Pesq. Vet. Bras. 31(7):620-622, julho 2011

Avian pox virus infection in a common barn owl (*Tyto alba*) in southern Brazil[1]

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ABSTRACT.- Gilberto D. Vargas G.D., Albano A.P., Fischer G., Hübner S., Sallis S.E., Nunes C.F., Raffi M.B. & Soares M.P. 2011. **Avian pox virus infection in a common barn owl (*Tyto alba*) in southern Brazil.** *Pesquisa Veterinária Brasileira 31(7):620-622.* Laboratório de Virologia e Imunologia, Faculdade de Veterinária, Universidade Federal de Pelotas, Campus Universitário, Pelotas, RS 96010-900, Brazil. E-mail: gdavilavargas@gmail.com

A young common barn owl (*Tyto alba*) was referred to the *Núcleo de Reabilitação da Fauna Silvestre* (Nurfs), Federal University of Pelotas (UFPel), after been found in a barn of a brick factory in the urban area of Pelotas, Rio Grande do Sul, Brazil. The bird was apathic, weak and with crusty lesions in the featherless areas (eyes, beak, legs), and died soon after arrival at Nurfs. Necropsy and histopathological examination of the lesions were carried out. The hyperplasia and hypertrophy of the cutaneous lesions, several eosinophilic intracytoplasmic inclusion bodies in epithelial cells (Bollinger bodies), as well as particles characteristic of poxvirus, observed by electronic microscopy, confirmed the infection by avian poxvirus, what highlights the importance of *Tyto alba* as carrier of the virus in the wild.

INDEX TERMS: *Tyto alba*, common barn owl, avian pox virus.

RESUMO.- [**Infecção por pox vírus aviário em coruja de igreja (*Tyto alba*) no sul do Brasil.**] Uma coruja-de-igreja (*Tyto alba*) em idade juvenil foi encaminha ao Núcleo de Reabilitação da Fauna Silvestre (Nurfs), Universidade Federal de Pelotas (UFPel), após ter sido encontrada num galpão de uma olaria na região urbana da cidade de Pelotas, RS. A ave apresentava-se apática, debilitada e com lesões crostosas nas áreas sem penas do corpo (olhos, patas e bico), e morreu logo após a chegada ao Nurfs. Foram realizados necropsia e exame histopatológico. A presença de hiperplasia e hipertrofia epidérmica nas lesões cutâneas, várias inclusões intracitoplasmáticas eosinofílicas nas células epiteliais (Corpúsculos de Bollinger), assim como partículas características de poxvirus, demonstradas por microscopia eletrônica, confirmaram a infecção por poxvirus aviário, o que ressalta a importância da espécie *Tyto alba* como portadora do vírus na natureza.

TERMOS DE INDEXAÇÃO: *Tyto alba*, pox virus aviário, bouba aviária.

INTRODUCTION

Poxviruses are among the largest and most complex viruses known and are members of the genus *Avipoxvirus* of the family Poxviridae (Tripathy 1991, Boulanger et al. 2000, Canal 2007). The avian poxvirus (pox) is a transmissible disease that is spread by several vectors: biting arthropods such as mosquitoes and mites (Proctor & Owens 2000), aerosols generated from infected birds, or the ingestion of contaminated food or water (Clubb 1986, Berchieri Júnior 2009). The disease has two forms: cutaneous and diphtheritic. The cutaneous form is characterized by epidermal lesions on featherless areas of the body, whereas the diphtheritic form produces fibrinonecrotic and proliferative lesions in the mouth, esophagus, and mucous membranes of the upper respiratory tract (Tripathy & Reed 2008). Avian pox has been reported in a wide range of avian species including domestic, pet and free-living birds (Bolte et al. 1999, Literàk et al. 2001, Pledger 2005, Lierz et al. 2007, Kulich et al. 2008, Tarello 2008, Tripathy & Reed 2008). There is no exact knowledge on the number of species, strains or variants, which actually exist within the genus *Avipoxvirus* (Bolte et al. 1999). However it is known that sixty species of birds in over 20 families are susceptible to avian pox (Graham & Halhiwell 1986, Ritchie & Carter 1995). Management and conservation programs for wild, threatened, and endemic bird species need information about diseases in these populations, but little is known about the incidence of *avipoxvirus* natural infections in wild birds, especially in Strigiformes order.

[1] Received on July 14, 2010.
Accepted for publication on September 20, 2010.

