Ecography

ECOG-03462
Heinen, J. H., van Loon, E. E., Hansen, D. M. and Kissling, W. D. 2017. Extinction-driven changes in frugivore communities on oceanic islands. – Ecography
doi: 10.1111/ecog.03462

Supplementary material

Supplementary material Appendix 1

Sources for species occurrences

Austin, J. J., & Arnold, E. N. (2001). Ancient mitochondrial DNA and morphology elucidate an extinct island radiation of Indian Ocean giant tortoises (*Cylindraspis*). Proceedings of the Royal Society of London B: Biological Sciences, 268, 2515-2523.

Barreiros, J. P., Elias, R. B., Lourenço, J., Dias, E., & Borges, P. A. (2010). First records of *Tarentola mauritanica* (Linnaeus, 1758) (Reptilia; Gekkonidae) in the Azores. Arquipelago. Life and Marine Sciences, 27, 73-75.

Boye, P., Hutterer, R., López-Martínez, N., & Michaux, J. (1992). A reconstruction of the Lava mouse (*Malpaisomys insularis*), an extinct rodent of the Canary Islands. Zeitschrift für Säugetierkunde, 57, 29-38.

Carleton, M. D., Olson, S. L., & Vespucci, A. (1999). Amerigo Vespucci and the rat of Fernando de Noronha: a new genus and species of *Rodentia* (Muridae, Sigmodontinae) from a volcanic island off Brazil's continental shelf. American Museum of Natural History 3256, 1-59.

Cheke, A., & Hume, J. P. (2010). Lost land of the Dodo: the ecological history of Mauritius, Réunion and Rodrigues. Bloomsbury Publishing, London.

Del Hoyo, J., Elliott, A., & Christie, D. (2010). Handbook of the birds of the world. Lynx Edicions, Barcelona.

Dowler, R. C., Carroll, D. S., & Edwards, C. W. (2000). Rediscovery of rodents (Genus *Nesoryzomys*) considered extinct in the Galapagos Islands. Oryx, 34, 109-118.

Eckhardt, R. C. (1972). Introduced plants and animals in the Galapagos Islands. Bioscience, 22, 585-590.

Firmat, C., Rodrigues, H. G., Hutterer, R., Rando, J. C., Alcover, J. A., & Michaux, J. (2011). Diet of the extinct Lava mouse *Malpaisomys insularis* from the Canary Islands: insights from dental microwear. Naturwissenschaften, 98, 33-37.

Flannery, T. F. (1995). Mammals of new guinea. Cornell University Press, Ithaca.

Flannery, T. F., Colgan, D., & Trimble, J. (1994). A new species of *Melomys* from Manus Island, Papua New Guinea, with notes on the systematics of the *M. rufescens* complex (Muridae: Rodentia). Proceedings of the Linnean Society of New South Wales 114, 29-43.

Flannery, T. F., & Wickler, S. (1990). Quaternary murids (Rodentia: Muridae) from Buka Island, Papua New Guinea, with descriptions of two new species. Australian Mammalogy, 13, 127-139.

Hansen, D.M. & Galetti, M. (2009). The forgotten megafauna. Science, 324, 42-43.

Harris, D. B., & Macdonald, D. W. (2007). Population ecology of the endemic rodent *Nesoryzomys swarthi* in the tropical desert of the Galapagos Islands. Journal of Mammalogy, 88, 208-219.

Hume, J. P., & Prys-Jones, R. P. (2005). New discoveries from old sources with reference to the original bird and mammal fauna of the Mascarene Islands, Indian Ocean. Zoölogische Mededelingen, Leiden, 97, 85-95.

Hume, J. P., & Walters, M. (2012). Extinct birds. T & AD Poyser, Bloomsbury, London.

