Ornithology from the Lakeshore

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The Firebirds

Our feelings about fire range from the cosy to the catastrophic, and depend on the context and on our level of control. The progression of our species is deeply linked to our inventiveness in gaining control over fire. We ingeniously moved combustion inside of machines and thereby enabled the development of a society on steroids.

Unfortunately, the negative consequences have become all too apparent. Using coal, oil and gas as incendiary resources, we have burned ourselves into a global crisis. So much so that the current geological epoch has been called the Pyrocene (Nimmo *et al.* 2021, Pyne 2021). Among the multifarious consequences of the pursuits and practices of the growing population, out-of-control wildfires have become one of the most terrifying and destructive natural disasters. You may remember how in 2020 a bushfire raged in Australia turning an area larger than Belgium and The Netherlands combined into ashes. News reports abound headlining furibund fires, even in the Arctic. As Covington & Pyne (2020) put it, "It can seem like Earth itself is on fire".

Although the frequency, scale, severity and intensity of fires may be increasing globally, let us remind ourselves that fire has shaped terrestrial ecosystems long before humans were present on Earth. Every year an estimated 3% of the global land area burns, or about 400 million hectares of land (Forkel *et al.* 2019). Thus, we also need to consider fire as a fundamental force in evolutionary ecology (Kelly & Brotons 2017, Pausus & Parr 2018). As is well known, plants have evolved a variety of traits that enable them to flourish and flower under recurrent fires (Keeley *et al.* 2011). However, the role fire has played in the evolution of the life history and behaviour of animals still remains underexplored. In an insightful review, Pausus & Parr (2018) highlight several key questions that need to be addressed to improve our understanding of the evolutionary role of fire in animals. They distinguish fire-adapted animals – those that have evolved traits that are shaped by fire, including the eager urge to escape from it – and fire-dependent animals, a more select group that needs (or at least opportunistically uses) the resources generated by fire for survival or reproduction. In the following, let me highlight a few fascinating examples of fire dependency from the feathered world.

The most rational and common reaction to a raging fire is to flee from it. Animals are generally well-adapted to recognize the tell-tale signs of fires (where there is smoke…) and will either hide in a safe place or move away swiftly to avoid a certain death. It is precisely this judicious response that is exploited by some predatory birds. On different continents, numerous raptor species have been observed to make their way to the edge of the blaze where they often congregate in large numbers, in anticipation of a richly stocked, albeit moving, buffet. In a remarkable example of niche construction, Black Kites *Milvus migrans* in the Northern Territory of Australia self-cater a buffet of small mammals, reptiles, and insects by spreading the fire themselves. Aboriginal people presumably have known for a long time that some raptors, including Black Kites, Whistling Kites *Haliastur sphenurus* and Brown Falcons *Falco berigora*, occasionally pick up a burning branch in their talons or beak and drop it elsewhere to ignite a fire. The tool-use behaviour of these 'firehawks' has been witnessed by Australian fire fighters and a few scientists (Bonta *et al.* 2017). Apparently, the behaviour has not yet been documented on photo or video, and although Bonta and his colleagues do not doubt it, they admit that scepticism remains about whether the birds intentionally, rather than accidentally, spread fire. Who knows whether our ancestors learned to use fire from observing avian arsonists? Bird watching provides many benefits, but also has many practitioners. So, one wonders how exceptional this behaviour is, why it has not been better documented, and why it does not seem to occur elsewhere on the planet.

Birds of various plumes and predilections are attracted not by the fires themselves but by the resources that become available in recently burned areas. For example, hummingbirds and other nectar-eating species may be drawn to the post-fire explosion of flowers, whereas predators may benefit from hunting under upgraded spot-and-track conditions provided by the newly created open habitat. Arguably the best studied ornithological example of fire dependency is the case of the aptly named Black-backed Woodpecker *Picoides arcticus* in western North America. Black-backed Woodpeckers are found in coniferous forests and bogs with dead trees, and often in areas that

