Isolation and Serological Characterization of Ureaplasmas from Nonhuman Primates

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Abstract. During 1973 through 1980, a survey was conducted to isolate ureaplasmas from the various sites of 306 apparently healthy nonhuman primates belonging to 8 species in 5 genera under 3 families: 9 common squirrel monkeys (*Saimiri sciurea*), 9 green monkeys (*Cercopithecus aethiops*), 164 cynomolgus monkeys (*Macaca fascicularis*), 10 rhesus monkeys (*Macaca mulata*), 53 Japanese monkeys (*Macaca fuscata*), 1 orangutan (*Pongo pygmaeus*), 2 gorillas (*Pan gorilla*) and 58 chimpanzees (*Pan troglodytes*). Ureaplasmas were isolated from the nasal and oral cavities of common squirrel monkeys, and from the nasal cavity, oral cavity, rectum and prepuce of green monkeys. The organisms, furthermore, were less frequently isolated from the nasal cavity, oral cavity, rectum and prepuce of cynomolgus monkeys, and from the nasal cavity of chimpanzees. None of the organisms was recovered from the other simian species. In serological studies by the growth inhibition and metabolism inhibition tests, *Ureaplasma* strains of simian origins were found to be antigenically heterogeneous and divided into 4 distinguishable serogroups in accordance with the families in the zoological classification of nonhuman primates, *Callithricidae*, *Cebidae*, *Cercopithecidae* and *Pongidae*, respectively. The simian *Ureaplasma* strains were known to be antigenically different from bovine, caprine, ovine, canine, feline and avian ones, although there were common antigens between the *Ureaplasma* serogroup derived from the family *Cercopithecidae* and some serovars of *Ureaplasma urealyticum*.

Since simian ureaplasmas were isolated for the first time from the throat of squirrel monkeys by Taylor-Robinson et al. [26] in 1971, these organisms have been recognized to distribute in various species of nonhuman primates [3, 6, 7, 11, 19, 25, 26]. A survey of ureaplasmas in nonhuman primates has an important role to search for the model of some human diseases, including reproductive failures [1, 2, 4, 5, 8, 27], as well as respiratory diseases. However, there have been few systematic observations on the ecology of ureaplasmas in nonhuman primates in nature.

It has been described in serological studies that human [22, 23], bovine [12, 21], ovine [17, 20], canine [18] and feline [15, 16] ureaplasmas were antigenically heterogeneous, having the several serovars or serogroups within their host species, but the serological properties of these organisms of simian origin have not been clarified as yet.

The present authors [13] have also reported their isolation from common squirrel monkeys (*Saimiri sciurea*), green monkeys (*Cercopithecus aethiops*) and cynomolgus monkeys (*Macaca fascicularis*), with some results of biological and serological exami-

Table 1. Sources of various species of nonhuman primates used for isolation of ureaplasmas

Family	Monkey	Sex		Total	Source
		Male	Female		
Cebidae	Common squirrel monkey (<i>Saimiri sciurea</i>)	6	3	9	NIH
	Green monkey (<i>Cercopithecus aethiops</i>)	6	3	9	NIH
Cercopithecidae	Cynomolgus monkey (<i>Macaca fascicularis</i>)	56	50	106	164 NIH
		25	33	58	
	Rhesus monkey (<i>Macaca mulata</i>)	8	2	10	FM
	Japanese monkey (<i>Macaca fuscata</i>)	36	8	44	53 TZP
		4	5	9	
Pongidae	Orangutan (<i>Pongo pygmaeus</i>)		1	1	UZG
	Gorilla (<i>Pan gorilla</i>)		2	2	UZG
	Chimpanzee (<i>Pan troglodytes</i>)	34	24	58	FM

NIH: National Institute of Health, FM; Faculty of Medicine, University of Tokyo,

TZP: Tama Zoological Park, UZG: Ueno Zoological Gardens.

nations of these organisms. This communication deals with the inclusive results of isolation of ureaplasmas from various species of nonhuman primates during 1973 through 1980 in addition to those of the previous report [13] and the serological comparison with these organisms.