Jiménez-Uzcátegui, G., Snell, H. L. (2013). CDF Checklist of Galapagos Mammals - FCD Lista de especies de Mamíferos Galápagos. In: Bungartz, F., Herrera, H., Jaramillo, P., Tirado, N., Jiménez-Uzcátegui, G., Ruiz, D., Guézou, A. & Ziemmeck, F. (eds.). Charles Darwin Foundation Galapagos Species Checklist - Lista de Especies de Galápagos de la Fundación Charles Darwin. Charles Darwin Foundation / Fundación

Charles Darwin, Puerto Ayora, Galapagos: http://checklists.datazone.darwinfoundation.org/vertebrates/mammalia/
Lavery, T. H., Olds, A. D., Seddon, J. M., & Leung, L. K. P. (2016). The mammals of northern Melanesia: speciation, ecology, and biogeography. Mammal Review, 46, 60-76.
Le Grand, G. (1983). Check list of the birds of the Azores. http://repositorio.uac.pt/handle/10400.3/1025
Mathias, M. D. L. (1988). An annotated list of the mammals recorded from the Madeira Islands. Boletim do Museu Municipal do Funchal, 40, 111-137.
Mathias, M. D. L., Ramalhinho, M. G., Santos-Reis, M., Petrucci-Fonseca, F., Libois, R., Fons, R. & Collares-Pereira, M. (1998). Mammals from the Azores islands (Portugal): an updated overview. Mammalia, 62, 397-408.
Peterson, R. L. (1966). Recent mammal records from the Galapagos Islands. Mammalia, 30, 441-445.
Ramos, J. A. (1995). The diet of the Azores bullfinch *Pyrrhula murina* and floristic variation within its range. Biological Conservation, 71, 237-249.
Rodebrand, S. (2010). Checklist of the birds of the Azores including 2009. https://www.yumpu.com/it/document/view/24063313/checklist-of-the-birds-of-the-azores-including-2009
Sahley, C. T., Cervantes, K., Pacheco, V., Salas, E., Paredes, D., & Alonso, A. (2015). Diet of a sigmodontine rodent assemblage in a Peruvian montane forest. Journal of Mammalogy, 96, 1071-1080.
Shah, N. (2001). Eradication of alien predators in the Seychelles: an example of conservation action on tropical islands. Biodiversity and Conservation, 10, 1219-1220.
Steadman, D. W. (2006). Extinction and biogeography of tropical Pacific birds. University of Chicago Press, Chicago.
Steadman, D. W., & Ray, C. E. (1982). The relationships of *Megaoryzomys curioi*, an extinct cricetine rodent (Muroidea, Muridae) from the Galapagos Islands, Ecuador. Smithsonian Institution Press.
Steadman, D. W., Stafford, T. W., Donahue, D. J., & Jull, A. T. (1991). Chronology of Holocene vertebrate extinction in the Galápagos Islands. Quaternary Research, 36, 126-133.
Timm, R. M., Weijola, V., Aplin, K. P., Donnellan, S. C., Flannery, T. F., Thomson, V., & Pine, R. H. (2016). A new species of *Rattus* (Rodentia: Muridae) from Manus Island, Papua New Guinea. Journal of Mammalogy, 97, 861-878.
Turvey, S. T. (Ed.). (2009). Holocene extinctions. Oxford University Press, Oxford.
Wharton, D., Dowler, R., & Watts, J. (2012). Some analyses and recommendations on diet formulation for conservation breeding of the Galapagos Rice Rat of Isla Santiago, *Nesoryzomys swarthi*. Zoo Biology, 31, 498-505.
White, J. P. (2004). Where the wild things are: prehistoric animal translocation in the circum New Guinea archipelago. In: Fitzpatrick, S. M. (ed.): Voyages of discovery: the archaeology of islands. Westport, Praeger, p. 147-164.
Wickler, S. (2001). The prehistory of Buka: stepping stone island in the northern Solomons Dept. of Archaeology and Natural History and Centre for Archaeological Research, Australian National University.
www.birdingazores.com (access date February 2016)
www.avibase.bsc-eoc.org (access date February 2016)

Sources for body mass

Arnold, E. N. (1979). Indian Ocean giant tortoises: their systematics and island adaptations. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 286, 127-145.

Arnold, E. N. (1980). Recently extinct reptile populations from Mauritius and Reunion, Indian Ocean. Journal of Zoology, 191, 33-47.

