Mycoplasma auris sp. nov., Mycoplasma cottewii sp. nov., and Mycoplasma yeatsii sp. nov., New Sterol-Requires Mollicutes from the External Ear Canals of Goats

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Three mycoplasma strains, designated GIHT (T = type strain), UIAT, and VISIT, were isolated from the external ear canals of goats and were shown to be serologically distinct from each other and from previously described Acholeplasma, Entomoplasma, Mesoplasma, and Mycoplasma species. Using light and transmission electron microscopy, we showed that the cells of these organisms were small, pleomorphic, coccoid, nonmotile, and nonhelical and that each cell was surrounded by a single cytoplasmic membrane. There was no evidence of a cell wall, and the organisms grew freely in media containing penicillin at concentrations of 1,000 U/ml or more and thallous acetate (final concentration, 1:4,000) and produced the “fried-egg” morphology typical of most mollicutes. Growth occurred both aerobically and anaerobically (as determined by the GasPak method). The ability to catabolize glucose and mannose and the ability to hydrolyze arginine varied among the three strains. All three strains required sterol for growth, and none of the strains hydrolyzed urea. The guanine-plus-cytosine contents of the DNAs of strains UIAT, VISIT, and GIHT were determined to be 26.9, 27.0, and 26.6 mol%, respectively. Our data indicate that the three strains represent new Mycoplasma species, for which we propose the names Mycoplasma auris, Mycoplasma cottewii, and Mycoplasma yeatsii. The type strain of M. auris is UIAT (= ATCC 51348 = NCTC 11731), the type strain of M. cottewii is VISIT (= ATCC 51347 = NCTC 11732), and the type strain of M. yeatsii is GIHT (= ATCC 51346 = NCTC 11730).

Twenty-one serologically distinct mollicutes that are not Ureaplasma strains have been isolated from goats and sheep, and these organisms are known variously as the “caprine-ovine mycoplasmas” or the “mycoplasmas of goats and sheep” (3, 10). Some of these molliculates have also been isolated from other hosts, but the majority of them occur principally in these two species. A significant number of them are pathogens that have caused major economic losses worldwide in both hosts (3, 10).

During 1981 and 1982, many mycoplasmas were isolated from the external and middle ear canals of clinically normal goats in Australia (5, 6). As many as six serologic types, including pathogenic species, were found in one ear, and up to $10^8$ CFU of mycoplasmas was recovered from a single ear swab culture. Also found in the ear canals were three previously undescribed strains, designated strains GT (T = type strain), UT, and VT, which represented apparently new Mycoplasma species. The presence of these three strains in external ear canals (the external auditory meatus) has also been documented in the United States (8, 10), and other workers have described the presence of mycoplasmas in the ears of goats in Europe (1a) and Peru (14a). In clinically normal goat herds with a prior history of mycoplasmal disease, the mycoplasmas described above and other mycoplasmas can often be isolated from the external ear canals of live goats, while other sites, such as the nares and milk, are culturally negative (7, 8). Little is known about the pathogenicity of these strains, although a serotype similar to strain GT has been shown to cause experimental mastitis in goats and has also been isolated from two goats with arthritis, mastitis, and pyrexia (9).

Emerging evidence indicates that the strain GT, UT, and VT types of mycoplasmas described in this paper are common in the external ears of goats (5, 6, 8) and are often found in close association with the common ear mites of goats, Psoroptes cuniculi and Raillietia caprae. In Australia, the three types are prevalent in the ears of goats (4a), whereas in the United States the strain GT type is prevalent, the strain VT type is encountered sporadically, and the strain UT type is rare (8a). In this study we characterize, describe, and redesignate strains GT, UT, and VT. We demonstrate that these organisms are serologically distinct from all previously described species belonging to the genera Acholeplasma, Entomoplasma, Mesoplasma, and Mycoplasma and propose that they should be designated new Mycoplasma species.