Materials and Methods

Animals: The species and sources of 306 apparently healthy nonhuman primates including 8 species in 5 genera under 3 families for the isolation of ureaplasmas are given in Table 1. Of them, 9 common squirrel monkeys (*Saimiri sciurea*), 9 green monkeys (*Cercopithecus aethiops*), 106 cynomolgus monkeys (*Macaca fascicularis*) were imported from South Asia, Africa and South America to the National Institute of Health (NIH), Tokyo, for a survey of zoonoses. The specimens of these animals were kindly supplied from the NIH. Fifty-eight cynomolgus monkeys, 10 rhesus monkeys (*Macaca mulata*), 9 Japanese monkeys (*Macaca fuscata*) and 58 chimpanzees (*Pan troglodytes*) were purchased from commercial suppliers as laboratory animals and kept at our university. Fortyfour Japanese monkeys, 1 orangutan (*Pongo pygmaeus*) and 2 gorillas (*Pan gorilla*) were maintained for ex-

hibition at either the Tama Zoological Park or the Ueno Zoological Gardens, Tokyo.

Ureaplasma stains: *Ureaplasma* strains used as the reference strains for serological studies were 8 serovars of *Ureaplasma urealyticum* [23], 7 bovine [21], 1 caprine [17], 2 ovine [17], 4 canine [18] and 1 avian [14] strains. Ten strains originated from the nonhuman primates belonging to 6 species in 4 families are listed in Table 2. The origins and sources of these strains have been described before [7, 11, 13, 19, 25]. Strains M1-A and M2-A, which were designated tentatively by the present authors, originated from the common marmosets (*Callithrix jacchus*) were kindly supplied from Dr. A. C. Hill, Medical Research Council Laboratory Animals Centre, England. Strains My6690 and Sp1625A from a common marmoset and a common squirrel monkey, respectively, which had been isolated by Dr. D. Taylor-Robinson et al., M.R.C. Clinical Research Centre, England, were derived through Dr. C. J. Howard, A.R.C., Institute for research on Animal Diseases, England. Strain Tiny from a talapoin monkey (*Miopithecus talapoin*) was gifted by Dr. R. B. Kundsins, Peter Bent Brigham Hospital, U.S.A. Strains T167-2 and T163 from the green monkeys and strain T234-1 from a cynomolgus monkey were the isolates in our laboratory as described previously [13]. Strains CH28 and CH33 were those freshly isolated from the chimpanzees in this study.

Table 2. Origins of 10 simian *Ureaplasma* strains used in serological studies

Strain	Family	Species	Origin isolated	Source or supplied by
M1-A	<i>Callithricidae</i>	Common marmoset (<i>Callithrix jacchus</i>)	Lung	A.C. Hill
M2-A			Lung	A.C. Hill
My6690			Unknown	C.J. Howard
Sp1625A	<i>Cebidae</i>	Common squirrel monkey (<i>Saimiri sciurea</i>)	Throat	C.J. Howard
T163	<i>Cercopithecidae</i>	Green monkey (<i>Cercopithecus aethiops</i>)	Oral cavity	Our laboratory
T167-2			Prepuce	Our laboratory
T234-1		Cynomolgus monkey (<i>Macaca fascicularis</i>)	Oral cavity	Our laboratory
Tiny		Talapoin monkey (<i>Miopithecus talapoin</i>)	Vaginal lavage	R.B. Kundsinn
CH28	<i>Pongidae</i>	Chimpanzee (<i>Pan troglodytes</i>)	Nasal cavity	Our laboratory
CH33			Nasal cavity	Our laboratory

Table 3. Isolation of ureaplasmas from various sites of nonhuman primates

Site tested	Common squirrel monkey	Green monkey	Cynomolgus monkey	Rhesus monkey	Japanese monkey	Orangutan	Gorilla	Chimpanzee
Nasal cavity	2/9 (22.2%)	1/9 (11.1%)	1/94 (1.1%)	0/10	0/5	0/1	0/1	2/58 (3.4%)
Oral cavity	6/9 (66.7%)	3/9 (33.3%)	1/164 (0.6%)	0/10	0/53	0/1	0/2	0/58
Rectum	0/9	1/9 (11.1%)	1/68 (1.5%)	0/10	0/2	—**	—	0/58
Prepuce	0/6	3/6 (50.0%)	1/81 (1.2%)	0/8	0/4	—	—	0/34
Vagina	0/3	0/3	0/83	0/2	0/5	0/1	—	0/24
Total	8/36 (22.2%)	8/36 (22.2%)	4/490 (0.8%)	0/40	0/69	0/3	0/3	2/232 (0.9%)

* No. positive/No. examined.