Arnold, E. N., & Bour, R. (2008). A new *Nactus* gecko (Gekkonidae) and a new *Leiolopisma* skink (Scincidae) from La Réunion, Indian Ocean, based on recent fossil remains and ancient DNA sequence. Zootaxa, 1705, 40-50.

Austin, J. J., & Arnold, E. N. (2001). Ancient mitochondrial DNA and morphology elucidate an extinct island radiation of Indian Ocean giant tortoises (*Cylindraspis*). Proceedings of the Royal Society of London B: Biological Sciences, 268, 2515-2523.

Balen, B. (2008). Bare-eyed White-eye (*Woodfordia superciliosa*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.) (2014). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona.

Baptista, L.F., Trail, P.W., Horblit, H.M. & de Juana, E. (2016). Rarotonga Fruit-dove (*Ptilinopus rarotongensis*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/54331 on 10 February 2016).

Baptista, L.F., Trail, P.W., Horblit, H.M. & Kirwan, G.M. (2016). Grey-green Fruit-dove (*Ptilinopus purpuratus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/54335 on 10 February 2016).

Baptista, L.F., Trail, P.W., Horblit, H.M., Kirwan, G.M. & Sharpe, C.J. (2016). Tooth-billed Pigeon (*Didunculus strigirostris*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/54282 on 10 February 2016).

Barnagaud, J. Y., Kissling, W.D., Sandel, B., Eiserhardt, W. L., Şekercioğlu, Ç. H., Enquist, B. J., Tsirogiannis, C. & Svenning, J. C. (2014). Ecological traits influence the phylogenetic structure of bird species co□occurrences worldwide. Ecology letters, 17, 811-820.

Bauer, A. M., & Russell, A. P. (1986). *Hoplodactylus delcourti* n. sp.(Reptilia: Gekkonidae), the largest known gecko. New Zealand Journal of Zoology, 13, 141-148.

Cheke, A., & Hume, J. P. (2010). Lost land of the Dodo: the ecological history of Mauritius, Réunion and Rodrigues. Bloomsbury Publishing, London.

Collar, N. (1997). Blue-crowned Lorikeet (*Vini australis*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.) (2014). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/54456 on 17 February 2016).

Collar, N. (2016). Omao (*Myadestes obscurus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/58234 on 17 February 2016).

Collar, N. & Sharpe, C.J. (2016). Puaiohi (*Myadestes palmeri*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/58235 on 17 February 2016).

de Rooij, N. (1915) The reptile of Indo-Australian Archipelago I: Lacertilia, Chelonia. E. J. Briil., Leiden.

