

17. Hansen, M.M., Olivieri, I., Waller, D.M., and Nielsen, E.E.; GeM Working Group (2012). Monitoring adaptive genetic responses to environmental change. *Mol. Ecol.* **21**, 1311–1329.
18. Visser, M.E., Gienapp, P., Husby, A., Morrissey, M., de la Hera, I., Pulido, F., and Both, C. (2015). Effects of spring temperatures on the strength of selection on timing of reproduction in a long-distance migratory bird. *PLoS Biol.* **13**, e1002120.
19. Bradshaw, W.E., and Holzapfel, C.M. (2001). Genetic shift in photoperiodic response correlated with global warming. *Proc. Natl. Acad. Sci. USA* **98**, 14509–14511.
20. Pulido, F., and Berthold, P. (2003). Quantitative genetic analysis of migratory behavior. In *Avian Migration*, P. Berthold, E. Gwinner, and E. Sonnenschein, eds. (Springer-Verlag), pp. 53–77.
21. Franks, S.J., Weber, J.J., and Aitken, S.N. (2014). Evolutionary and plastic responses to climate change in terrestrial plant populations. *Evol. Appl.* **7**, 123–139.
22. van Asch, M., Salis, L., Holleman, L.J.M., van Lith, B., and Visser, M.E. (2013). Evolutionary response of the egg hatching date of a herbivorous insect under climate change. *Nat. Clim. Chang.* **3**, 244–248.
23. Bradshaw, W.E., and Holzapfel, C.M. (2007). Evolution of animal photoperiodism. *Annu. Rev. Ecol. Evol. Syst.* **38**, 1–25.
24. Nussey, D.H., Postma, E., Gienapp, P., and Visser, M.E. (2005). Selection on heritable phenotypic plasticity in a wild bird population. *Science* **310**, 304–306.
25. Phillimore, A.B., Leech, D.I., Pearce-Higgins, J.W., and Hadfield, J.D. (2016). Passerines may be sufficiently plastic to track temperature-mediated shifts in optimum lay date. *Glob. Change Biol.* **22**, 3259–3272.
26. Merilä, J., and Hendry, A.P. (2014). Climate change, adaptation, and phenotypic plasticity: the problem and the evidence. *Evol. Appl.* **7**, 1–14.
27. Gwinner, E. (1989). Einfluß der Photoperiode auf das circannuale System des Halsbandschnäppers (*Ficedula albicollis*) und des Trauerschnäppers (*F. hypoleuca*). *J. Ornithol.* **130**, 1–13.
28. Gwinner, E. (1986). *Circannual Rhythms* (Springer).
29. Winkler, D.W., Gandoy, F.A., Areta, J.I., Iliff, M.J., Rakhimberdiev, E., Kardynal, K.J., and Hobson, K.A. (2017). Long-Distance Range Expansion and Rapid Adjustment of Migration in a Newly Established Population of Barn Swallows Breeding in Argentina. *Curr. Biol.* **27**, 1080–1084.
30. Samplonius, J.M., and Both, C. (2017). Competitor phenology as a social cue in breeding site selection. *J. Anim. Ecol.* **86**, 615–623.
31. Jenni, L., and Kéry, M. (2003). Timing of autumn bird migration under climate change: advances in long-distance migrants, delays in short-distance migrants. *Proc. Biol. Sci.* **270**, 1467–1471.
32. Buskirk, J.v., Mulvihill, R., and Leberman, R.C. (2009). Variable shifts in spring and autumn migration phenology in North American songbirds associated with climate change. *Glob. Change Biol.* **15**, 760–771.
33. del Hoyo, J., Elliott, A., Christie, D.A., and Kirwan, G.M. (2018). *Handbook of the Birds of the World Alive*. <http://www.hbw.com/>.
34. Hoffmann, D., Hoffmann, U., and Flörchinger, M. (2012). Änderungen in der Brutphänologie des Trauerschnäppers (*Ficedula hypoleuca*). Ergebnisse einer Langzeitstudie (1973–2012) an Höhlenbrütern in Rheinland-Pfalz. *Fauna Flora Rheinland-Pfalz* **12**, 523–537.
35. Van de Pol, M., Bailey, L.D., McLean, N., Rijdsdijk, L., Lawson, C.R., and Brouwer, L. (2016). Identifying the best climatic predictors in ecology and evolution. *Methods Ecol. Evol.* **7**, 1246–1257.
