

PINCHING OFF SYNDROME IN TWO WHITE-TAILED SEA EAGLES (*Haliaeetus albicilla*) IN THE CZECH REPUBLIC

KEY WORDS: *disease; feather abnormality; raptor.*

Pathological changes involving the feathers of raptors include a peculiar pinching off syndrome (POS). The term “pinching off” was given to a condition of defective feather growth, wherein the young vascularized feathers fall out prematurely and upon examination are found to have a marked constriction at the base of the shaft (Cooper 1985, Veterinary aspects of captive birds of prey, with 1985 supplement, The Standfast Press, Cherington, Tetbury, Gloucestershire, U.K.). The pattern is for normal growth of a rectrix or remige to one-half to two-third of its normal length, after which the blood supply withdraws and the feather twists and falls out or “pinches off.” A new feather usually grows after removal of the remaining stump (whether by the bird or by human intervention), and this new feather may or may not pinch off.

POS in White-Tailed Sea Eagles (*Haliaeetus albicilla*) was found sporadically in Europe (Muller et al. 2007, *J. Avian Med. Surg.* 21:103–109). In all cases, the abnormalities of feathers were pronounced and persistent, and the eagles never attained the ability to fly, even when in human care. In this letter, we describe the first cases of POS in the Czech Republic. The White-Tailed Sea Eagle is an endangered species (Literak et al. 2007, *Eur. J. Wildl. Res.* 53:195–203), and POS could seriously threaten the population. We investigated various infectious agents, ectoparasites and heavy metals as potential causes of POS.

Two diseased juvenile White-Tailed Sea Eagle siblings (a male and female, ca. 20 wk old) were found on the ground approximately 100 m from their nest in Trebonsko basin (the first on 13 August 2001, the second on 24 August 2001), in the southwestern part of the Czech Republic (49°00'N, 14°46'E). This nest has been occupied by a pair of eagles for several years, and the adults present in 2001 appeared to be healthy. Both eaglets had major feather abnormalities of the tail and wing feathers and were not able to fly. Both were transported to a wildlife rehabilitation center, where they were kept in an aviary. The eagles were fed mostly chickens and drinking water was obtained from a local source. Different drugs were tried during their stay in an effort to improve the feather condition. The eagles were examined by many standard ways in May 2002, February 2004, January 2005, and September 2005. Both birds were euthanized in September 2005, as their condition was not improving and neither could fly. They were autopsied immediately after the euthanization.

The changes in both eagles were almost identical. None of the flight and tail feathers had grown to full length. These feathers fell out and the regrowing feathers also displayed permanent defects. Feathers were deformed and easily broken at the base, with blood clots appearing at the calamus. Over time, we observed continuous shortening of the flight and tail feathers. The changes of flight feathers on both wings appeared to be symmetrical, starting first at the elbows and later spreading both proximally and distally. Feathers that were pulled out or changed during molting were replaced by abnormal feathers. The sheaths opened late and persisted on regrowing feathers. The base of some flight and tail feathers in an area of *umbilicus inferior* and feather shafts were macroscopically constricted. Blood clots formed in the area of the calamus on primaries and secondaries. Feather shafts curled, so the image of a feather contour was also curled. When feathers broke, the rest of the shafts stayed in place. The rachis showed linear splitting in the middle. Most of the flight and tail feathers were missing. These symptoms worsened slowly over 4 yr, and the birds were never able to fly. The tail and flight feathers and the course of the disease showed typical signs described formerly for POS. The autopsy and following histological examination did not show any other changes or abnormalities.

Hematology in January and September 2005 indicated heterophilia, with no other changes in the hematological profile. The smears of bone marrow were negative for detection of viral particles. Blood biochemistry revealed hyperbateglobulinemia, elevated lactic dehydrogenase, creatin kinase, and a lowered level of thyroxine. The electron microscopy and polymerase chain reactions (PCRs) examination did not reveal circoviruses or polyomavirus. In March 2003, chewing lice *Colpocephalum flavescens* (De Haan 1829) were found on one eagle; adult lice were observed on the body and a few nymphs were found inside of a feather quill. In September 2005, two other species were observed on the body surface of this eagle: *Craspedorrhynchus macrocephalus* (Nitzsch 1874), located mostly on the neck, and *Degeeriella discocephalus* (Burmeister 1838), located on the dorsal side of the body and on the wings. No quill mites were found.

Viral infections in raptors are characterized primarily by lymphocytosis (both absolute and relative) if there is no accompanying bacterial infection. For the two eaglets with POS, we did not observe any reactive lymphocytes that may be seen in viral disease. Blood chemistry was unremarkable. Electron microscopy (September 2005) examination for viral

detection and PCR were mainly focused on detection of circovirus and polyomavirus particles and were negative. Dystrophic changes of feathers caused by circovirus are well known as "psittacine beak and feather disease" in parrots, and have been described in many other species, such as pigeons, and canaries (Todd 2000, *Avian Pathol.* 29:373–394). Polyomavirus, another possible viral cause of feather abnormalities, is known in passerines and psittacines. The skin was examined pathohistologically, as well, but none of the examinations showed signs for either inflammation or revealed viruses, bacteria, or fungi. Because we found no significant evidence for the presence of viruses, bacteria and fungi, and because electron microscopy and PCR studies were negative, we concluded that an infectious agent was not likely the cause of the POS.

Ectoparasitological examinations were repeatedly positive for chewing lice in one of the eagles. However, we do not consider chewing lice to be the cause of the POS, as these ectoparasites are very common in birds and do not generally cause lesions typical of POS.

Concentrations of heavy metals mercury, cadmium, lead, copper, cobalt, and nickel in whole blood in October 2001 were not extremely high; however, concentrations of Cu (7.93 and 7.61 mg kg⁻¹) and Co (3.01 and 2.22 mg kg⁻¹) were relatively elevated. Because there were no signs relevant for poisoning, we do not consider heavy metals to be the cause of the POS.

The causes of feather changes in companion birds include viral, bacterial and fungal infections, parasites, trauma, hypothyroidism, toxic substances, inadequate nutrition, congenital, neoplastic, immune-mediated diseases, allergy or irradiation, and mental disorders. Examinations of various possible causes of POS in two White-Tailed Sea Eagles were performed in this study as well as recently in four White-Tailed Sea Eagles with POS in Germany (Muller et al. 2007, *Avian Pathol.* 36:235–243) but failed to reveal etiology of the disease. It remains for us to consider a possible genetic component to POS.

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