MATERIALS AND METHODS

Strain designation. Previously, the mycoplasma strains described in this paper have been designated strains GT, UT, and VT (5, 6, 8, 9, 10). However, these organisms were originally deposited as strains IHT, IA, and IST, respectively, in the Mycoplasma Reference Culture Collection in Adelaide, Australia. In this study, strains GT was the actual original strain IHT, strain IA was the actual original strain IA, and strain VT was the actual original strain IST. For purposes of this paper, in order to consolidate the original designations, we redesignate strains GT (= IHT), UT (= IA), and VT (= IST) as strains GIHT, UIAT, and VISIT, respectively.

Mycoplasmas and antisera used. Strains GIHT, UIAT, and VISIT were each cloned a minimum of three times by using...
conventional filtration and single-colony pick techniques (24) prior to the study. Antisera to these three strains were prepared in rabbits by using a procedure recommended elsewhere (22). The antisera to the following 115 strains of mollicutes were obtained from the Laboratory in Frederick, Md.: Acholeplasma axanthum S-743T, Acholeplasma caviae PP3T, Acholeplasma equitale C112T, Acholeplasma granularum BTS39T, Acholeplasma hippikoni C1T, Acholeplasma laiddawie PG8T, Acholeplasma medcum PG49T, Acholeplasma morum 72-043T, Acholeplasma multilocale PNS52T, Acholeplasma ocutil 19LT, Acholeplasma parvum H23M1, Entomoplasma melaleuciae M1T, Entomoplasma ellychniae ELCN-1T, Entomoplasma lucivorax PIPN-2T, Entomoplasma luminosum PIMN-1T, Entomoplasma somnillae PYAN-1T, Mesoplasma florinum L1T, Mesoplasma entomophilum TAC1T, Mesoplasma seiffertii F7T, Mesoplasma lactucae 831-08T, Mycoplasma agalactiae PG2T, Mycoplasma alkalessis D12T, Mycoplasma ali Isleyt, Mycoplasma anatis 1340T, Mycoplasma anseris 1219T, Mycoplasma arginini G230T, Mycoplasma arthritidis PG6T, Mycoplasma bovignivialium PG11T, Mycoplasma bovirhini PG43T, Mycoplasma bovis Donetta1T, Mycoplasma bovoculi M165/69T, Mycoplasma buccal CH20247T, Mycoplasma california ST-6T, Mycoplasma canadense 275CT, Mycoplasma canis PG14T, Mycoplasma capricolum subsp. capricolum California Kid1T, Mycoplasma capricolum subsp. capricolum California Kid T1T, Mycoplasma cloacale B317CT, Mycoplasma donetta CH20247T, Mycoplasma donetta PG18T, Mycoplasma gallinarum PG16T, Mycoplasma gallisepticum PG31T, Mycoplasma gallopavonis WR1T, Mycoplasma gateae CS1T, Mycoplasma genitalium G37T, Mycoplasma glycinum 486T, Mycoplasma hominis PG21T, Mycoplasma hyorhynchos H3-6BFT, Mycoplasma hyopneumoniae IT, Mycoplasma hyorhini B5T, Mycoplasma hyosynoviae S16T, Mycoplasma indii 3T, Mycoplasma iners PG30T, Mycoplasma iowae 695T, Mycoplasma leocapitus 3L2T, Mycoplasma leonhargis LL2T, Mycoplasma lipofaciens R171T, Mycoplasma lipophilum MAb1, Mycoplasma maculosum PG15T, Mycoplasma meleagridis 17529T, Mycoplasma moasitz MK405T, Mycoplasma mobile 163KT, Mycoplasma molare H542T, Mycoplasma muris R171T, Mycoplasma mustelae MX9T, Mycoplasma mycoides subsp. capri PG3T, Mycoplasma mycoides subsp. mycoides B3, Mycoplasma neurolyticum Type A1T, Mycoplasma opalescens MH5408T, Mycoplasma orale CH19299T, Mycoplasma ovipneumoniae Y98T, Mycoplasma ovoninonis 128T, Mycoplasma penetrans GTU54T, Mycoplasma phocaeareiae 1049T, Mycoplasma phocarhini 852T, Mycoplasma phocidae 105T, Mycoplasma pigrum 70-159T, Mycoplasma pneumoniae FHT, Mycoplasma primatum HRC292T, Mycoplasma pullorum CKKT, Mycoplasma pulmonis PG34T, Mycoplasma purpureus KS-1T, Mycoplasma salvinarum PG20T, Mycoplasma simbae LX1T, Mycoplasma spermophilum AH159T, Mycoplasma spumans PG13T, Mycoplasma suavi M158T, Mycoplasma subsuid T, Mycoplasma synoviae WVU 1853T, Mycoplasma testudinis 01008T, Mycoplasma vescundtum 107T, bovine mycoplasma strain PG50 (bovine sterile group 7), bovine mycoplasma strain California calf, caprine mycoplasma strain G145, and ovine mycoplasma strain 3306. In addition, another set of antisera to strains GIHT, UIAT, and VIST were obtained from the laboratory of California Kid. The molluscs listed above include all of the Acholeplasma and Mycoplasma species that have been described and all members of the recently described genera Entomoplasma and Mesoplasma (26).