** Not tested.

Media and isolation of ureaplasmas: Media used for isolation and serological study of ureaplasmas were T-broth and T-agar as stated elsewhere [18]. In some cases for their isolation, the solid medium omitted phosphate buffer (a mixture of 7 volumes of 1.5 M KH_2PO_4 and 3 volumes of 1.5 M Na_2HPO_4 solution) was employed. Specimens were obtained by inserting the sterile cotton swabs into the nasal cavity, oral cavity, rectum, prepuce and vagina of each animal and then cultured for ureaplasma isolation in the same manner as reported previously [18].

Preparation of antisera and serological tests: Cloning of isolates were conducted by the procedure as mentioned in a previous report [18]. Antisera were produced in rabbits as described before [21]. Serological tests were performed by the growth inhibition and metabolism inhibition tests [21].

Results

Isolation of ureaplasmas

The frequency of isolation of ureaplasmas from 306 nonhuman primates is shown in Table 3. The organisms were recovered from the nasal cavity and oral cavity of common squirrel monkeys, and from the nasal cavity, oral cavity, rectum and prepuce of green monkeys. The nasal cavity, oral cavity, rectum and prepuce of cynomolgus monkeys and the nasal cavity of chimpanzees were also positive for ureaplasmas in low incidence. No positive culture, however, was obtained from any sites of rhesus

Table 4. Serological comparison between simian and human ureaplasmas by growth inhibition test

Origin	Strain or serovar	Antiserum against															
		My-6690	Sp-1625A	T167-2	T163	T234-1	Tiny	CH33	I	II	III	IV	V	VI	VII	VIII	
Simian	M1-A	5*	—**	—	—	—	—	—	—	—	—	—	—	—	—	—	
	M2-A	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	My6690	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Sp1625A	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	
	T163	—	—	2	3	—	—	—	—	—	—	—	—	—	—	—	
	T167-2	—	—	2	2	—	—	—	—	—	—	—	—	—	—	—	
	T234-1	—	—	—	1.5	5	2	—	—	—	1.5	—	—	—	—	—	
	Tiny	—	—	—	—	2	3	—	—	—	—	—	—	—	—	—	
	CH28	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	
	CH33	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	
Human	I	—	—	—	—	—	—	—	5	—	—	—	—	—	—	—	
	II	—	—	—	—	—	—	—	—	3	—	—	2	—	—	—	
	III	—	—	—	—	1.5	2	—	—	—	5	—	—	—	—	—	
	IV	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	
	V	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	
	VI	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	
	VII	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	
	VIII	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	

* Width (mm) of inhibiting zone.

** No growth inhibition.

monkeys, Japanese monkeys, orangutan and gorillas examined.

Serological comparison between simian and human *Ureaplasma* strains

Antigenic relationships between 10 simian *Ureaplasma* strains and 8 serovars of *U. urealyticum* were tested by the growth inhibition test. As shown in Table 4, all the simian strains used could be placed into 4 different serogroups that fitted definitely to the simian families, *Callithreidae*, *Cebidae*, *Cercopithecidae* and *Pongidae*, respectively, from which the organisms were derived. The first group contained 3 strains M1-A, M2-A and My6690 from the common marmosets, and the second contained the strain Sp1625A from a common squirrel monkey. The third group comprised 4 strains, T163 and T167-2, T234-1, and Tiny from green

monkeys, cynomolgus monkey and talapoin monkey, respectively, but all the strains of this serogroup were not always identical antigenically, having one way cross-reactions among them. The fourth group consisted of 2 strains CH28 and CH33 from the chimpanzees.

In the antigenic comparison between the simian serogroups and the human serovars, it was found that there existed some relations among the strains of the third serogroup from *Cercopithecidae* and human serovar III. However, the remaining serogroups never reacted with human serovars.

The metabolism inhibition test demonstrated that the simian *Ureaplasma* strains were also differentiated into 4 serogroups as determined in the growth inhibition test, although a number of weak cross-reactions were observed between the third simian

Table 5. Serological comparison between simian and human ureaplasmas by metabolism inhibition test