recently burned. This inconspicuous, somewhat elusive, but beautiful bird is a true post-fire specialist (Tremblay *et al.* 2016), with local populations strongly increasing soon after a fire and then gradually declining (a "boom-and-decline" cycle; Tingley *et al.* 2018). Breeding adults are predominantly active in areas with a high density of dead trees that arose after high-severity burns (Stillman *et al.* 2019). After the infernal blaze, the remaining stumps are promptly colonized by wood-boring beetles seeking to reproduce. The ensuing beetle larvae offer a comestible bonanza for the Black-backed Woodpeckers, which also aim to make hungry copies of themselves. As shown by radio telemetry, the fledglings prefer moving into more friendly neighbourhoods, which experienced less severe burns (Stillman *et al.* 2020). Such areas still have many living trees and the

Figure 1. (A) Detail of the wing feathers of a Bronze-winged Courser that was found dead along a road (photo Warwick Tarboton; for other photos of Bronze-winged Coursers by the same photographer, see www.warwicktarboton.co.za/birdpgs/303BWCou.html). (B) A nest of a Bronze-winged Courser with a typical clutch of three eggs and (C) recently hatched chicks in a burned patch of miombo habitat in southern Zambia (the birds are in the bottom-right corner; photos Claire Spottiswoode).

avian inhabitants are therefore less exposed to predators. Predation by raptors may indeed be a key selective factor, as most deaths of the tracked individuals could be unequivocally attributed to predation by hawks and owls (Stillman *et al.* 2020). Unsurprisingly, then, adult and teenager Black-backed Woodpeckers may have different views concerning the starvation-predation trade-off.

Closer to (my) home and featured in this issue of Ardea, a similar story can be told about the Eurasian Three-toed Woodpecker *Picoides tridactylus* (Versluijs *et al.* 2022). This look-alike of the black-backed relative also shows a wildfire-related boom-and-bust cycle.

Although changes in food availability may often be a key factor, fires also create other types of resources or selective pressures. For example, when a fire creates an open area in an otherwise densely forested habitat, the open space can be used by lekking species, notably grouse, as mating arenas (Hancock *et al.* 2011). Furthermore, fires may locally reduce parasite abundance and thereby lessen the deleterious effects on their hosts (see e.g. Kaiser *et al.* 2021). However, the adaptive value of the behaviour of fire specialists is not always that clear. For example, several species including nightjars and larks breed in recently burned patches. Among them is a rather mysterious member of the family Glareolidae in Africa.

I am referring to the Bronze-winged Courser *Rhinoptilus chalcopterus*. Due to its secretive behaviour and nocturnal habits, this species is hard to find even in areas where it is known to breed. Moreover, its plumage is rather cryptic, despite the marvellous iridescent violet primary tips. These name-giving feathers are only clearly visible with the bird in hand (Figure 1A), and one cannot help wondering whether they are used in any hitherto unknown mating or anti-predator display. Bronze-winged Coursers breed in the Miombo woodlands (Frost 1996) that cover much of Central and Southern Africa and consist of tropical grasslands, savanna and shrubland. Within this habitat, the female lays its eggs almost exclusively on a patch that has just been cleared by a fire. However, when the incubating parent leaves the nest, it typically runs for cover and disappears in more dense, undisturbed habitat nearby. Any doubts you may have about the evolutionary history of this bird's relation to fire instantly go up in smoke (pun intended) when you are lucky enough to find a nest.

Bronze-winged Courser eggs, described by Pitman (1932) as "singularly lovely, in fact I have yet to see a more beautiful egg of any species of Limicolae", look like pieces of burned material (Figure 1B), and their chicks uncannily resemble burned tufts of grass (Figure 1C). Several intriguing questions about the behavioural ecology of this species remain unanswered. For one, even if the valuable nest content is well-camouflaged, what is the benefit of laying eggs in recently burned, entirely open patches? Could the smell of the recent burn reduce the detectability of the eggs or offspring for odour-oriented mammalian predators? Or is it also about the parents' own survival? After all, a bird sitting on a nest in an open environment where long grass has been burned off might be able to spot an approaching predator sooner and quietly leave the nest until the danger has departed. Or is there an even simpler explanation and do these birds 'chase fire to avoid fire'? Indeed, the recently cleared forest floor will not burn during the birds' breeding attempt. Another puzzle is about how these birds find a suitable breeding area with a recently burned patch to deposit their precious eggs. Could olfactory cues play a role during their nocturnal aerial excursions?