Culture medium and growth conditions. Liquid or solid medium B (11) supplemented with either 5, 10, or 20% (vol/vol) equine or porcine serum was used as a general-purpose medium. Penicillin G (potassium salt; 1,000 IU/ml) and thallous acetate (final concentration, 1:4,000) were used as bacterial inhibitors. Bacterial inhibitors were omitted in studies in which we specifically examined bacterial reversion. The base media used for glucose fermentation and arginine hydrolysis studies were treated as described elsewhere (12) with glucose oxidase (type II; Sigma Chemical Co., St. Louis, Mo.) and arginine decarboxylase (Sigma) before enrichments were added. For fermentation studies, medium B was supplemented with 1% (wt/vol) D-glucose or 1% (wt/vol) D-mannose and a phenol red indicator (pH 7.6). Arginine hydrolysis was determined in medium FF (11) modified by omitting glucose and adding 0.2% (wt/vol) L-arginine (pH 7.4). All cultures were incubated aerobically or anaerobically (GasPak; BBL Microbiology Systems, Cockeysville, Md.) at 37°C. For hemolysis tests, tryptose blood agar base (Difco Laboratories, Detroit, Mich.) was supplemented with 5% (vol/vol) defibrinated ovine blood. The agar used for growth inhibition studies was mycoplasma agar base (BBL) supplemented with 1% (vol/vol) PPLO serum fraction (Difco). For studies in which we examined sterol dependence in liquid media, mycoplasma broth base (BBL) was supplemented with 10% fresh yeast extract and 15% fetal bovine serum.

Erythrocyte hemadsorption. We determined the ability of strains GHT, UIAT, and VIST to hemadsorb chicken and guinea pig erythrocytes as described elsewhere (13).

Serologic studies. Strains GHT, UIAT, and VIST were each tested against antisera to strains GHT, UIAT, and VIST by performing growth inhibition tests and direct and indirect immunofluorescence tests and were also tested against the antisera and fluorescein conjugates listed above, as described below. For these tests we used a standard disc growth inhibition test (2) or a modified procedure in which 4-mm agar wells were filled with antisera after the agar plates were seeded with the appropriate mycoplasma concentration and subsequently allowed to dry. The agar plates were kept at 25°C for 24 h and then incubated at 37°C until growth was optimum, usually 48 to 72 h. A direct agar plate epifluorescence procedure (14) was performed with colonies of strains GHT, UIAT, and VIST grown on SP4 medium (27) by using fluorescein conjugated antisera to the mollicute strains listed above. In addition, an indirect fluorescence procedure was performed with GHT, UIAT, and VIST colonies grown on horse serum agar medium by using specific rabbit antisera to strains GHT, UIAT, and VIST and then fluorescein-conjugated goat anti-rabbit antiserum.

