Characteristics of *Mycoplasma meleagridis* sp. n., Isolated from Turkeys

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**ABSTRACT**

YAMAMOTO, R. (University of California, Davis), C. H. BIGLAND, AND H. B. ORTMAYER. Characteristics of *Mycoplasma meleagridis* sp. n., isolated from turkeys. J. Bacteriol. 90:47-49. 1965.—A designation is proposed for a pathogenic *Mycoplasma* species isolated from turkeys. The organism originally was recovered from the air-sac lesion of a turkey poult in 1957, and was designated the "N" strain. *Mycoplasma* species with identical characteristics have since been recovered from the sinus, trachea, oviduct, vagina, semen, and bursa of Fabricius of turkeys. The organism has been recovered from many turkey flocks throughout the country. Many investigators have confirmed the original finding that this organism is antigenically distinct from other known serotypes of *Mycoplasma* found in poultry. The species proposed is *Mycoplasma meleagridis* sp. n.

Of 19 distinct antigenic types of *Mycoplasma* recovered from poultry (Yoder, 1963; Dierks, 1964), 3 are proven pathogens. *M. gallisepticum* (Edward and Kanarek, 1960) is the cause of chronic respiratory disease in chickens and turkeys (Adler, 1960), and *M. synoviae* (Olson, Kerr, and Campbell, 1964) is the cause of infectious synovitis. A third serological type, associated with airsacculitis in young turkeys, is commonly referred to as the "N" strain. This strain was described first by Adler et al. (1958). The biological and antigenic characteristics of the original isolate, designated "N," were studied by Yamamoto and Adler (1958). They placed it in group V of five distinct serological types of *Mycoplasma* studied at that time. The isolate later was studied by Kleckner (1960), Kelton and Van Roekel (1963), Yoder (1963), and Dierks (1964), who also characterized it as a distinct serological type. Although Edward and Kanarek (1960) classified several of the mycoplasmas of avian origin into species, they did not include the "N" strain. Recently, Yamamoto and Bigland (1965) produced airsacculitis in turkey poults with recent isolates of "N" *Mycoplasma* recovered from the air sac, semen, or oviduct of turkeys. Thus, in view of the previous work and the recent observations on the ecological and biological properties of "N" *Mycoplasma*, it seems appropriate at this time to propose a designation for the organism, namely, *M. meleagridis* sp. n.

**MATERIALS AND METHODS**

The organism may be cultivated on PPLO Agar (Difco) enriched with horse serum (15%), and yeast autolysate (1%; Albimi Laboratories, Inc., Flushing, N.Y.). The enrichment broth of Adler, Yamamoto, and Bankowski (1954) also may be used prior to plating on agar medium.

**RESULTS AND DISCUSSION**

Growth characteristics. The initial isolation of *M. meleagridis* from infected tissues of turkeys is readily accomplished. Although inoculated plates are held for at least 6 days before final disposition, colonies may be visible as early as the second day. Growth is optimal at 37 to 38 C and slight at 40 to 42 C. The organism will not grow at room temperature (22 to 24 C), but cultures held at room temperature for 6 days and then incubated at 37 C are viable. The organism is a facultative anaerobe. An earlier report by Yamamoto (1957) that "N" *Mycoplasma* is a strict aerobe was found in the present investigations to be in error. The recovery rate of *M. meleagridis* is comparable whether suspect materials are plated directly onto agar medium or passaged initially through the enrichment broth. Most isolates, however, cannot be maintained in broth, and they lose their viability after two to three such passages. Accordingly, *M. meleagridis* is maintained in the laboratory...
by agar-to-agar passage at weekly intervals. Most isolates also may be maintained by mincing colonies on agar in 3% sucrose and freezing the resulting suspension. With such procedures, the organism will remain viable for at least 2 months. Lyophilized cultures remain viable for at least 1 year.

Giemsa-stain smears of isolates which can be maintained in broth show coccoid bodies indistinguishable from those of \textit{M. gallisepticum}. On agar, \textit{M. meleagridis} appears as flat, small, delicate colonies (diameter, 0.04 to 0.18 mm), with rough-appearing centers or ill-defined nipples. Upon continuous passage, however, nipping of the colonies becomes more prominent.

\textbf{Biochemical and antigenic characteristics.} Although certain cultural, biochemical, and biological characteristics of \textit{M. meleagridis} are helpful in the presumptive identification of the organism (Table 1), definitive identification is based on serology. The fluorescent-antibody (Corstvet and Sadler, 1964), agglutination (Yamamoto et al., 1965), and antiglobulin (Adler and DaMassa, 1964) procedures have been used to identify \textit{M. meleagridis}. Recent isolates of \textit{M. meleagridis} (Yamamoto et al., 1965) conform to the description of the original isolate (Yamamoto and Adler, 1958). In Table 1, the characteristics of \textit{M. meleagridis}, \textit{M. synoviae}, and \textit{M. gallisepticum} are compared.

\textbf{Source of isolation.} The organism has been recovered from the following anatomical sites of the turkey: air sacs, trachea, sinus, bursa of Fabricius, vagina, and semen (Yoder and Hofstad, 1964; Yamamoto et al., 1965; Bohl, personal communication).

\textbf{Pathogenicity.} \textit{M. meleagridis} causes an airsacculitis in turkeys (Dierks, 1964; Kumar et al., 1964; Yoder and Hofstad, 1964; Yamamoto and Bigland, 1965). Naturally or experimentally infected turkeys develop agglutinins to antigens prepared from isolates of \textit{M. meleagridis} (Adler, 1958; Bigland and Yamamoto, 1965; Yamamoto and Bigland, 1964a). All evidence to date indicates that \textit{M. meleagridis} does not produce pathological changes in chickens (Adler, 1958; Yamamoto and Bigland, 1964b; Yoder, personal communication).

\textbf{Table 1. Characteristics of pathogenic Mycoplasma species of poultry origin}

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>\textit{M. meleagridis}</th>
<th>\textit{M. gallisepticum}</th>
<th>\textit{M. synoviae}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representative strains</td>
<td>N, 17529, “oviduct”</td>
<td>S6, PH, A5069</td>
<td>1853, NTF, 1071</td>
</tr>
<tr>
<td>NAD$^+$ and CO$_2$ requirement</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Glucose fermentation</td>
<td>–</td>
<td>+</td>
<td>No growth</td>
</tr>
<tr>
<td>Tetrazolium blue reduction$^a$</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Growth in broth</td>
<td>( \text{V}^d )</td>
<td>+</td>
<td>No growth</td>
</tr>
<tr>
<td>Morphology</td>
<td>Coccoid</td>
<td>Coccoid</td>
<td>Coccoid</td>
</tr>
<tr>
<td>Hemagglutination (chicken</td>
<td>( \text{V}^d )</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>erythrocytes)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pathogenicity for</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Chickens</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Turkeys</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary lesions</td>
<td>Airsacculitis</td>
<td>Airsacculitis, tracheitis,</td>
<td>Synovitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sinusitis</td>
<td></td>
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</tbody>
</table>

$^a$ Nicotinamide adenine dinucleotide.
$^b$ Medium containing tetrazolium blue (Yamamoto and Adler, 1958).
$^c$ \( \text{V} \) = variable; most isolates cannot be maintained in broth.
$^d$ Of many isolates studied, one hemagglutinated chicken erythrocytes.

\textbf{Acknowledgments}

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\textbf{Literature Cited}


