

## Severe beak deformity in *Melopsittacus undulatus* caused by *Knemidocoptes pilae*

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**Abstract:** An outbreak of knemidocoptic mange caused by *Knemidocoptes pilae* is described in caged Australian budgerigars (*Melopsittacus undulatus*) in a public park in L'Elia (Valencia, Spain). Five individuals (5 out of 70) displayed severe malformation of the beak, with the rhamphotheca, rhinotheca, and gnathotheca affected and a slight lateral deviation of the jawbone, which did not, however, impede feeding or grooming.

**Key words:** *Knemidocoptes pilae*, mange, *Melopsittacus undulatus*, abnormal beak growth, Spain

### 1. Introduction

Beak deformities with overgrowth or shortening of the maxilla that usually prevent their correct alignment are rarely observed phenomena (1); they are associated with a weakening in the individual that can threaten its survival and are thus a factor of vital importance in wild birds (2).

Although there is a higher incidence of these deformities in the families Icteridae and Mimidae (1), at least a further 28 have been found to have abnormal beaks, including Psittacidae (3,4).

These anomalies have a varied aetiology, amongst which are trauma, abnormal wear of the rhamphotheca (5), nutritional deficiencies (vitamins and calcium metabolism), tumours (4), and infectious diseases (6), especially those caused by mange mites, in particular by the *Knemidocoptes* species, which are easily transmitted by direct contact between caged birds, and in many cases affect other parts of the body such as the legs (3,7,8).

### 2. Case history

In a public park in L'Elia (Valencia, Spain) (39°33'53.87"N 0°32'00.77"W), 5 Australian budgerigars (*Melopsittacus undulatus*) were observed to have differing degrees of beak malformations. The birds were housed in a pagoda-type bird cage (Figure 1A–C) with another 65 budgerigars and 2 cockatiels (*Nymphicus hollandicus*). The affected birds were captured using a net. Particularly notable was a mutated pearl green female weighing approximately

35 g with a very obvious scaly hyperkeratosis on the beak, both on the rhamphotheca (horny covering) and on the rhinotheca and gnathotheca (upper and lower maxillae), presenting a striking overgrowth as well as a slight lateral deviation of the jawbone (Figure 1).

To confirm suspected knemidocoptic mange and in order to discover the aetiology of the deformity in the birds affected, we proceeded to perform deep scraping of the surface of the beak of both maxillae with the aid of a scalpel blade, and subsequently rinsing with Amman's lactophenol. Microscope examination of the scraping revealed an abundance of mites, which were identified using identification keys. (9).