Absence of reversion. Strains GHT, UIAT, and VIST were subcultured five times in solid and liquid medium B preparations that contained no antibiotics. Following each passage, agar colonies were treated with Diene stain and examined with a stereomicroscope (17). Centrifuged liquid cultures were examined by bright-field microscopy at a magnification of x1,250 following staining with Giemsa stain, and 1,250 following staining with Giemsa stain, and x1,250 following staining with Giemsa stain, and x1,250 following staining with Giemsa stain, and x1,250 following staining with Giemsa stain, and x1,250 following staining with Giemsa stain, and x1,250 following staining with Giemsa stain.
separately filtered through membrane filters (Millipore Corp., Bedford, Mass.) with average graded pore sizes of 450, 300, and 220 nm. An unfiltered sample was also examined as a control. Filtered and unfiltered samples were titrated by preparing serial 10-fold dilutions and then determining a viability count (CFUs) for each dilution (18).

Sterol dependence. We determined whether sterol was required for growth by (i) an indirect procedure based on susceptibility to digitonin-impregnated discs (25) on medium B agar containing 20% equine serum and (ii) a modified test procedure in which we compared sustained growth in serum-free and serum-containing culture media and in serum-free medium containing 0.04% polyoxymethylene sorbitan (Tween 80) (20).

Morphological studies. Centrifuged deposits from broth cultures of strains GIHT, UIAT, and VIST in the logarithmic phase of growth were examined at a magnification of >1,250 by dark-field microscopy and by transmission electron microscopy of ultrathin sections processed by a procedure described elsewhere (19).

Biochemical activity. Tests to examine the breakdown of glucose, mannose, and arginine were conducted in the media described above, while tests to examine the breakdown of urea and "film and spot" production were performed as described by Alutto et al. (1). The ability to reduce 2,3,5-triphenyltetrazolium chloride aerobically, the ability to digest serum and casein, and the ability to produce phosphatase were determined by procedures described by Cottew (4). In general, the requirements of the International Committee on Systematic Bacteriology Subcommittee on the Taxonomy of Mollicutes (15) were followed.

Estimation of DNA base composition. To extract and prepare DNA, cells were grown in 200 ml of glucose broth and were pelleted by centrifugation at 10,000 x g. The DNA was extracted and purified by a procedure described elsewhere (23). To estimate base composition, DNA samples were dissolved in 0.33X SSC (1x SSC is 150 mM NaCl plus 15 mM trisodium citrate). The melting temperature (Tm) was estimated by thermal denaturation in a recording spectrophotometer. The base composition was calculated from the following equation, as described previously (16): G+C content = 2.24Tm – 135.14 (in 0.33 X SSC). The G+C content of each DNA was calculated from the mean of two Tm estimates. A. laidlawii PG8 (= NCTC 10116), which has a previously reported G+C content of 32.6 mol% (21), was used as a control.

RESULTS AND DISCUSSION

Serologic studies. Reciprocal testing of strains GIHT, UIAT, and VIST in both growth inhibition and direct epimimnofluorescence tests indicated that these three mollicutes were serologically distinct from each other. When we performed indirect immunofluorescence tests with an additional set of antisera to strains GIHT, UIAT, and VIST prepared in a separate laboratory, we found that the three strains were similarly distinct in reciprocal tests. In addition, no significant serologic cross-reactions were observed when antigens of the three caprine isolates were tested against antisera to all of the previously described Achlobactrum, Entomobacter, Meso- plasma, and Mycoplasma species in disc growth inhibition and direct epimimnofluorescence serologic tests. Thus, in all of the tests there were completely homologous reactions, and no cross-reactions of significance occurred.

Sterol requirement. The growth of strain GIHT, UIAT, or VIST on agar containing 20% serum was inhibited to a distance of 6 to 11 mm from the well by a digitonin-impregnated disc.

All three strains grew for only 2 passages in serum-free medium, for 1 passage in serum-free medium supplemented with Tween 80, and for all 23 passages tested in a control medium containing 15% fetal bovine serum.