Dowler, R. C., Carroll, D. S., & Edwards, C. W. (2000). Rediscovery of rodents (Genus *Nesoryzomys*) considered extinct in the Galapagos Islands. Oryx, 34, 109-118.
Dunning, J. B. (1993). Handbook of avian body masses. CRC, Boca Raton.
Ernst, C.H., Barbour, R.W., 1989. Turtles of the World. Smithsonian Institution Press, Washington, DC.
Fishpool, L. & Tobias, J. (2016). Brown-eared Bulbul (*Microscelis amaurotis*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona.
Flannery, T.F. (1995). Mammals of the South-West Pacific & Moluccan Islands. Chatswood, New South Wales: Reed Books, 464 pp.
Fleischer, R. C., James, H. F., & Olson, S. L. (2008). Convergent evolution of Hawaiian and Australo-Pacific honeyeaters from distant songbird ancestors. Current Biology, 18, 1927-1931.
Gosler, A. & Clement, P. (2016). Canary Blue Tit (*Cyanistes teneriffae*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/59910 on 17 February 2016).
Greer, A. E. (1970). The systematics and evolution of the subsaharan Africa, Seychelles, and Mauritius scincine scincid lizards. Harvard University.
Hansen, D. M., Donlan, C. J., Griffiths, C. J., & Campbell, K. J. (2010). Ecological history and latent conservation potential: large and giant tortoises as a model for taxon substitutions. Ecography, 33, 272-284.
Herrel, A., Meyers, J. J., & Vanhooydonck, B. (2002). Relations between microhabitat use and limb shape in phrynosomatid lizards. Biological Journal of the Linnean Society, 77, 149-163.
Higgins, P., Christidis, L. & Ford, H. (2016). Marbled Honeyeater (*Pycnopygius cinereus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/60263 on 17 February 2016).
Higgins, P., Christidis, L. & Ford, H. (2016). Red Wattlebird (*Anthochaera carunculata*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/60325 on 18 February 2016).
Hume, J. P., & Walters, M. (2012). Extinct birds. T & AD Poyser, Bloomsbury, London.
Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C., & Meiri, S. (2014). Is the island rule general? Turtles disagree. Global Ecology and Biogeography, 23, 689-700.
James, H. F., & Olson, S. L. (1991). Descriptions of thirty-two new species of birds from the Hawaiian Islands: Part II. Passeriformes. Ornithological Monographs, 46, 1-88.
James, H. F., Zusi, R. L. & Olson, S. L. (1989). *Dysmorodrepanis munroi* (Fringillidae: Drepanidini), a valid genus and species of Hawaiian finch. Wilson Bulletin 101.2, 159-179.
Jones, K. E., Bielby, J., Cardillo, M., Fritz, S. A., O'Dell, J., Orme, C. D. L., Safi, K., Sechrest, W., Boakes, E. H., Carbone, C., Connolly, C., Cutts, M. J., Foster, J. K., Grenyer, R., Habib, M., Plaster, C. A., Price, S. A., Rigby, E. A., Rist, J., Teacher, A., Bininda-Emonds, O. R. P., Gittleman, J. L., Mace, G. M., Purvis, A. & Michener, W. K. (2009) PanTHERIA: a species-level database of life history, ecology, and geography of extant and recently extinct mammals. Ecology, 90, 2648-2648.
Meiri, S. (2008). Evolution and ecology of lizard body sizes. Global Ecology and Biogeography, 17, 724-734.
Meiri, S. (2010). Length–weight allometries in lizards. Journal of Zoology, 281, 218-226.

Nogales, M., Rando, J. C., Valido, A., & Martín, A. (2001). Discovery of a living giant lizard, genus *Gallotia* (Reptilia: Lacertidae), from La Gomera, Canary Islands. Herpetologica, 57, 169-179.
Pérez-Méndez, N., Jordano, P., & Valido, A. (2015). Downsized mutualisms: Consequences of seed dispersers' body-size reduction for early plant recruitment. Perspectives in Plant Ecology, Evolution and Systematics, 17, 151-159.
Pough, F. H. (1980). The advantages of ectothermy for tetrapods. American Naturalist, 115, 92-112.
Pratt, D. & de Juana, E. (2016). Laysan Finch (*Telespiza cantans*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/61433 on 17 February 2016).
Rocha, C. F. D., Vrcibradic, D., Menezes, V. A., & Ariani, C. V. (2009). Ecology and natural history of the easternmost native lizard species in South America, *Trachylepis atlantica* (Scincidae), from the Fernando de Noronha Archipelago, Brazil. Journal of Herpetology, 43, 450-459.
Rocha, S., Roesler, H., Gehring, P. S., Glaw, F., Posada, D., Harris, D. J., & Vences, M. (2010). Phylogenetic systematics of day geckos, genus *Phelsuma*, based on molecular and morphological data (Squamata: Gekkonidae). Zootaxa, 2429, 1-28.
Sánchez-Hernández, P., Ramírez-Pinilla, M. P., & Molina-Borja, M. (2012). Agonistic and courtship behaviour patterns in the skink *Chalcides viridanus* (Fam. Scincidae) from Tenerife. Acta Ethologica, 15, 65-71.
Sandom, C., Dalby, L., Fløjgaard, C., Kissling, W. D., Lenoir, J., Sandel, B., Trøjelsgaard, K., Ejrnæs, R. & Svenning, J. C. (2013). Mammal predator and prey species richness are strongly linked at macroscales. Ecology, 94, 1112-1122.
Spencer, N. J., Thomas, B. W., Mason, R. F., & Dugdale, J. S. (1998). Diet and life history variation in the sympatric lizards *Oligosoma nigriplantare polychroma* and *Oligosoma lineoocellatum*. New Zealand Journal of Zoology, 25, 457-463.
Steadman, D. W. (1999). The biogeography and extinction of megapodes in Oceania. Zoologische Verhandelingen, 7-22.
Steadman, D. W. (2006). Extinction and biogeography of tropical Pacific birds. University of Chicago Press, Chicago.
van Balen, B. (2016). Malagasy White-eye (*Zosterops maderaspatanus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (retrieved from http://www.hbw.com/node/60227 on 18 February 2016).
Vinson J, Vinson J-M. (1969). The saurian fauna of the Mascarene Islands. Mauritius Institute Bulletin, 6, 203-320.
White, A. W., Worthy, T. H., Hawkins, S., Bedford, S. & Spriggs, M. (2010) Megafaunal meiolaniid horned turtles survived until early human settlement in Vanuatu, Southwest Pacific. Proceedings of the National Academy of Sciences, 107, 15512-15516.
World Parrot Trust https://www.parrots.org/encyclopedia (accessed February 2016)
World Parrot Trust https://www.parrots.org/encyclopedia/masked-shining-parrot (accessed February 2016)
World Parrot Trust https://www.parrots.org/encyclopedia/palm-lorikeet (accessed February 2016)
Zug, G. R. (2013). Reptiles and amphibians of the Pacific Islands: a comprehensive guide. University of California Press, London.

