

NOTES

Gliding Motility of *Mycoplasma pulmonis*

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The gliding movements of freshly isolated *Mycoplasma pulmonis* cells were observed and measured. The motile cells had a characteristic appearance, an average speed of 0.4 to 0.7 $\mu\text{m/s}$, and a maximum speed of 1 $\mu\text{m/s}$.

Gliding motility of mycoplasmas was first detected in *Mycoplasma pulmonis*. The first report given by Andrewes and Welch (1) described the main characteristics of the motile cells. They found spherical cells ("globules") that glided in the direction of a protruding stalk. No true motility was observed after the cells became detached from the glass. After about six passages in vitro, the movements were no longer detectable. These observations were confirmed by Nelson (8) and Nelson and Lyons (9), but no further observations or experiments were reported in the following years. Meanwhile, the gliding motility of *M. pneumoniae* (3) and *M. gallisepticum* (4) was detected, and adequate methods for photography, measurements, and analysis were developed (10).

Because of the rapid decline of *M. pulmonis* motility during passages on artificial media, it seemed important to obtain data from early cultures. Our own observations were performed on an isolate from a rat with signs of infection in the upper respiratory tract. A nasal swab was taken and squeezed out in liquid medium (7) containing penicillin (1,000 U/ml) and 0.05% thallium acetate. From the resulting suspension, two agar plates (7) were inoculated, and two cover slip chambers (2) were filled. Colonies grown on agar were positive for glucose fermentation and were sensitive against anti-*M. pulmonis* antiserum. The cover slip chambers were examined by phase-contrast microscopy after 20 h at 37°C. Numerous motile elements were seen gliding along the glass surface. Photographs and cinematographic pictures (frequency, 120 frames per min) were taken and analyzed as described previously (10). After the first series of exposures, the

incubation temperature was reduced at 32°C, and after 1 h of adaptation more cinematographic series were taken.

Two forms of motile cells were observed. One was a round cell with a protruding flexible stalk (Fig. 1), which was often slightly thickened at the front end. Sometimes the length of the stalk exceeded the diameter of the cell considerably. Occasionally, several cells were attached together (Fig. 1), as already described by Andrewes and Welch (1). The other form observed was that of an elongated cell with a tapered leading end (Fig. 1, right). These forms were termed "gliders" by Nelson (8). The length of these cells varied considerably from about 1.5 to more than 5 μm . The stalk of the round cells and the whole body of the elongated cells were highly flexible (Fig. 2). The stalk was always the leading part during the movements. The elongated cells also did not change their leading end except in few cases of very long cells, which in fact may have consisted of two cells just before separation. The cells moved with a low percentage of resting periods (0 to 25%); the average speed (without pauses) during move-

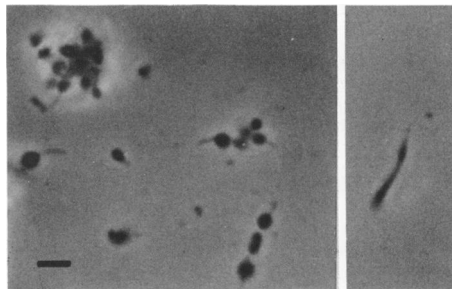


FIG. 1. *M. pulmonis* cells on glass surface. Phase contrast; bar indicates 2 μm . Left, Moving cell with protruding stalk and clustered cells pulled by motile cell; right, elongated cell.

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