36. Bailey, L.D., and van de Pol, M. (2016). climwin: An R Toolbox for Climate Window Analysis. *PLoS ONE* **11**, e0167980.
37. Helm, B., Schwabl, I., and Gwinner, E. (2009). Circannual basis of geographically distinct bird schedules. *J. Exp. Biol.* **212**, 1259–1269.
38. Pulido, F., and Berthold, P. (2010). Current selection for lower migratory activity will drive the evolution of residency in a migratory bird population. *Proc. Natl. Acad. Sci. USA* **107**, 7341–7346.
39. Bearhop, S., Fiedler, W., Furness, R.W., Votier, S.C., Waldron, S., Newton, J., Bowen, G.J., Berthold, P., and Farnsworth, K. (2005). Assortative mating as a mechanism for rapid evolution of a migratory divide. *Science* **310**, 502–504.
40. Ouweland, J., and Both, C. (2017). African departure rather than migration speed determines variation in spring arrival in pied flycatchers. *J. Anim. Ecol.* **86**, 88–97.
41. Altwegg, R., Broms, K., Erni, B., Barnard, P., Midgley, G.F., and Underhill, L.G. (2012). Novel methods reveal shifts in migration phenology of barn swallows in South Africa. *Proc. Biol. Sci.* **279**, 1485–1490.
42. Van Doren, B.M., Liedvogel, M., and Helm, B. (2017). Programmed and flexible: long-term Zugunruhe data highlight the many axes of variation in avian migratory behaviour. *J. Avian Biol.* **48**, 155–172.
43. Coppack, T., Tindemans, I., Czisch, M., Van der Linden, A., Berthold, P., and Pulido, F. (2008). Can long-distance migratory birds adjust to the advancement of spring by shortening migration distance? The response of the pied flycatcher to latitudinal photoperiodic variation. *Glob. Change Biol.* **14**, 2516–2522.
44. Ouweland, J., Burger, C., and Both, C. (2017). Shifts in hatch dates do not provide pied flycatchers with a rapid ontogenetic route to adjust offspring time schedules to climate change. *Funct. Ecol.* **31**, 2087–2097.
45. Ryu, T., Veilleux, H.D., Donelson, J.M., Munday, P.L., and Ravasi, T. (2018). The epigenetic landscape of transgenerational acclimation to ocean warming. *Nat. Clim. Chang.* **8**, 504–509.
46. Prentice, M.B., Bowman, J., Lalor, J.L., McKay, M.M., Thomson, L.A., Watt, C.M., McAdam, A.G., Murray, D.L., and Wilson, P.J. (2017). Signatures of selection in mammalian clock genes with coding trinucleotide repeats: Implications for studying the genomics of high-pace adaptation. *Ecol. Evol.* **7**, 7254–7276.
47. Wilschut, R.A., Oplaat, C., Snoek, L.B., Kirschner, J., and Verhoeven, K.J.F. (2016). Natural epigenetic variation contributes to heritable flowering divergence in a widespread asexual dandelion lineage. *Mol. Ecol.* **25**, 1759–1768.
48. Gwinner, E., Neusser, V., Engl, E., Schmidl, D., and Bals, L. (1987). Haltung, Zucht und Eliaufzucht afrikanischer und europäischer Schwarzkehlchen *Saxicola torquata*. *Gefiederte Welt* **117**, 118–120.
49. Ouweland, J., Ahola, M.P., Aulsems, A.N.M.A., Bridge, E.S., Burgess, M., Hahn, S., Hewson, C.M., Klaassen, R.H.G., Laaksonen, T., Lampe, H.M., et al. (2016). Light-level geolocators reveal migratory connectivity in European populations of pied flycatchers *Ficedula hypoleuca*. *J. Avian Biol.* **47**, 69–83.
50. Newton, I. (1966). The moult of the bullfinch *Pyrrhula pyrrhula*. *Ibis* **108**, 41–67.
51. Gwinner, V.E. (1975). Die circannuale Periodik der Fortpflanzungsaktivität beim Star (*Sturnus vulgaris*) unter dem Einfluss gleich- und andersgeschlechtiger Artgenossen. *Z. Tierpsychol.* **38**, 34–43.
52. Bates, D., Maechler, M., Bolker, B., and Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *J. Stat. Softw.* **67**, 1–48.