Sources for diet

Allison, A. (1982) Distribution and ecology of New Guinea lizards. In: Biogeography and Ecology of New Guinea: Part One - Seven (ed J. L. Gressitt), pp. 803-813. Springer Netherlands, Dordrecht.

Arkive (http://www.arkive.org/santiago-galapagos-mouse/nesoryzomys-swarthi/#ref2 accessed 25-2-2017)

Bennett, D. (2014). The arboreal foraging behavior of the frugivorous monitor lizard *Varanus olivaceus* on Polillo Island. Biawak 8, 15-18.

Blake, S., Wikelski, M., Cabrera, F., Guezou, A., Silva, M., Sadeghayobi, E., Yackulic, C. B. & Jaramillo, P. (2012). Seed dispersal by Galápagos tortoises. Journal of Biogeography, 39, 1961-1972.

Brattstrom, B. H. (2015). Food webs and feeding habits on the Revillagigedo Islands, Mexico 1. Pacific Science, 69, 181-195.

Bullock, D. J. (1986). The ecology and conservation of reptiles on Round Island and Gunner's Quoin, Mauritius. Biological Conservation, 37, 135-156.

Capula, M., & Luiselli, L. (1994). Trophic niche overlap in sympatric *Tarentola mauritanica* and *Hemidactylus turcicus*: a preliminary study. Herpetological Journal, 4, 24-25.

Cheke, A.S., Hume, J.P. (2008). Lost land of the Dodo. Christopher Helm, London.

Cogger, H. G., Sadlier, R., Cameron, E. E. (1983). The terrestrial reptiles of Australia's island territories. Australian National Parks and Wildlife Service.

Cooper Jr, W. E. (2000). Correspondence between diet and food chemical discriminations by omnivorous geckos (*Rhacodactylus*). Journal of Chemical Ecology, 26, 755-763.

Daza, J. D., Herrera, A., Thomas, R., Claudio, H. J. (2009). Are you what you eat? A geometric morphometric analysis of gekkotan skull shape. Biological Journal of the Linnean Society, 97, 677-707.

Dowler, R. C., Carroll, D. S., & Edwards, C. W. (2000). Rediscovery of rodents (Genus *Nesoryzomys*) considered extinct in the Galapagos Islands. Oryx, 34, 109-118

Evans, A. E., Towns, D. R., Beggs, J. R. (2015). Relative importance of sugar resources to endemic gecko populations in an isolated island ecosystem. New Zealand Journal of Ecology, 39, 262.