The dictum "Pyrodiversity begets Biodiversity" (Pausus & Parr 2018) implies that fire should not be equated with destruction. The natural history of a plethora of species reminds us that much of terrestrial life has evolved in an environment that is characterized by frequent natural fires. For ornithologists in particular, much remains to be discovered about how birds have adapted to this reality.

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Bonta M., Gosford R., Eussen D., Ferguson N., Loveless E. & Witwer M. 2017. Intentional fire-spreading by "firehawk" raptors in northern Australia. J. Ethnobiol. 37: 700–718.

Covington W.W. & Pyne S. 2020. Fire in our future. Science 370: 13.

Forkel M. *et al.* & Arneth A. 2019. Emergent relationships with respect to burned area in global satellite observations and fire-enabled vegetation models. Biogeosciences 16: 57–76.

Frost P. 1996. The ecology of miombo woodlands. In: Campbell B. (ed.) The Miombo in transition: woodlands and welfare in Africa, pp. 11–57, Centre for International Forestry Research, Bogor, Indonesia.

Hancock M.H., Amphlett A., Proctor R., Dugan D., Willi J., Harvey P. & Summers R.W. 2011. Burning and mowing as habitat management for capercaillie *Tetrao urogallus*: an experimental test. For. Ecol. Manag. 262: 509–521.

Kaiser S.W., Greenlees M.J. & Shine R. 2021. Wildfires modify the parasite loads of invasive cane toads. Biol. Lett. 17: 20210470.

Keeley J.E., Pausus J.G., Rundel P.W., Bond W.J. & Bradstock R.A. 2011. Fire as an evolutionary pressure shaping plant traits. Trends Plant Sci. 16: 406–411.

Kelly L.T. & Brotons L. Using fire to promote biodiversity. Science 355: 1264–1265.

Nimmo D.G., Carthey A.J.R., Jolly, C.J. & Blumstein D.T. 2021. Welcome to the Pyrocene: animal survival in the age of megafire. Glob. Change Biol. 27: 5684–5693.

Pausus J.G. & Parr C.L. 2018. Towards an understanding of the evolutionary role of fire in animals. Evol. Ecol. 32: 113–125.

Pitman C.R.S. 1932. Notes on the breeding habits and eggs of *Rhinoptilus chalcopterus*. Ool. Rec. 12: 16–23.

Pyne S.J. 2021. The Pyrocene: how we created an age of fire, and what happens next. University of California Press.

Stillman A.N., Siegel R.B., Wilkerson R.L., Johnson M., Howell C.A. & Tingley M.W. 2019. Nest site selection and nest survival of black-backed woodpeckers after wildfire. Condor 121: 1–13.

Stillman A.N., Lorenz T.J., Fischer P.C., Siegel R.B., Wilkerson R.L., Johnson M. & Tingley M.W. 2021. Juvenile survival of a burned forest specialist in response to variation in fire characteristics. J. Anim. Ecol. 90: 1317–1327.

Tingley M.W., Stillman A.N., Wilkerson R.L., Howell C.A., Sawyer S.C. & Siegel, R.B. 2018. Cross-scale occupancy dynamics of a postfire specialist in response to variation across a fire regime. J. Anim. Ecol. 87: 1484–1496.

Tremblay J.A., Dixon R.D., Saab V.A., Pyle P. & Patten M.A. 2020. Black-backed Woodpecker (*Picoides arcticus*), v. 1.0. In: Rodewald P.G. (ed.) Birds of the world. Cornell Lab of Ornithology, Ithaca, NY, USA.

Versluijs M., Mikusinski G. & Roberge J.-M. 2022. Foraging behaviour of the Eurasian Three-toed Woodpecker *Picoides tridactylus* in its peak abundance after wildfire. Ardea 110: 75–88.