

# The First Case of Microbiologically Detected *Macrorhabdus ornithogaster* and *Candida spp.* infection from Two Budgerigar (*Melopsittacus undulatus*) in Turkey

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**Abstract:** In this case, a 3-year-old budgie with swelling on its chest is presented. Physical examination revealed swelling in the chest, shedding of the feathers, and restlessness. The swelling in the chest was relieved by puncture and the animal was partially relieved; but re-formed later. It was learned that despite the use of many antibiotics, no response was obtained. The samples from the budgerigars were incubated at 37 °C in Blood Agar, Mac Conkey Agar, Nutrient Agar and 21 °C in Sabouraud Dextrose Agar under aerobic and microaerophilic conditions. Colonies grown on microaerophilic cultivation were evaluated. As a result of the conventional identification, *Macrorhabdus ornithogaster* (*M. ornithogaster*) and *Candida spp.* detected. Acidic water and probiotic therapy were recommended. In this study, zoonotic *M. ornithogaster* was determined in budgerigars for the first time in Turkey. Significant improvement in the budgerigar, improvement in feathers, regrowth, and reduction in breast swelling were detected. It should not be ignored that yeast infections can also be seen in budgie due to bacterial infections and occasional feeding with poor quality feeds.

**Keywords:** Budgie, *Candida spp.*, *Macrorhabdus ornithogaster*.

## 1. Introduction

Megabacteriosis; It is caused by *Macrorhabdus ornithogaster* (*M. ornithogaster*), a fungus belonging to the *Ascomycetes* class, which causes infections characterized by chronic respiratory system symptoms and stomach inflammation especially in budgerigars, parrots and canaries. It has been reported that an infection that reduces the quality of life of budgerigars is an infection that can lead to significant economic losses in

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poultry [1]. Megabacteriosis was defined as a fatal gastrointestinal disease that is widely distributed in the world and includes various avian species in 2011 [2].

A disease state where megabacteria will not work may show complete manifestation without clinical manifestation and several weeks or persistence from demonstration. The name *M. ornithogaster* is formed from the Greek words macrorhabdus (long rod) and ornithogaster (bird stomach) and is derived from megabacteriosis, macrorhabdosis, goinglight (GL), wasting disease, budgerigar disease, bacteria giganticus, Megabacteria-associated disease (MAD), proventricular/ventricular disease; it is most commonly named Avian Gastric Yeast (AGM). There is lateral rocking or linear movement of the microorganism. The agent is oxidase and catalase negative; does not use nitrate. It does not produce acetone from glucose and hydrolyzes esculin. It does not use arginine, lysine, ornithine or tryptophan. It produces acid from glucose, galactose, levulose, maltose, melibiose, starch and sucrose [3]. As a result of electron microscopic studies in the early 2000s, it was suggested that the causative agent might be a fungus [4]. The infection is seen in many countries in Europe, Africa and North America; it has been detected in various poultry species in Australia, New Zealand, England and Israel. It has been reported that there are no studies in Turkey [5, 6]. It has been reported that factors such as malnutrition, stress, and immunosuppression increase the severity of the infection in the formation of the disease. It is reported that especially canaries, budgerigars and parrots are among the important reservoirs of *M. ornithogaster*. It is very important in the contamination of feces; it has been reported that the most important transmission route is fecal-oral transmission [4, 6, 7].

It has been reported that *M. ornithogaster* is most heavily colonized in the isthmus region (between the glandular and muscular stomach) [8]. In advanced cases, atrophy, necrosis and ulcers in the isthmus region, as well as inflammation and hemorrhages are observed. These lesions reduce the feed conversion rate and feed utilization of the animal. Along with chronic weakness in animals, undigested feeds are also encountered in the feces. Deaths may also occur after a long process as a result of the deterioration of the fluid and electrolyte balance in further stages [8, 9, 10, 11, 12]. When *M. ornithogaster* penetrates the stomach, it increases the pH values, which are on average 2.18-2.39, to 5.17-7.3 on average in dead animals [9, 13]. Depending on the microbial flora in the feed, there may be an increase in the number of *M. ornithogaster*; infections caused by *M. ornithogaster* have been reported at a rate of 48.3% in animals fed commercial feed [14]. The acute form of *M. ornithogaster* infections is mostly seen in canaries and budgerigars. Although no characteristic finding was observed, it was reported that blood came from the mouth of animals and death occurred as a result of gastric rupture [7, 11, 16]. The chronic form is fatigue, depression, fluffing and shedding of feathers, discoloration of the beak, cravings for overeating, undigested feed, stomach contents or blood coming from the mouth, foot problems, dry stool in the cloacal region, stool

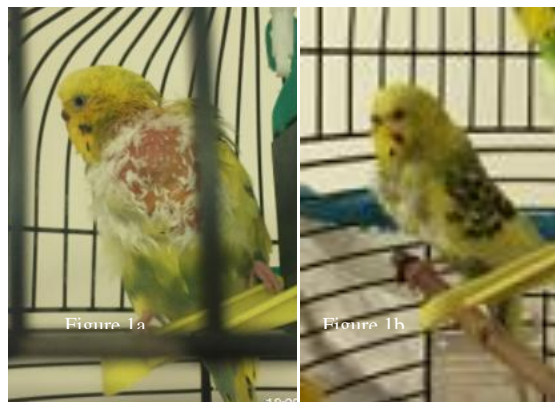
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discoloration and diarrhea in animals aged 1-5 years including chickens such symptoms are also observed [1, 7, 11, 16, 17].