Flannery, T. F., & Wickler, S. (1990). Quaternary murids (Rodentia: Muridae) from Buka Island, Papua New Guinea, with descriptions of two new species. Australian Mammalogy, 13, 127-139.

Fuller, E. (2001). Extinct Birds. Comstock, New York.

Gibbons, J., Clunie, F. (1984). Brief notes on the voracious gecko, *Gehyra vorax*. Domodomo, 2, 34-36.

Griffiths, C. J., Hansen, D. M., Jones, C. G., Zuël, N., & Harris, S. (2011). Resurrecting extinct interactions with extant substitutes. Current Biology, 21, 762-765.

Hansen, D. M., Donlan, C. J., Griffiths, C. J., & Campbell, K. J. (2010). Ecological history and latent conservation potential: large and giant tortoises as a model for taxon substitutions. Ecography, 33, 272-284.

James, H. F., & Burney, D. A. (1997). The diet and ecology of Hawaii's extinct flightless waterfowl: evidence from coprolites. Biological Journal of the Linnean Society, 62, 279-297.

James, H. F., & Olson, S. L. (1991). Descriptions of thirty-two new species of birds from the Hawaiian Islands: Part II. Passeriformes. Ornithological Monographs, 46, 1-88.

Kissling, W. D., Böhning–Gaese, K., & Jetz, W. (2009). The global distribution of frugivory in birds. Global Ecology and Biogeography, 18, 150-162.

Kissling, W. D., Dalby, L., Fløjgaard, C., Lenoir, J., Sandel, B., Sandom, C., Trøjelsgaard, K. & Svenning, J. C. (2014). Establishing macroecological trait datasets: digitalization, extrapolation, and validation of diet preferences in terrestrial mammals worldwide. Ecology and evolution, 4, 2913-2930.

Lavery, T. H., Olds, A. D., Seddon, J. M., & Leung, L. K. P. (2016). The mammals of northern Melanesia: speciation, ecology, and biogeography. Mammal Review, 46, 60-76.

Leguat, F. (1721). Voyages et avantures de François Leguat et de ses compagnons en deux isles désertes des Indes orientales.

Marshall J. E. (2009). The role of colour and odour in fruit selection by diurnal, endemic skinks (*Oligosoma*) in Aotearoa/New Zealand. Thesis, Doctor of Philosophy, University of Otago, Otago.

Meehan, H. J., McConkey, K. R., Drake, D. R. (2002). Potential disruptions to seed dispersal mutualisms in Tonga, Western Polynesia. Journal of Biogeography, 29, 695-712.

Mori, A., & Randriamahazo, H. J. A. R. (2002). Foraging mode of a Madagascan iguanian lizard, *Oplurus cuvieri cuvieri*. African Journal of Ecology, 40, 61-64.

Mourer-Chauviré, C., & Balouet, J. C. (2005). Description of the skull of the genus *Sylviornis* Poplin, 1980 (Aves, Galliformes, Sylviornithidae new family), a giant extinct bird from the Holocene of New Caledonia. In: Proceedings of the International Symposium Insular Vertebrate Evolution: the Palaeontological Approach (Vol. 12, pp. 205-218).

Moyle, R. G., & Marks, B. D. (2006). Phylogenetic relationships of the bulbuls (Aves: Pycnonotidae) based on mitochondrial and nuclear DNA sequence data. Molecular Phylogenetics and Evolution, 40, 687-695.

Pernetta, J. C. (1983) The wildlife of the Purari catchment. In: The Purari — tropical environment of a high rainfall river basin (ed T. Petr), pp. 253-268. Springer Netherlands, Dordrecht.

Perry, G., Buden D.W. (1999). Ecology, behavior and color variation of the green tree skink, *Lamprolepis smaragdina* (Lacertilia: Scincidae), in Micronesia. MICRONESICA-AGANA, 31, 263-273.

Rocha, C. F. D., Vrcibradic, D., Menezes, V. A., & Ariani, C. V. (2009). Ecology and natural history of the easternmost native lizard species in South America, *Trachylepis atlantica* (Scincidae), from the Fernando de Noronha Archipelago, Brazil. Journal of Herpetology, 43, 450-459.

