**Mycobacterium**

**How do birds get infected:**

- They can get infected by other birds (captive or exposure to wild birds)
- Humans: Although *Mycobacterium tuberculosis* primarily causes disease in humans, many animals are reported to be susceptible to infection, including primates, swine, cattle, sheep, goats, dogs, cats, and elephants (3, 8). Infection with *M. tuberculosis* in birds is rare. Psittacine birds (principally the parrot family) are the only avian species known to become infected with *M. tuberculosis*, presumably due to close contact with tuberculous owners. *Mycobacterium tuberculosis* was isolated from the eyelid, skin, tongue, and lungs of a green-winged macaw (*Ara chloroptera*). Two persons living in the same household were culture positive for pulmonary tuberculosis 3 to 4 years before tuberculosis was diagnosed in the bird. Although humans have not been shown to acquire tuberculosis from birds, an infected bird may be a sentinel for human infection.

**Can you catch it from a pet bird ...**

Diseases such as Mycobacterium Avium Complex (MAC), psittacosis (parrot fever), and Salmonella are the primary diseases associated with pet birds that can be potentially transmitted to humans.

**Disease Testing:** Zoologix can test birds for diseases, including the Mycobacterium - Bird Disease Testing

Below is the information Zoologix provides on this condition:

Many different mycobacteria can cause disease in birds, mammals and reptiles. Infections occur through contact with other infected animals or humans through inhalation or the digestive route (Moreland, 1970). Infected animals can become reservoirs, causing outbreaks of disease. Mycobacterial infections have also been reported in many other captive and wildlife species.

Detection of mycobacterial infections has relied on tuberculin skin response, serological testing, histopathology, microscopy and culture identification. Among these, the most frequently used methods are culture identification and the tuberculin skin test (also known as the PPD, for Purified Protein Derivative), the latter being a routine test in quarantine and preventive medicine protocols
However, the PPD test is not adequately sensitive or specific in many species and the rate of false negatives is high. Culture and associated biochemical tests for the identification of mycobacteria species are slow and painstaking procedures, and require careful collection and preservation of specimens in order to obtain accurate results.

PCR detection of mycobacterial DNA is highly sensitive when proper specimens are carefully collected. Sample types and collection techniques vary by species; deep respiratory samples obtained using bronchial lavage are preferred for some species. Gastric lavage can also be a useful sampling technique. Pathology samples should be taken from foci most likely to contain the pathogen -- typically lymph nodes or lung or other organ lesions. Trunk washes are used to obtain samples from elephants (National Tuberculosis Working Group for Zoo and Wildlife Species, 2003).

In addition to the detection of a number of mycobacterial species by real time PCR, identification of mycobacteria to the species level can be accomplished rapidly through sequence analysis of PCR products using a restriction fragment length polymorphism (RFLP) technique. Ultrasensitive detection of mycobacteria by PCR and subsequent restriction digest analysis not only allows reliable detection of various species of mycobacteria but in many cases also enables identification of mycobacteria at the species level.

Utilities:

- Confirm the disease causing agent
- Ensure that flocks are free of disease-causing mycobacteria
- Early prevention of spread of mycobacteria among a flock
- Minimize human exposure to disease-causing mycobacteria
- Safety monitoring of biological products and vaccines that derive from birds

References:


Control:

- Prevention: Sanitation and minimizing stress and overcrowding; Provide proper ventilation; Prevent malnutrition with a proper diet.
- New additions to the aviary should be quarantined for a minimum of 1-2 months.
- Testing new additions for M. avium is also a good way to prevent possible outbreaks.
- All M. avium isolates that have been tested up to now are totally resistant to the antituberculous drugs currently used in humans ATB is extremely difficult to treat, and in many cases treatment is not considered a viable option.

*Mycobacterium* is a genus of Actinobacteria, given its own family, the Mycobacteriaceae. The genus includes pathogens known to cause serious diseases in mammals, including tuberculosis and leprosy. The Latin prefix "myco—" means both *fungus* and *wax*; its use here relates to the "waxy" compounds in the cell wall.

Microbiologic characteristics

Mycobacteria are aerobic and nonmotile bacteria (except for the species Mycobacterium marinum which has been shown to be motile within macrophages) that are characteristically acid-alcohol fast.[1] Mycobacteria do not contain endospores or capsules, and are usually considered Gram-positive. While mycobacteria do not seem to fit the Gram-positive category from an empirical standpoint (i.e. they do not retain the crystal violet stain), they are classified as an acid-fast Gram-positive bacterium due to their lack of an outer cell membrane. All Mycobacterium species share a characteristic cell wall, thicker than in many other bacteria, which is hydrophobic, waxy, and rich in mycolic acids/mycolates. The cell wall makes a substantial contribution to the hardiness of this genus.

Many *Mycobacterium* species adapt readily to growth on very simple substrates, using ammonia or amino acids as nitrogen sources and glycerol as a carbon source in the presence of mineral salts. Optimum growth temperatures vary widely according to the species and range from 25 °C to over 50 °C.

Some species can be very difficult to culture (i.e. they are fastidious). Further, some species also have extremely long reproductive cycles — *M. leprae*, may take more than 20 days to proceed through one division cycle (for comparison, some *E. coli* strains take only 20 minutes), making laboratory culture a slow process.

A natural division occurs between slowly– and rapidly–growing species. Mycobacteria that form colonies clearly visible to the naked eye within 7 days on subculture are termed rapid
growers, while those requiring longer periods are termed slow growers. Mycobacteria are slightly curved or straight rods between 0.2-0.6 µm wide by 1.0-10 µm long.

Ecological characteristics

Mycobacteria are widespread organisms, typically living in water (including tap water treated with chlorine) and food sources. Some, however, including the tuberculosis and the leprosy organisms, appear to be obligate parasites and are not found as free-living members of the genus.

Pathogenicity

Mycobacteria can colonize their hosts without the hosts showing any adverse signs. For example, billions of people around the world are infected with *M. tuberculosis* but will never know it because they will not develop symptoms.

Mycobacterial infections are notoriously difficult to treat. The organisms are hardy due to their cell wall, which is neither truly Gram negative nor positive, and unique to the family, they are naturally resistant to a number of antibiotics that work by destroying cell walls, such as penicillin. Also, because of this cell wall, they can survive long exposure to acids, alkalis, detergents, oxidative bursts, lysis by complement and antibiotics which naturally leads to antibiotic resistance. Most mycobacteria are susceptible to the antibiotics clarithromycin and rifamycin, but antibiotic-resistant strains are known to exist.

Various phenotypic tests can be used to identify and distinguish different Mycobacteria species and strains.

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