Definitive diagnosis of megabacteriosis caused by *M. ornithogaster* is made by detecting the agent in stools, swabs taken from crops, gastric contents and gastric lavage. It differs from other factors in that it is quite large and is immediately noticeable in dyeing. It has been reported to grow at 38-42 °C in a microaerophilic atmosphere in media such as Sabouroud Dextrose Agar (SDA), Basal Medium Eagle (BME) and MRS Medium [1, 15]. In studies, it was reported that planting in SDA showed good growth in an environment with 5% CO<sub>2</sub> and 37 °C [1, 6]. It can also be diagnosed by PCR test [5]; in situ hybridization studies have also been reported to be successful [8, 15].

Megabacteriosis cannot be treated with antibiotics, and success is achieved by using antifungals. As an alternative method, acids to reduce gastric acidity through the drinking water of animals or *Lactobacillus spp.* genus bacteria are applied [5, 13].

In our case, in the physical examination of a 3-year-old budgerigar, clinical findings such as swelling on the chest, swelling and shedding of feathers, restlessness, and depression were observed (Fig. 1 and 2).



**Fig. 1**

Swelling in the chest, clinical signs of feather loss and reduction in breast swelling.

**Fig. 2**

Feather regrowth 15 days after treatment.

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After the swelling in the chest was formed, the animal was discharged by puncture by the owner and the animal was partially relieved; but re-formed a few months later. It was learned that despite the use of many antibiotics, no response was obtained.

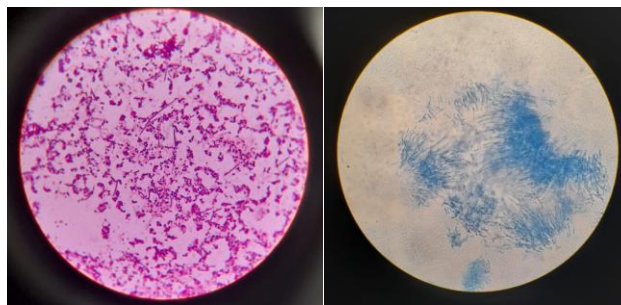
### 2. Materials and Methods

Fluid was drawn from the swelling in the chest of the budgerigar under sterile conditions and taken for microbiological examination. The contents were found to be bloody but free of mucus.

The samples from the budgerigars were incubated at 37 °C in Blood Agar, Mac Conkey Agar, Nutrient Agar and 21 °C in Sabouraud Dextrose Agar under aerobic and microaerophilic conditions. Colonies formed were identified by conventional methods [3].

### 3. Results and Discussion

After 24-48 hours of incubation, colonies grown in microaerophilic cultivation were evaluated. Hemolytic colonies were detected on Blood Agar. Colonies were stained with Gram, Giemsa, Modified Ziehl-Neelsen and Lactophenol cotton blue (Fig. 3 and 4). Bacteria, which were considerably larger than other bacterial agents, were observed in microscopic examination.



**Fig. 3**

Gram stain x1000 microscopic image of *M. ornithogaster* and *Candida spp.*

**Fig. 4**

Lactophenol cotton blue stain x1000 microscopic image of *M. ornithogaster*.

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It was determined that the causative agent was *M. ornithogaster* by culture method. As a result of the conventional identification, *M. ornithogaster* and *Candida spp.* detected. Swapped again, sterile stools were collected and microbiological examinations resulted in *M. ornithogaster* and *Candida spp.* factors were confirmed. Acidic water and probiotic therapy were recommended. After about two weeks of treatment, the budgerigar showed a significant improvement, improvement in feathers, regrowth, and reduction in breast swelling (Fig. 5 and 6).



**Fig. 5 and 6**

Reduction in breast swelling and feather regrowth 15 days after treatment.

Many studies have been done on *M. ornithogaster* infections. However, the diagnosis of *M. ornithogaster* was mostly made by histological and cultural methods. In Iran *M. ornithogaster* infections in a large number of canaries were detected by histologically and molecular methods [18]. In another study, faecal Gram staining, PCR analysis and pathologic diagnosis was used to detect *M. ornithogaster* were compared [19]. In our case, the histological examination could not be performed due to budgerigar being alive.

The infection is seen in many countries in Europe, Africa and North America; it has been detected in various poultry species in Australia, New Zealand, England and Israel. It is reported that especially canaries, budgerigars and parrots are among the important reservoirs of *M. ornithogaster* [7]. It is very important in the contamination of faeces; it was determined that the most important transmission route is faecal-oral transmission [4]. *M. ornithogaster* is most heavily colonized in the isthmus region (between the glandular and muscular stomach) [8]. Depending on the microbial flora in the feed, *M. ornithogaster* number may increase; infections caused by *M. ornithogaster* have been reported at a rate of 48.3% in animals fed commercial feed [14]. The acute form of *M. ornithogaster* infections is mostly seen in canaries and budgerigars [7, 11, 16].

## 4. Conclusion

In this study, *M. ornithogaster* was detected microbiologically in budgerigar for the first time in Turkey. It should not be ignored that yeast infections can also be seen in budgie due to bacterial infections and occasional feeding with poor quality feeds.

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