Rothschild, W. (1907). Extinct Birds. Hutchinson & Co, London.

Sadek R. 1981. The diet of the Madeiran lizard *Lacerta dugesii*. Zoological Journal of the Linnean Society, 73, 313-341.

Sandom, C., Dalby, L., Fløjgaard, C., Kissling, W. D., Lenoir, J., Sandel, B., Trøjelsgaard, K., Ejrnæs, R. & Svenning, J. C. (2013). Mammal predator and prey species richness are strongly linked at macroscales. Ecology, 94, 1112-1122.

Spencer N, Thomas B, Mason R, Dugdale J. (1998). Diet and life history variation in the sympatric lizards *Oligosoma nigriplantare polychroma* and *Oligosoma lineoocellatum*. New Zealand Journal of Zoology, 25, 457-463.

Traveset, A., Nogales, M., Vargas, P., Rumeu, B., Olesen, J. M., Jaramillo, P. & Heleno, R. (2016). Galápagos land iguana (*Conolophus subcristatus*) as a seed disperser. Integrative Zoology, 11, 207-213.

Valido, A. & Olesen, J. M. (2007) The importance of lizards as frugivores and seed dispersers. Seed dispersal: theory and its application in a changing world (eds A. J. Dennis, E. W. Schupp, R. A. Green & D. A. Westcott), pp. 124-147. CABI, Wallingford & Cambridge.

Vinson, J., Vinson, J.-M. (1969). The saurian fauna of the Mascarene Islands. Mauritius Institute Bulletin, 6, 203-320.
White, A. W., Worthy, T. H., Hawkins, S., Bedford, S. & Spriggs, M. (2010). Megafaunal meiolaniid horned turtles survived until early human settlement in Vanuatu, Southwest Pacific. Proceedings of the National Academy of Sciences, 107, 15512-15516.
Whittaker, R. J. & Fernandez-Palacios, J. M. (2007) Island biogeography. Oxford University Press, Oxford.
Wilson, S. (2012). Australian lizards: a natural history: CSIRO Publishing.
Wright, K. M., Skeba S. (1992). Hematology and plasma chemistries of captive prehensile-tailed skinks (*Corucia zebrata*). Journal of Zoo and Wildlife Medicine, 23, 429-432.

Sources for flight ability

Dekker, R. W. R. J. (2007) Distribution and speciation of Megapodes (Megapodiidae) and subsequent development of their breeding. In: Biogeography, Time, and Place: Distributions, Barriers, and Islands (ed W. Renema), pp. 93-102. Springer Netherlands, Dordrecht.
Diamond, J. (1991). A new species of rail from the Solomon Islands and convergent evolution of insular flightlessness. The Auk, 108, 461-470.
Hume, J. P., & Walters, M. (2012). Extinct birds. T & AD Poyser, Bloomsbury, London.
Shapiro, B., Sibthorpe, D., Rambaut, A., Austin, J., Wragg, G. M., Bininda-Emonds, O. R., Lee, P. L. M. & Cooper, A. (2002). Flight of the dodo. Science, 295, 1683-1683.
Steadman, D. W. (2006). A new species of extinct parrot (Psittacidae: Eclectus) from Tonga and Vanuatu, South Pacific 1. Pacific Science, 60, 137-145.
Steadman, D. W. (2006). Extinction and biogeography of tropical Pacific birds. University of Chicago Press, Chicago.
Steadman, D. W., & Kirch, P. V. (1998). Biogeography and prehistoric exploitation of birds in the Mussau islands, Bismarck archipelago, Papua New Guinea. Emu, 98, 13-22.

Supplementary material Appendix 2

Calculation of tortoise body mass

For tortoises, body mass data is often not available. Consequently, morphometric data such as curved carapace length (CCL) are often used to estimate body mass using the equation from Pough (1980). However, the equation from Pough (1980) for the relationship between body mass and CCL is based on data that includes both tortoises and aquatic terrapins. The latter have a flattened, streamlined carapace shape that is suited for their aquatic lifestyle. In contrast, tortoises have more dome-shaped carapaces (Austin and Arnold 2001). Hence, the applicability of the equation from Pough (1980) for tortoises is questionable.