Morphological studies. Examination by phase-contrast and light microscopy revealed pleomorphic coccoid forms. No evidence of motility was observed, and helical forms were not seen. Transmission electron microscopy of ultrathin sections revealed pleomorphic coccoid forms with an outer unit cytoplasmic membrane that showed no evidence of cell wall material (Fig. 1).

Growth conditions. Strains GIHT, UIAT, and VIST grew well aerobically in media supplemented with either 5, 10, or 20% equine or porcine serum. Colonies on agar had the typical "fried-egg" appearance characteristic of most mycoplasma cultures, and they readily took up Diens stain. Colony diameters ranged from 0.5 to 1.5 mm after 48 to 72 h of incubation. Anaerobically, strain UIAT grew equally well with all three serum concentrations in the agar, but the growth of strains GIHT and VIST was sparse. A peculiar and very interesting characteristic of strain VIST was its ability to produce highly pigmented, intense brown to black colonies on agar, as previously described (6, 10). Pigmentation developed on agar colonies after 2 to 4 days (or more) of incubation and only in colonies that were well separated. This characteristic was first noticeable in the center of each colony, but coloration gradually became more intense and in many cases encompassed most of the colony within 4 to 7 days. Pigmentation occurred only on solid agar medium supplemented with thallous acetate. On this type of agar, the pigmentation produced by strain VIST colonies (assuming that pigmentation was expressed in well-isolated colonies) was usually sufficient for a presumptive diagnosis of this serologic type.

Biochemical characteristics. Strain GIHT utilized both glucose and mannose slowly, requiring about 2 weeks for a decline in pH of 0.5 or more units. Sterol was required for growth, and arginine was hydrolyzed. Tetrazenol was reduced. Phosphatase was not produced, and urea was not hydrolyzed. Serum and casein were not digested, and film and spots were not produced.

Strain UIAT did not ferment glucose or mannose but did hydrolyze arginine. Sterol was required for growth, and urea was not hydrolyzed. Tetrazenol was reduced. Phosphatase was produced. Serum and casein were not digested, and film and spots were not produced.

Strain VIST fermented both glucose and mannose. Arginine and urea were not hydrolyzed. Sterol was required for growth. Tetrazenol was reduced. Phosphatase was not produced. Serum and casein were not digested, and film and spots were not produced.

Hemolytic activity. Strains GIHT and VIST grew aerobically on ovine blood agar, producing colonies that were 0.1 to 0.25 mm in diameter after 48 to 72 h of incubation and a zone (diameter, approximately 1.5 mm) of viridans type (α) hemolysis (i.e., a greenish discoloration of the blood agar). After 4 to 7 days of incubation the lysis generally became more intense, resembling weak beta-hemolysis. Strain UIAT grew poorly on ovine blood agar, producing barely discernible colonies that were about 0.1 mm in diameter and weak viridans type hemolytic zones that were approximately 1 mm in diameter.

Erythrocyte hemadsorption. Strain GIHT hemadsorbed guinea pig erythrocytes but not chicken erythrocytes. Strains UIAT and VIST did not hemadsorb either type of erythrocytes.

Filtration studies. An unfiltered strain GIHT culture contained 8 x 10^8 CFU/ml, while following filtration through 450-, 300-, and 220-nm-pore-size filters the resulting preparations

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FIG. 1. Electron photomicrographs of sections of strains UIA\textsuperscript{T} (a), VIS\textsuperscript{T} (b), and GIH\textsuperscript{T} (c) stained with uranyl acetate and Reynold lead acetate. A single cytoplasmic membrane is present in each cell. Bars = 500 nm.
contained $4 \times 10^6$, $9 \times 10^7$, and $2 \times 10^5$ CFU/ml, respectively. The corresponding values for strain UIAT were $3 \times 10^6$ (unfiltered), $1 \times 10^7$, and $0 \times 10^5$ CFU/ml, respectively, and the values for strain VIST were $7 \times 10^6$ (unfiltered), $5 \times 10^5$, $2 \times 10^6$, and $3 \times 10^5$ CFU/ml, respectively.