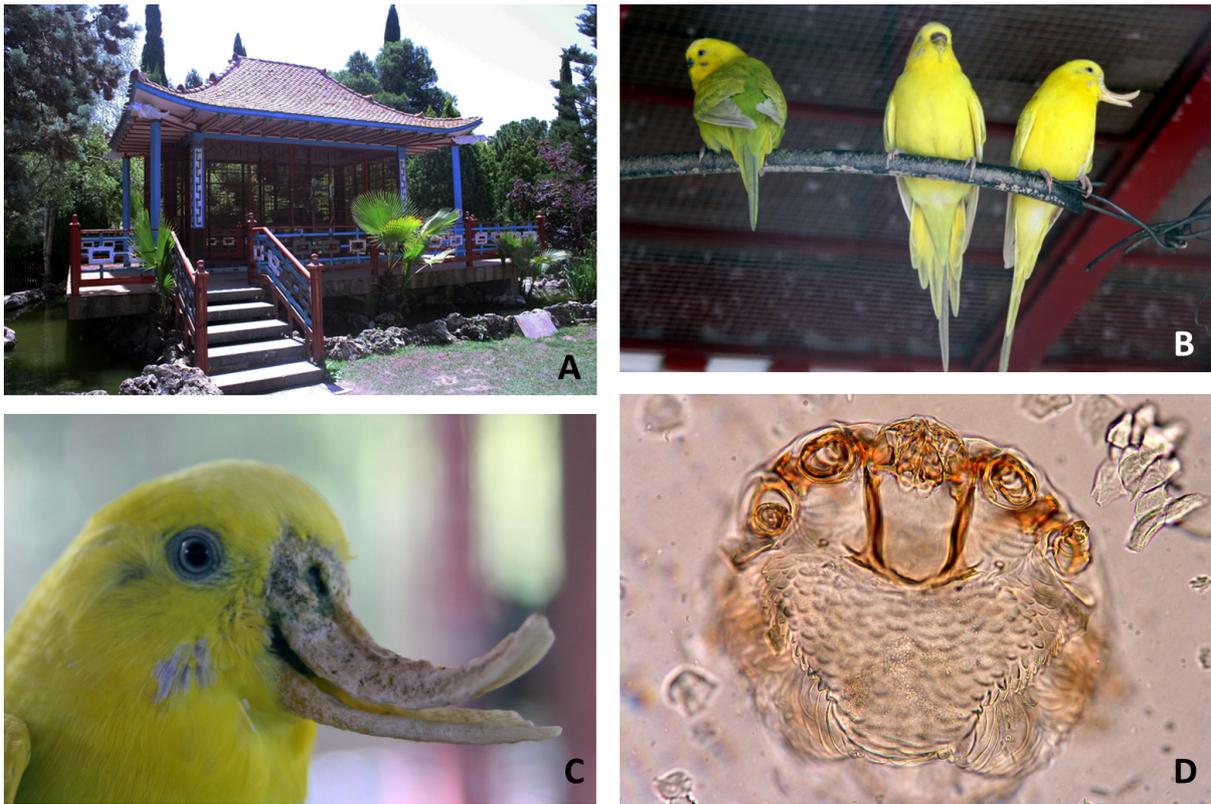
### 3. Results and discussion

Parasitisation by *Knemidocoptes pilae* Lavoipierre & Griffiths, 1951 (Acari: Knemidokoptidae) (Figure 1D) is identified as the origin of the deformations found.

Generally, the presence of beak malformations in birds, whatever the cause may be, is not frequent (less than 2%) (2,10). The lesions observed were only located on the beak, which coincides with previous findings in Turkey (3). However, *K. pilae* mange can also cause proliferative spongiform lesions in areas without feathers, such as the legs, nostrils, face, and around the eyes (8).

Cases of "scaly leg" caused by *K. pilae* have been described in India (11) and in Brazil where, as well as an overgrowth of the beak very similar to that described by

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**Figure 1.** (A) Birdcage. (B) Several affected individuals. (C) Detail of one bird affected; changes can be appreciated in all structures of the beak. (D) *K. pilae* present in the lesions studied.

us, there were also obvious alterations around the nostrils (7). Likewise, in Turkey, an outbreak of mite infestation was described in a group of 30 budgerigars, causing pruritus and proliferative spongiform lesions of differing degrees of severity, with lesions mostly on the face and beak, although also on the legs and, to a minor degree, around the eyes (3).

The pathogenic effect arises from the mechanical (burrowing into tissues) and chemical action (metabolites from their excretions) of the mites. As a general rule, knemidocoptic mange is transmitted by direct contact and it mainly affects young individuals with nutritional deficiencies, with high levels of stress or poor conditions of hygiene (3), although the disease is also associated with immunodepression and degree of consanguinity (12). The pathogen may also enter the bird cage via contact with free-living birds that are attracted to the surrounds by the bird feeders or the caged birds themselves.

Deformed beaks prevent correct grooming (10), which is the first line of defence against ectoparasites (13); however, the plumage of the individuals studied was in optimum condition and they had normal eating habits. Some birds are able to adapt to the malformation and survive by changing their habits (1).

To control the outbreak, all the birds with lesions and all those that have been in direct contact with symptomatic individuals should be isolated and treated with macrocyclic lactones. For small birds such as *M. undulatus*, some authors advocate oral treatment with ivermectin (14); the dose should be calculated by means of interspecies extrapolation using allometric models, and topical treatment (15) or treatment with moxidectin spot-on solution, which achieves equally satisfactory results (3). The private character of this aviary did not allow us to take action ourselves. In this sense, we recommend the employees of the aviary follow these guidelines: separation of affected birds and treatment topically of all individuals (including apparently healthy ones) with ivermectin (1%, Ivomec® Inyectable Porcinos, Merial Laboratorios, Barcelona, Spain) twice with a 10-day interval.

Infection by *Knemidocoptes* species mites is a frequent problem in poultry farming that also occurs in recreational aviculture and its consequences can lead to the death of infested birds. Given that poor hygiene and crowding are the main causes of infestations with this mite, it is essential to carry out basic preventive measures, in particular disinfection and cleaning the birdcage, watching for symptoms, and treating individuals with anti-parasitic products.

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