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MATERIALS AND METHODS

A young common barn owl (*Tyto alba*) was referred to Núcleo de Reabilitação da Fauna Silvestre (Nurfs), Universidade Federal de Pelotas (UFPel), Rio Grande do Sul (latitude 31°48'3.52"S and longitude 52°24'31.21"W), in January 2007. Clinical examination and necropsy were performed. Tissue samples were fixed in 10% buffered formalin, embedded in paraffin and sectioned at 4-6μm. All tissues were stained with hematoxylin and eosin for histopathologic examination. Selected sections of the skin formalized with epidermal hyperplasia were fixed in 2% glutaraldehyde with 2% paraformaldehyde, in 0.4 M cacodylate buffer (pH 7.4). Blocks were post fixed in 1% osmium tetroxide buffered in 0.4 M sodium cacodylate (pH 7.4), and embedded in Epon 812. Semithin sections were stained with methylene blue. Ultra thin sections were stained with lead citrate and uranyl acetate and examined with an EM 109 Zeiss electron microscope at 80 kilovolts.

RESULTS

Clinical examination revealed that the bird was dehydrated, depressed, with poor body condition and difficulty in flying, and showed several coalescing masses with 0.5-1.0cm in diameter, yellowish, rough, firm, and raised above the surface of the skin, situated on the base of the beak, mouth, eyelids (Fig.1a) and legs (Fig.1b). The superficial layers of the nodules were removed without difficulty. On the following day, the bird died, probably due to the inability to ingest food. At necropsy, it was observed poor corporal condition with lack of fat deposits. Pseudo-epitheliomatous hyperplasia in the skin (Fig.2a), with ballooning degeneration of epithelial cells and the presence of the typical eosinophilic inclusions body (Bollinger bodies) with solid and ring pattern distending the cytoplasm were observed upon histological examination. Multiples foci of heterophilic cells and necrosis were observed in the areas with marked hypertrophy and hyperplasia of the epidermis. Bacterial colonies were present in the ulcerated areas. Ultrastructurally, the inclusion was formed from numerous, dumbbell-shaped bodies, typical of pox virions (Fig.3).

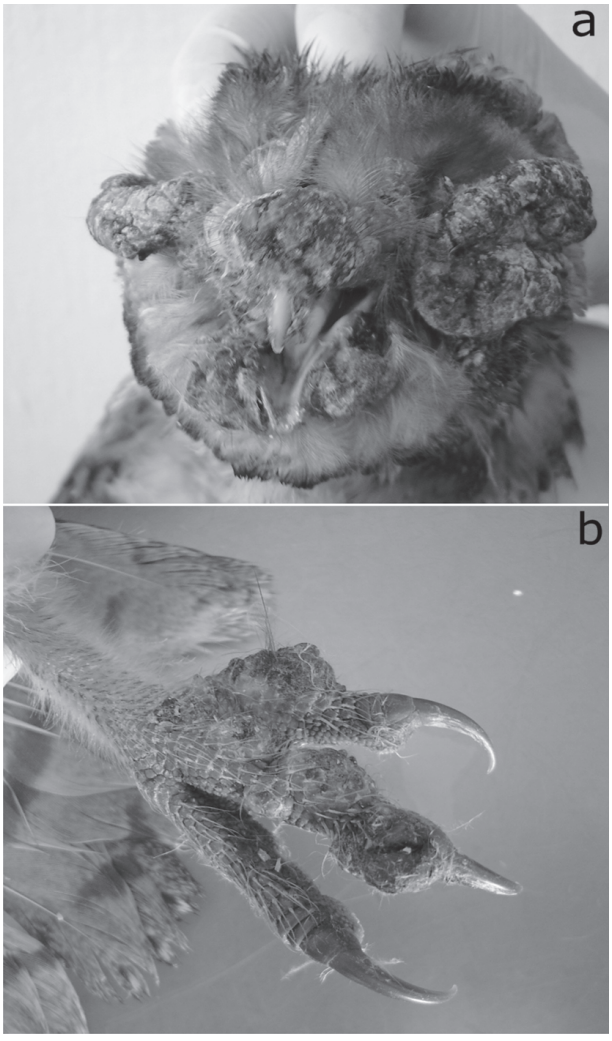

Fig.1. (**a**) Common barn owl, *Tito alba*, with coalescing masses on the base of the beak, mouth, eyelids and (**b**) legs, with 0.5-1.0cm diameter, round, yellowish, rough, firm and raised above the surface of the skin.