Origin	Strain or serovar	Antiserum against														
		My6690	Sp1625A	T163	T167-2	T234-1	Tiny	CH33	I	II	III	IV	V	VI	VII	VIII
Simian	M1-A	10,240*	—**	—	—	—	—	—	—	—	—	—	—	40	—	—
	M2-A	20,480	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	My6690	≥40,960	40	—	—	—	—	—	—	—	—	—	—	—	—	—
	Sp1625A	640	10,240	—	—	—	—	80	—	—	—	—	—	—	—	—
	T163	160	—	5,120	2,560	640	640	—	160	—	160	80	160	—	640	320
	T167-2	—	—	2,560	2,560	640	320	—	—	—	—	—	—	—	320	80
	T234-1	—	160	2,560	5,120	20,480	2,560	40	1,280	—	1,280	—	—	80	40	—
	Tiny	—	—	320	160	1,280	20,480	—	320	—	320	—	—	—	—	—
	CH28	—	160	—	80	160	—	≥40,960	40	—	—	—	80	—	—	40
	CH33	40	80	—	80	—	—	≥40,960	—	—	—	—	40	—	40	40
Human	I	—	—	—	80	80	320	—	10,240	160	160	80	80	—	—	—
	II	—	—	—	—	—	820	—	160	2,560	40	40	40	—	40	—
	III	—	—	40	—	2,560	2,560	—	160	—	20,480	40	40	40	—	—
	IV	—	—	1,280	640	80	—	40	80	40	40	20,480	80	—	—	80
	V	—	—	40	80	40	40	—	80	1,280	—	—	10,240	160	80	640
	VI	—	—	—	40	—	80	—	160	—	40	40	80	10,240	—	—
	VII	—	—	80	320	40	320	80	40	—	40	—	320	80	10,240	320
	VIII	—	—	160	80	320	640	40	40	80	40	—	40	—	640	10,240

* Reciprocal of the highest dilution of serum showing metabolism inhibition.

** No inhibition at the dilution of 1:20.

Table 6. Serological relationship of simian *Ureaplasma* strains to bovine, caprine, ovine, canine, feline and avian strains by metabolism inhibition test

Antiserum Strain	Origin	Homologous titer	Simian <i>Ureaplasma</i> strain			
			My6690	Sp1625A	T167-2	CH33
C13	Bovine	10,240*	—**	—	—	—
C24		10,240	—	—	40	—
C23		≥40,960	—	—	—	—
C17		5,120	—	—	—	—
C12		≥40,960	—	—	40	—
C7		≥40,960	—	—	—	—
T44		≥40,960	—	—	—	—
G10V	Caprine	20,480	—	—	—	—
S8V-A	Ovine	≥40,960	—	—	—	—
I202		≥40,960	—	—	—	—
D1M-C	Canine	10,240	—	—	—	—
D29M		20,480	—	—	—	—
D11N-A		≥40,960	—	—	—	—
D6P-C		≥40,960	—	—	—	—
FT2-B	Feline	≥40,960	—	—	—	—
F2		10,240	—	—	—	—
D6-1	Avian	10,240	—	—	—	—

* Reciprocal of the highest dilution of serum showing metabolism inhibition.

** No inhibition at the dilution of 1:20.

serogroup and human serovars I, III, IV, VII and VIII (Table 5).

Serological relationships between simian *Ureaplasma* strains and those of other animal species

Four simian representative strains, My6690, Sp1625A, T167-2 and CH33 selected from the each serogroup, respectively, were tested with the antisera against bovine, caprine, ovine, canine, feline and avian reference strains by the metabolism inhibition test. As shown in Table 6, the 4 simian strains were found to be unrelated antigenically to those of the other animal origins.

Discussion

It has recently been known that ureaplasmas are widely distributed in higher nonhuman primate species as well as lower

ones. The organisms have been isolated from the throat, nasal cavity, trachea and/or urogenital tract of common marmosets [6, 7, 11], squirrel monkeys [13, 26], green monkeys [13], talapoin monkeys [19], patas monkeys [19], cynomolgus monkeys [13, 19] and chimpanzees [3], and recently, from the brain and spinal cord of common marmosets [10]. In addition, it has been suggested that the simian ureaplasmas might be associated with reproductive failure including unexplained infertility in patas, cynomolgus and talapoin monkeys [19].

In the present investigation, ureaplasmas were detected in the various sites of apparently healthy common squirrel and green monkeys, suggesting that the organisms might form a part of the normal bacterial flora of the respiratory and/or urogenital tracts of these simian species. However, rhesus monkeys, Japanese mon-

keys, orangutan and gorillas were negative for cultures of ureaplasmas. Therefore, we could not generally evaluate the ecological significance of these organisms in nonhuman primates. Further extensive works will be required to determine how widely the organisms are distributed in all population of nonhuman primates in nature, or whether they are related in any particular diseases of these animals.