**DNA base composition.** The DNA G+C contents calculated from the means of two $T_m$ estimates were 26.6, 26.9, and 27.0 mol% for strains GIHT, UIAT, and VIST, respectively. For A. laidlawii PG8, the value which we determined was 32.4 mol% (the previously reported value was 32.6 mol%).

**Observations on habitat and pathogenicity.** Strain UIAT was isolated from the external ear canals of goats in Australia, as were other serologically and otherwise indistinguishable strains (5, 6). One serologically similar strain has been isolated once in the United States (10).

Strain VIST and other indistinguishable strains were isolated from the external ear canals of goats in Australia (5, 6). Numerous other isolates of this serotype have been obtained from the same anatomical site of goats in the United States (8a).

Strain GIHT was isolated from the external ear canals of goats in Australia, as were numerous other serologically and otherwise indistinguishable strains (5, 6); an isolate was also obtained from a retropharyngeal lymph node. Serologically similar isolates have been obtained frequently from the external ear canals of goats in the United States, and one isolate was obtained from the same site in a calf housed in close confinement with goats harboring strain GIHT serologic types in their ears (8a). An isolate designated GM790A, which was reported to be a serologic equivalent of strain GIHT, was isolated from the lungs, spleens, and milk of two naturally infected goats in the United States (9). One goat was mastitic and had an elevated temperature. Inoculation of strain GM790A into the teat canals of two lactating goats resulted in abrupt termination of lactation, leading to mastitis and agalactia within 3 days.

In Australia, serologic types similar to strains GIHT, UIAT, and VIST are prevalent in the ear canals of goats (4a). In the United States, serotypes similar to strain GIHT are common in the ear canals of goats, strain VIST types have been recovered occasionally, and strain UIAT serotypes are rare (8a).

**Taxonomic conclusions.** The characteristic cellular morphology and size of strains GIHT, UIAT, and VIST and their typical colony form, together with their resistance to penicillin and their failure to revert to bacterial forms in the absence of penicillin, confirm that these organisms are members of the Mollicutes. The sterol requirement of these organisms, their nonhelical form, their atmospheric and temperature requirements, and their inability to metabolize urea place them in the genus Mycoplasma. The fact that the three strains are serologically distinct from each other and from all other relevant species of Mollicutes indicates that they should be considered separate new Mycoplasma species, as proposed below.

**Taxonomic proposals for new species and taxonomic descriptions.** (i) **Taxonomic proposals.** For strain UIA and other indistinguishable isolates we propose the name Mycoplasma auris sp. nov., with strain UIA (= ATCC 51347 = NCTC 11731) as the type strain.

For strain VIS and other indistinguishable isolates, we propose the name Mycoplasma cottewii sp. nov., with strain VIS (= ATCC 51348 = NCTC 11730) as the type strain.

For strain GIH and other indistinguishable isolates, we propose the name Mycoplasma yeatsii sp. nov., with strain GIH (= ATCC 51346 = NCTC 11730) as the type strain.

(ii) **Description of Mycoplasma auris sp. nov.** Mycoplasma auris (aur=in. L. gen. n. auris, of the ear, referring to the provenance of the organism, the ears of goats). M. auris is serologically distinct from all of the other Acholeplasma, Entomoplasma, Mesoplasma, and Mycoplasma species evaluated in this study.

Colonies on agar have the fried-egg appearance characteristic of most members of the Mollicutes. M. auris does not catalyze glucose or mannose, but arginine is hydrolyzed. Sterol is required for growth, and urea is not hydrolyzed. Tetrazolium is not reduced aerobically. Phosphatase is produced. Serum and casein are not digested, and film and spots are not produced on equine or porcine serum-containing media. Chicken and guinea pig erythrocytes are not hemadsorbed.

