H. and Sakakibara, I. 1990. *Jpn. J. Vet. Sci.* 52: 1323–1324.
19. Ogimoto, K. and Imai, S. 1981. *Atlas of Rumen Microbiology*, Japan Scientific Societies Press, Tokyo.
20. Pritze, F. 1928. *Z. Parasit.* 1: 345–415.
21. Qadri, S. S. and Navarathram, E. S. 1966. *Riv. Parasitol.* 27: 89–96.
22. Reardon, L. V. and Rininger, B. F. 1968. *Lab. Anim. Care* 18: 577–580.
23. Sheffield, F. W. and Beveridge, E. 1962. *Nature (Lond.)* 196: 294–295.
24. Teare, J. A. and Loomis, M. R. 1982. *J. Am. Vet. Med. Assoc.* 181: 1345–1347.
25. Van der Hoeven, J. A. and Rijpstra, A. C. 1957. *Doc. Med. Geogr. Trop.* 9: 225–228.
26. Van Riper, D. C., Day, P. W., Fineg, J. and Prine, J. R. 1966. *Lab. Anim. Care* 16: 360–363.
27. Wenyon, C. M. 1926. *Protozoology*, Bailliere, London.
28. Young, R. J., Fremming, B. D., Benson, R. E. and Harris, M. D. 1957. *Proc. Anim. Care Panel* 7: 67–82.