

Selected Abstracts From the Literature

The lungs of the finch: Three-dimensional pulmonary anatomy of the zebra finch (*Taeniopygia castanotis*). Martinez A, Diaz RE, Grand Pre CA, et al. *Philos Trans R Soc Lond B Biol Sci.* 2025; 380:20230420.

The respiratory system of birds is one of the most elaborate among all vertebrates. As a result, this is one of the most studied systems in avian species. As an important avian model for multiple scientific disciplines, the zebra finch (*Taeniopygia castanotis*) is a perfect example for further elucidating the novelty of the avian respiratory system. The pulmonary system of birds is unique because air flows unidirectionally through the gas-exchanging lung. To better characterize the movement of air, the authors used microcomputed tomography to visualize and describe the morphology of the zebra finch's lower respiratory system. These results were used to compare intra- and interspecific differences of the bronchial tree with a phylogenetically and ecologically different species, the grey parrot (*Psittacus erithacus*). The findings revealed that zebra finches have highly variable lungs and air sac morphology within individuals but generally do not diverge from the general system described for passerines. The authors also found that the parabronchi in the zebra finch were arranged into isolated segments between secondary bronchi; this had not been previously described in birds and may be tied to specific airflow patterns for this species. Another interesting finding in both zebra finches and grey parrots was that they had constrained interstitial distances and robust, caudally directed third ventrobronchi. The authors suggested that these may play an unexplored role in the unidirectional airflow patterns of birds.

Molecular assessment of *Chlamydia psittaci* and *Circovirus* in psittacines from a CETAS in Bahia, Brazil. Antonio ES, Fraga RE, Sacramento P, et al. *Braz J Microbiol.* 2025;56:927–938.

Animal trafficking remains a major issue for birds. During the trafficking process, birds are kept in unsanitary conditions that can increase the likelihood of the dissemination and translocation of pathogens. The Centros de Triagem de Animais Silvestres (CETAS - Wild Animal Screening Centers) is a rehabilitation program that receives trafficked animals with the aim

to release them back into the wild. Therefore, centers want to minimize the likelihood of introducing and disseminating pathogens to potentially immunocompromised animals under rehabilitation. In this paper, the authors' objective was to conduct an epidemiological study to measure the prevalence of *Chlamydia psittaci* and *Circovirus* in trafficked psittacines housed at a CETAS in Bahia. Cloacal swabs and blood samples were collected from 135 psittacines, including both residents and newly arrived birds placed in quarantine. Conventional polymerase chain reaction assays were used to test the samples for the 2 pathogens. The assays utilized the *opmA* gene and *ORF1* to detect *C. psittaci* and *Circovirus*, respectively. Three (2.2%) of the birds were *C. psittaci* positive. The birds were treated with antibiotics, retested, and incorporated back into the CETAS population after testing negative. None of the birds tested positive for *Circovirus*; however, 22 (16%) showed feather abnormalities. Fortunately, the prevalence of these pathogens is low in this population; however, it is important for facilities to remain vigilant to limit the likelihood of an outbreak.

Nonlinear vocal phenomena in African penguin begging calls: Occurrence, significance and potential applications. Morandi I, Zanoli A, Tenneriell C, et al. *Philos Trans R Soc Lond B Biol Sci.* 2025; 380:20240019.

Who says our avian patients cannot tell us they are sick? Well, in this study, the authors focused on African penguins (*Spheniscus demersus*) and their natural vocalizations to identify variations in calls that may be indicative of changes in health. African penguins use high-frequency food solicitation signals (begging calls) to request food from their parents. In this study, the authors measured the occurrence of nonlinear vocal phenomena (NLP) in the begging calls of 91 hand-reared penguin chicks at a wildlife rehabilitation center. Begging calls were recorded daily from the hatchlings of wild, abandoned eggs to the chicks' post-release into the wild, approximately 3 months later. The authors found that a majority (70%) of begging calls contained NLP. Of these NLP, the most frequently observed were sidebands (54.1%) and deterministic chaos (71.4%), which were also found to co-occur more than 25% of the time. The authors suggested that the aperiodic chaotic features may be

important in increasing the adults' attention and avoiding habituation. The occurrence of NLP also depended on the penguins' age, with older chicks producing more NLP in their calls. Moreover, the authors found that NLP significantly increased in chicks after contracting a respiratory disease (eg, bacterial or fungal infection). This latter finding might be useful for identifying subtle changes and guiding diagnostics for chicks needing veterinary treatment.

Respiratory anatomy and physiology in diving penguins. Ponganis PJ, Williams CL, Scadeng M. *Philos Trans R Soc Lond B Biol Sci.* 2025;380:20230422.

The respiratory system of penguins is well-adapted to the challenges of their aquatic existence. These birds face many physiologic challenges, including managing gas exchange and minimizing the risks of pulmonary barotrauma, decompression sickness, and nitrogen narcosis during dives. In this review article, topics on anatomy and physiology, including lung morphology and morphometry, respiratory air volume measurements, physiological and biomechanical mechanisms of baroprotection, and air sac and arterial partial pressure of oxygen (PO₂) profiles in relation to movement of air during breathing and during dives, are covered. For diving, limits for baroprotection to 200, 400, and 600 m in Adélie penguin (*Pygoscelis adeliae*), king penguin (*Aptenodytes patagonicus*), and emperor penguins (*Aptenodytes forsteri*), respectively, would require complete transfer of air sac air and reductions in the combined tracheobronchial tree-para-bronchial volumes of 24%, 53%, and 76% in Adélie, king, and emperor penguins, respectively. Similar to non-diving birds, penguin air sac and arterial PO₂ profiles at rest were consistent with unidirectional airflow through the lungs. However, during dives, PO₂ profiles were altered to account for the compression of the air sac air into the parabronchi and air capillaries with or without additional air mixing induced by potential differential air sac pressures generated by wing movements. The review article also contains numerous visual aids to show how diving impacts the respiratory system of penguins.