DISCUSSION AND CONCLUSION

The clinical, macroscopic, histological, and electron microscopic findings of this owl were consistent with poxvirus infection as described in mammals and avian species (Deern et al. 1997, Pledger 2005, Lierz et al. 2007, Kulich 2008, Tarello 2008). Grossly, the lesions were representative of self-limiting cutaneous pox infection. This presentation was similar to that reported in other raptor species where no cases of diphtheritic pox lesions have been reported (Graham & Halliwell 1986, Deern et al. 1997, Tarello 2008). Avian poxvirus is resistant to environmental factors, but requires broken skin for transmission, since it is incapable of penetrating the intact epidermis (Ensley et al. 1978, Wheeldon et al. 1985, Gerlach 1986). Two common forms of transmission in birds are traumatic injuries and bites from mosquitoes and other blood-sucking arthropods (Gerlach 1994). The presence of lesions on the face and legs in this report may be a result of the usual feeding sites for such arthropods.

Pox infections have been observed in some owl species in North America. At the Center for Birds of Prey in Maitland, Florida, poxvirus infection has been confirmed in Eastern screech owls (*Megascops asio*) and great horned owls (*Bubo*

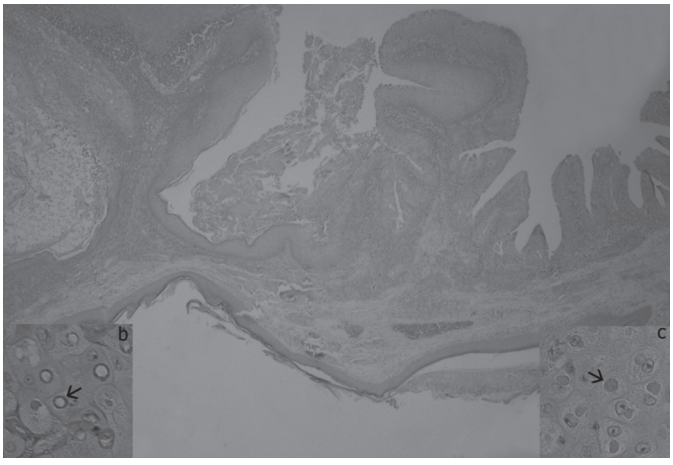

Fig.2. (**a**) Proliferative lesion in eyelid tissues causing a pseudo-epitheliomatous hyperplasia. HE, 40x. (**b**) Left Inset: ring eosinophilic inclusions (arrows); (**c**) Right Inset: solid eosinophilic inclusions (arrows). HE, 400x.

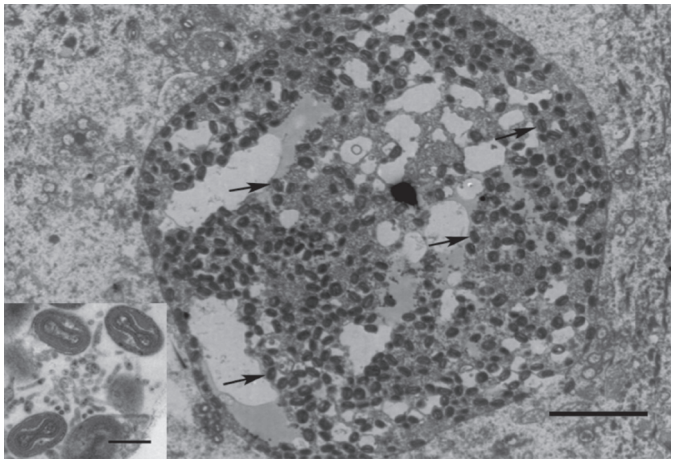

Fig.3. Electron micrograph showing epithelial cell with a pox viral inclusion containing numerous virions (arrows). Bar = 2ìm. Inset: Details of typical poxvirus virions with an electron dense biconcave nucleocapside core, two lateral bodies and an outer lipoprotein coat. Bar = 200nm.

virginianus) by the presence of Bollinger bodies on light microscopy examination of tissues (Deern et al. 1997). One of the most important questions regarding avian poxvirus infection in owls is to determine whether owls represent a new host species. In this sense, to our knowledge, this is one of the few cases of owl poxvirus reported in South America to date, characterizing common barn owl (*Tyto alba*) as a possible host species. The effect of the avian poxvirus in the common barn owl and other endemic birds from South America is unknown because of the difficulty in detecting diseased and/or dead birds in nature. However, considering the viral agent characteristics as well as its transmission ways, the case reported suggests that the virus circulates among wild birds, which can become source of infection for domestic or industrially raised birds, as it has been reported. Besides, data shown in this work can contribute for studies related to the impact of this disease in the population of wild birds, as well as auxiliary information source for management and conservation programs for wild, threatened, and endemic bird.

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