Growth is equally good under aerobic and anaerobic (GasPak) conditions. Very small colonies. Slight viridans-type hemolysis occurs on ovine blood agar incubated aerobically; beta-hemolysis occurs after further incubation.

Filterable through 300-nm-pore-size filters with some loss of viability but not filterable through 220-nm-pore-size filters.

The G+C content of the DNA is 26.9 mol%.

The type strain is UIA (= ATCC 51348 = NCTC 11731).

Many other serologic types similar to strain UIAT have been isolated from the ears of goats in Australia. The organism has been recovered only once in the United States.

The only known habitat of M. auris is the external ear canals of goats. Pathogenicity is unknown.

(iii) **Description of Mycoplasma cottewii sp. nov.** Mycoplasma cottewii (cot.tew`ii M. L. gen. n. cottewii, of Cottew, named, as proposed by R. H. Leach, after G. S. Cottew, one of the coisolators of the organism). M. cottewii is serologically distinct from all of the other Acholeplasma, Entomoplasma, Mesoplasma, and Mycoplasma species evaluated in this study.

Colonies on agar have the fried-egg appearance characteristic of most mycoplasmas.

M. cottewii catalyzes glucose and mannose. Arginine and urea are not hydrolyzed. Tetrazolium is reduced aerobically. Phosphatase is not produced. Sterol is required for growth. Serum and casein are not digested, and film and spots are not produced on equine or porcine serum-containing media. Chicken and guinea pig erythrocytes are not hemadsorbed.

Acrobic growth is greater than growth under anaerobic (GasPak) conditions when the two methods are compared. Colonies on ovine blood agar that are incubated aerobically produce zones of viridans type hemolysis, which changes to a beta-hemolysis after additional incubation. Brown to black pigmentation, which is often intense, occurs in young, well-separated colonies on thallium acetate-containing agar medium; this characteristic can be used for presumptive diagnostic identification of M. cottewii.

Filterable through 220-nm-pore-size filters with some loss of viability.

The G+C content of the DNA is 27.0 mol%.

The type strain is VIS (= ATCC 51347 = NCTC 11732).

Serologic types similar to strain VIST are common in the ears of goats in Australia and have been recovered occasionally from the ears of goats in the United States. One isolation of a strain VIST serotype has been reported from the nasal sinuses of goats (6). Pathogenicity is unknown.

(iv) **Description of Mycoplasma yeatsii sp. nov.** Mycoplasma yeatsii (yeat'si.i. M. L. gen. n. yeatsii, of Yeats, named after F. R. Yeats, one of the original coisolators of the organism). M. yeatsii is serologically distinct from all of the other Acholeplasma, Entomoplasma, Mesoplasma, and Mycoplasma species evaluated in this study.

Colonies on agar have the fried-egg appearance characteristic of most mycoplasmas.

M. yeatsii utilizes glucose and mannose slowly, requiring 2
weeks or longer for a decrease in pH of 0.5 or more units. Sterol is required for growth. Arginine is hydrolyzed, and tetrazolium is reduced aerobically. Phosphatase is not produced, and urea is not hydrolyzed. Serum and casein are not digested, and film and spots are not produced on equine or porcine serum-containing media. Guinea pig erythrocytes are hemadsorbed, chicken erythrocytes not hemadsorbed. Good growth occurs aerobically, but only sparse growth occurs under anaerobic (GasPak) conditions. Colonies on ovine blood agar that are incubated aerobically produce a zone of viridans type hemolysis, which changes to weak beta-hemolysis after further incubation.

Filterable through 220-nm-pore-size filters with some loss of viability.

The G+C content of the DNA is 26.6 mol%.

The type strain is GtH (= ATCC 51346 = NCTC 11730).

Many other serologically similar isolates have been identified in Australia and in the United States. The usual habitat is the external ear canals of goats, but strain GtH serotypes have also been isolated from a retropharyngeal lymph node (6) and from naso tracts, internal organs, and milk of naturally infected goats (9).

REFERENCES