Exploring new depths: King penguins break dive records during the austral winter. Oberlin M, Enstipp MR, Le Bohec C, et al. *J Exp Biol.* 2025; 228:jeb250184.

Historically, the emperor penguin was considered the champion diver among penguins, with the king penguin closely behind and only thought to be second

because of its slightly smaller size. However, the evidence behind this finding was limited to the opportunities for collecting data. Study of the foraging ecology of king penguins has been typically restricted to the austral summer, and these study periods were relatively short. Research on the autumn-winter foraging period was limited, but this is a time when birds must undertake months-long foraging trips that require deeper dives to pursue their preferred prey, and there were thoughts that these dives could push their diving limits. In this study, 7 king penguins from the Crozet Islands were followed during autumn-winter, and the authors found that the birds conducted deeper and longer dives during this period. A majority of the birds exceeded the previous depth and duration records, but the deepest (424.5 m) and longest (10 min) dives were conducted by the same individual. These dives are the deepest and longest yet reported for king penguins and illustrate their ability to respond to seasonal changes by enhancing their dive capacity, likely through gradual acclimatization.

Aeroacoustics in owl flight: Biomechanisms and biomimetics. Rong J, Liu H. *Bioinspir Biomim.* 2025;20(4).

Owls are masters of the night, capable of near-silent flight and highly attuned hearing that make them the nightmares of their prey. While we understand the value of these adaptations as veterinarians, engineers are interested in them to improve the function of human-made systems. For example, the near-silent flight of owls can be used as a model to better understand and reduce aerodynamic noise. While leading-edge serrations, trailing-edge fringes, and velvety wing surfaces may appear as novel to the veterinarian working with these birds, engineers can see bioinspired solutions for various engineering applications. However, the mechanisms underlying these adaptations are only partially defined and require more investigation. This review article provides those interested in these concepts insight into the biomechanisms associated with silent flight, including historical perspectives and the latest experimental findings. The authors also discuss the challenges associated with adapting these biologically inspired methods as well as the potential roles of specific owl-inspired aeroacoustics, such as wing flexibility and flight kinematics. While engineering is beyond the expertise of this reviewer, the authors' concepts of bridging biological insights collected from owls with engineering innovation are fascinating.

Frequent, heterogenous fire supports a forest owl assemblage. McGinn K, Zuckerberg B, Jones GM, et al. *Ecol Appl.* 2025;35(1):e3080.

Forest fires have been a part of the landscape of the earth since the dawn of time. Fossil records have even shown how these fires impacted the lives of dinosaurs. Forest fires are important to managing the biodiversity of these ecosystems; however, alterations in how humans manage these systems and anthropogenic climate change have led to more severe fires and fires occurring in areas where they historically did not occur, leading to increased threats to many animal species. Owls serve as important apex predators in their systems and can play important roles in the management of biological communities; however, the impacts of these changing forest fires on their adaptability are largely unknown. In this study, the authors examined the impact of fire severity over the past 35 years on an assemblage of 6 forest owl species in Sierra Nevada, California. While the negative impacts of fire appeared to be limited to 1 to 4 years, spotted owls avoided the burned sites for up to 20 years. Low- to moderate-severity fire benefited small cavity-nesting species and great horned owls. Most of the owls, as might be expected, were adapted to fire within the region's natural range. However, birds might be expected to suffer higher impacts from more severe megafires, such as those being seen more frequently in this Anthropocene era. These findings strongly support management strategies that restore historical low- to moderate-severity fire with small patches of high-severity fire to promote the forest conditions that facilitate the conservation of these species.

Bird mortality at wind farms in a tropical desert. Roy A, Banerjee S, Uddin M, et al. *Sci Rep.* 2025; 15:19221.

As we work toward reducing the impacts of climate change on wildlife and the environment by seeking alternatives to fossil fuels, these lower-impact alternatives may reduce our carbon dioxide footprint but can still negatively impact wildlife. One example of this is wind farms. Studies have found they can have negative impacts on migratory species based on location. In this article, the authors investigate the impact of wind farms on bird mortality in a tropical desert, the Thar Desert, India. This ecosystem serves 300 bird species, including critically endangered vultures and bustards. The study evaluated a 3000-km² open natural ecosystem with approximately 900 turbines. The authors searched for carcasses at 90 randomly selected turbines using seven multi-season surveys. Mortalities at these sites were compared with 28 control sites. The authors found 124 bird carcasses at the turbines and none at the control sites. Bias-adjusted mortality found an estimated annual mortality of approximately 4464 birds per 1000 km² area. Mortality differed by location, being lower in undulating grasslands, higher at single turbines than clustered turbines, and increased with hub height. Bird flight height did not influence the relative vulnerability based on the bird family. This study reinforces that alternatives to fossil fuels do come at a cost to wildlife, and to minimize these impacts, we must consider the placement of these alternatives and institute mitigation measures to protect wildlife.