Taylor-Robinson et al. [25] mentioned that the *Ureaplasma* strains originated from squirrel monkeys had similar antigenic properties to each other, but were different antigenically from those of human, bovine and canine origins. The present authors [13] demonstrated previously that the strains from green monkeys and cynomolgus monkeys were serologically identical and the several strains of them showed an antigenic relation to some serovars of *U. urealyticum*. In the present serological study, the results of previous work were confirmed and it was found, further, that the simian ureaplasmas were antigenically heterogeneous, and were divided into 4 distinct serogroups in accordance with the families on the zoological classification of nonhuman primate. This finding suggests that a same serovar of ureaplasmas may harbor commonly in monkeys belonging to a same family.

Besides, the simian ureaplasmas were antigenically distinguished from those of bovine, caprine, ovine, canine, feline and avian origins. However, only the serogroup from the family *Cercopithecidae* which contained the green, cynomolgus and talapoin monkeys cross-reacted to some extents with several serovars of *U. urealyticum* of human origin. As stated in a previous paper [13], the fact that the simian serogroup shared common antigens with the human serovars suggests that this serogroup should

be taxonomically categorized into *U. urealyticum*. It is not surprising that human serovars are isolated from nonhuman primates, since most of human *Mycoplasma* species have been detected in nonhuman primates [9, 24].

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References

- [1] Bowie, W. R., DiGiacomo, R. F., Holmes, K. K., and Gale, J. L. (1978). Genital inoculation of male *Macaca fascicularis* with *Neisseria gonorrhoeae* and *Ureaplasma urealyticum*. *Br. J. Vener. Dis.* **54**, 235-238.
- [2] Braun, P., Lee, Y.-H., Klein, J. O., Marcy, S. M., Klein, T. A., Charles, D., Levy, P., and Kass, E. H. (1971). Birth weight and genital mycoplasmas in pregnancy. *New Engl. J. Med.* **284**, 167-117.
- [3] Brown, W. J., Jacobs, N. F., Jr., Arum, E. S., and Arko, R. J. (1976). T-strain mycoplasma in the chimpanzee. *Lab. Anim. Sci.* **26**, 81-83.
- [4] Caspi, E., Solomon, F., and Sompolski, D. (1972). Early abortion and mycoplasma infection. *Israel J. Med. Sci.* **8**, 122-127.
- [5] Friberg, J. (1980). Mycoplasmas and ureaplasmas in infertility and abortion. *Fert. Steril.* **33**, 351-359.
- [6] Furr, P. M., Hetherington, C. M., and Taylor-Robinson, D. (1979). Ureaplasmas in the marmoset (*Callithrix jacchus*): Transmission and elimination. *J. Med. Primatol.* **8**, 321-326.
- [7] Furr, P. M., Taylor-Robinson, D., and Hetherington, C. M. (1976). The occurrence of ureaplasmas in marmosets. *Lab. Anim.* **10**, 393-398.
- [8] Gale, J. L., DiGiacomo, R. F., Kiviat, M. D., Wang, S.-P., and Bowie, W. R. (1977). Experimental nonhuman primate urethral infection with *Chlamydia trachomatis* and *Ureaplasma* (T-mycoplasma). In Nongonococcal urethritis and related infections. Hobson, D., and Holmes, K. K., editors, American Society for Microbiology, Washington, D.C., 205-213.
- [9] Hill, A. C. (1977). The isolation of mycoplasmas from nonhuman primates. *Vet. Rec.*

