

Investigations into Megabacteriosis

Investigations into Megabacteriosis, carried out by Tom Pennycott, Senior Veterinary Investigation Officer at SAC Veterinary Services Avian Health Unit Auchincruive, near Ayr are discussed in this article. The work was funded in part by Caged & Aviary Birds' Avian Research Fund. The following article appeared in Caged & Aviary Birds (UK) 15 & 22 February, 1997.

Megabacteria

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"Diseases caused by infectious agents can be the most devastating. Since 1992, the three most important diseases diagnosed in cage and aviary birds in Scotland by the post mortem service of SAC Veterinary Services fall into this category, namely Megabacteriosis, Trichomoniasis (Canker) and Psittacosis.

This article deals with the first, Megabacteriosis, which has been diagnosed in many bird species, including Budgerigars, Cockatiels, Grass Parakeets, Rosellas, Lovebirds, and Ostriches. Listed in a report in 1994 were 17 species of Psittacines and nine species of Passerines in which Megabacteria had been demonstrated. It has been suggested that the condition was introduced to exhibition budgerigars in the early 1980's, rapidly spreading as a result of the widespread movement of birds within the Fancy.

The clinical signs seen in birds with Megabacteriosis are often not dramatic and fairly non-specific. Birds are seen to be "soft" with a hunched appearance and fluffed out feathers. Vomiting may be seen or signs that vomiting has occurred, such as dried regurgitated material on the walls of the cage or the head of the bird. Changes in the droppings may be apparent, from a slight looseness to severe diarrhoea. Birds

often appear to be feeding, but closer observation shows that they are grinding a lot of the seed instead of eating it, and fine powdery material may therefore accumulate in the seed dishes.

Throughout this the birds gradually lose weight and usually die in poor body condition, although sometimes death can occur more quickly.

Birds with Megabacteriosis appear to be susceptible to other diseases such as combined Megabacteriosis and Trichomoniasis in budgerigars, heavy feather mite infestation, severe nemidocoptic mange (scaly face), and Chlamydiosis have been noted in budgerigars with Megabacteriosis.

A combination of Megabacteria and the yeast *Candida albicans* was reported in a Lesser Sulphur-crested Cockatoo, and in one collection of Zebra Finches with Megabacteriosis. Deaths occurred due to secondary infections with the internal parasite *Isospora*, the yeast *Candida albicans*, and the bacterium *Yersinia pseudotuberculosis*. It remains unclear, however, whether the Megabacteria actually depress the immune system, allowing these secondary infections, or whether the presence of a large number of Megabacteria is the result of another as yet unknown disease which affects the bird's immunity.

Signs of other disease may therefore be superimposed on the picture described for Megabacteriosis.

Megabacteriosis is usually confirmed by the post-mortem examination of affected birds. The birds are often thin, with wasting of the breast muscles. The feathers around the head may be covered in dried regurgitated material, and the feathers around the vent often stained with faecal material.

Characteristic changes are found in the glandular and muscular stomachs of the

bird, which is where the Megabacteria can be found. The lining layer of the glandular stomach (proventriculus) becomes rough, raised, and discoloured. An early change is the accumulation of sticky mucus in the proventriculus, and in some birds ulceration and bleeding is seen. As a result of these changes, the whole shape of the proventriculus changes, a feature easily seen even before the organ is opened up. Changes in the gizzard (muscular stomach) are less obvious, but include thinning and smoothing of the hard yellow koilin layer lining the gizzard.

Changes may also be evident in the crop contents of some birds, due to the damage lower down in the stomachs and because of the altered eating habits. The crop may become distended with a frothy mixture of water, mucus, fine particles of ground seed and undigested discoloured seed partially regurgitated from the stomach. As discussed earlier, there may also be signs of other diseases.

Megabacteria can be readily found at the post mortem examination when scrapings from the glandular stomach are examined under the microscope. As the name suggests, these organisms are "mega" or very large, about 10-20 times the length of the bacterium E coli. The Megabacteria have a very characteristic appearance, looking like long "torpedoes", often lying in parallel bundles, which can be stained using special microbiological stains.

However, although the Megabacteria are instantly recognisable, their true identity remains unknown. It is even unclear whether these Megabacteria actually cause the damage to the stomach seen at post mortem, or whether they are organisms found in normal birds but which have multiplied to an excessive extent.

Megabacteria have been found in wild Goldfinches and Siskins in The

Netherlands and in wild Goldfinches in Australia. In 1994, I observed Megabacteria in a wild Siskin, one of many wild birds found dead in gardens in Scotland. The Megabacteria did not appear to be playing a role in the garden bird mortality, but it was decided that a survey should be undertaken to determine how common Megabacteria were in wild birds in the UK.

Post mortem examinations were carried out on 333 wild birds of many different species: 40% were Passeriformes, which includes Songbirds, Crows etc. As part of the post mortem procedure, scrapings from the proventriculus (glandular stomach) were made and examined for the presence of Megabacteria.

Of all the birds tested, only one bird - a Waxwing was found to be carrying Megabacteria, and in that bird the Megabacteria were not considered to be important. The Waxwing had died as a result of physical injury, and the stomachs appeared normal despite the presence of the Megabacteria, a situation commonly found in budgies. The measurements of the Megabacteria isolated from the Waxwing were remarkably similar to those found in Zebra Finches.

It therefore appears that Megabacteria are not widely distributed in the wild bird population of the UK. Nevertheless, the Siskin and Waxwing are both migratory species - are Megabacteria commoner in the wild birds of Continental Europe?

To find out more about the spread of Megabacteria within an aviary, a study was conducted in March 1992 on 30 aviary-kept Budgerigars of varying ages and from different sources. Birds in the collection which died or were culled were examined for evidence of Megabacteria.

Up to 1993, no Megabacteria were found. Then in January 1993, a bird

which had been added to the collection some five months earlier was culled because of loss of weight and general weakness. The bird was found to have typical post-mortem lesions of Megabacteriosis, with large numbers of organisms found. Two months later, a second bird died from Megabacteriosis - this bird had been in the collection for four months, being added only one month before the first case of Megabacteriosis.

The following three months saw another four birds dying with lesions of Megabacteriosis over the next nine months.

Two birds died after a Sparrow Hawk terrorised the aviary - both were found to be carrying Megabacteria. These two birds had chicks in the nest which also died, and two of the four chicks tested were also found to be carrying Megabacteria.

The original source of the Megabacteria must remain unknown. However, the peak of mortality due to Megabacteriosis

occurred about eight months after the first case was seen, and losses virtually ceased 15 months after the first case. This suggests that some degree of immunity developed in the birds in the collection.

The finding of Megabacteria in two hens (which died of other reasons) feedings chicks and the appearance of Megabacteria in two of the unweaned chicks, suggests that spread from adults to unweaned chicks may be a significant method of spread of the organisms.

I have made similar findings in a collection of Zebra Finches in which Megabacteriosis was a problem. In three of twelve chicks aged under four weeks, Megabacteria were demonstrated in scrapings from the proventriculus. The Zebra Finch chicks also had *Candida albicans* (yeast) infections of their crop, causing their death"

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