- 101, 117.
- [10] Hill, A. C. (1979). Mycoplasma isolation from the central nervous system. *Vet. Rec.* **105**, 102-103.
 - [11] Hill, A. C., Turton, J. A., and Bleby, J. (1978). Bacterial and mycoplasma flora of a laboratory colony of the common marmoset (*Callithrix jacchus*). *Vet. Rec.* **103**, 824-827.
 - [12] Howard, C. J., Gourlay, R. N., and Collins, J. (1978). Serological studies with bovine ureaplasmas (T-mycoplasmas). *Int. J. Syst. Bacteriol.* **28**, 473-477.
 - [13] Koshimizu, K., and Magaribuchi, T. (1977). Characterization of Ureaplasma (T-mycoplasma) isolated from imported nonhuman primates. *Jpn. J. Bacteriol.* **32**, 585-595 (in Japanese).
 - [14] Koshimizu, K., and Magaribuchi, T. (1978). Biological and serological characterization of ureaplasmas isolated from domestic fowls and red jungle fowls. *Jpn. J. Vet. Sci.* **40**, 719-727.
 - [15] Koshimizu, K., Magaribuchi, T., and Ito, M. (1979). Serological typing of ureaplasmas of feline origin. *Jpn. J. Vet. Sci.* **41**, 545-549.
 - [16] Kotani, H., Harasawa, R., Yamamoto, K., and Ogata, M. (1980). Serological studies with feline ureaplasmas. *Microbiol. Immunol.* **24**, 83-86.
 - [17] Kotani, H., Nagatomo, H., and Ogata, M. (1980). Isolation and serological comparison of ureaplasmas from goats and sheep. *Jpn. J. Vet. Sci.* **42**, 31-40.
 - [18] Kotani, H., and Ogata, M. (1979). Isolation and serological grouping of ureaplasmas from dogs. *Jpn. J. Vet. Sci.* **41**, 639-646.
 - [19] Kundsins, R. B., Rowell, T., Shepard, M. C., Parreno, A., and Lunceford, C. D. (1975). T-strain mycoplasmas and reproductive failure in monkeys. *Lab. Anim. Sci.* **25**, 221-224.
 - [20] Livingston, C. W., Jr., Gauer, B. B., and Shelton, M. (1978). A specific ureaplasma serotype associated with ovine uterine infections. *Am. J. Vet. Res.* **39**, 1699-1701.
 - [21] Ogata, M., Kotani, H., and Yamamoto, K. (1979). Serological comparison of bovine ureaplasma. *Jpn. J. Vet. Sci.* **41**, 629-637.
 - [22] Robertson, J. A., and Stemke, G. W. (1979). Modified metabolic inhibition test for serotyping strain of *Ureaplasma urealyticum* (T-strain mycoplasma). *J. Clin. Microbiol.* **9**, 673-676.
 - [23] Shepard, M. C., Lunceford, C. D., Ford, D. K., Purcell, R. H., Taylor-Robinson, D., Razin, S., and Black, F. T. (1974). *Ureaplasma urealyticum* gen. nov., sp. nov.: Proposed nomenclature for the human T (T-strain) mycoplasmas. *Int. J. Syst. Bacteriol.* **24**, 160-171.
 - [24] Somerson, N. L., and Barry, C. C. (1979). The mycoplasma flora of human and nonhuman primates. In *The Mycoplasmas II*, Tully, J. G., and Whitcomb, R. F., editors, Academic Press Inc., New York, 191-216.
 - [25] Taylor-Robinson, D., and Furr, P. M. (1973). The distribution of T-mycoplasmas within and among various animal species. *Ann. New York Acad. Sci.* **225**, 108-117.
 - [26] Taylor-Robinson, D., Martin-Bourgon, C., Watanabe, T., and Addey, J. P. (1971). Isolation of T-mycoplasmas from dogs and squirrel monkeys: Biological and serological comparison with those isolated from man and cattle. *J. Gen. Microbiol.* **68**, 97-107.
 - [27] Taylor-Robinson, D., and McCormack, W. M. (1979). In *The Mycoplasmas II*, Tully, J. G., and Whitcomb, R. F., editors, Academic Press Inc., New York, 307-366.

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サル類からのウレアプラズマの分離および血清学的性状: 尾形 学・小谷 均 (東京大学農学部家畜微生物学教室), 興水 馨・曲渕輝夫 (東京大学医学部附属動物実験施設)——1973年から1980年にわたり, 3科5属8種におよぶ306頭の外見上健康なサル類, すなわちリスザル9頭, ミドリザル9頭, カニクイザル164頭, アカゲザル10頭, ニホンザル53頭, オランウータン1頭, ゴリラ2頭, チンパンジー58頭からウレアプラズマの分離をこころみた. ウレアプラズマは, リスザルの鼻腔, 口腔, ミドリザルの鼻腔, 口腔, 直腸, 包皮, カニクイザルの鼻腔, 口腔, 直腸, 包皮およびチンパンジーの鼻腔から分離されたが, 他のサル類からは分離されなかった. 発育阻止試験および代謝阻止試験により血清学的性状を検討したところ, 供試したサル類由来ウレアプラズマ菌株は抗原的に不均質であり, サル類の動物分類学上の科, すなわちマーモセット科, オマキザル科, オナガザル科およびオランウータン科にそれぞれ対応する4血清群に分けられた. サル類由来株はウシ, ヤギ, ヒツジ, イヌ, ネコ, トリ由来株とは血清学的類似性は認められなかった. しかし, オナガザル科に属する血清群とヒト由来の *Ureaplasma urealyticum* 間には共通抗原が存在することが判明した.