We therefore predicted tortoise body mass (kg) from CCL (cm) by means of a polynomial regression based on data of 182 Aldabra Giant tortoises (*Aldabrachelys gigantea*) (R. Baxter and D. M. Hansen, unpub. data). This relationship allowed to predict body mass with high explanatory power ($R^2 = 0.962$, $p < 0.001$; Figure A2.1).

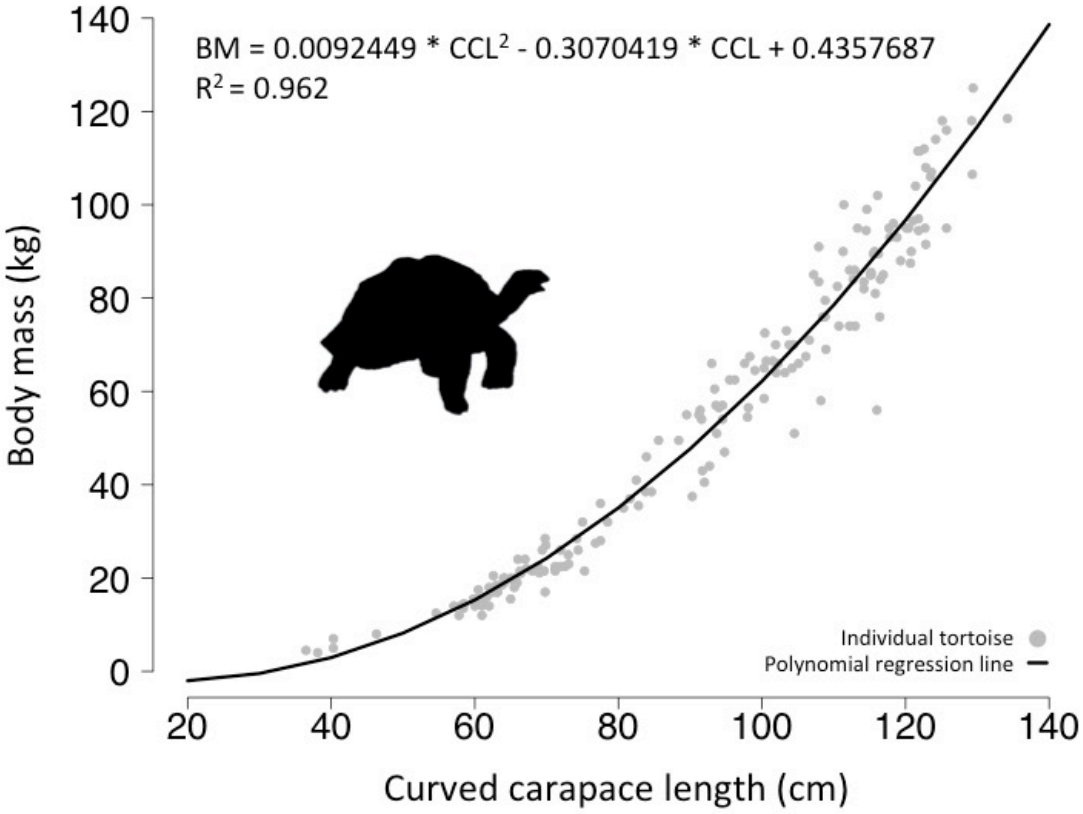

Figure A2.1. The polynomial relationship between the curved carapace length (CCL, in cm) and body mass (in kg) for 182 Aldabra Giant tortoises (*Aldabrachelys gigantea*). The relationship is based on unpublished data from Richard Baxter and Dennis M. Hansen.

References

Austin, J. J. and Arnold, E. N. 2001. Ancient mitochondrial DNA and morphology elucidate an extinct island radiation of Indian Ocean Giant Tortoises (Cylindraspis). - Proceedings: Biological Sciences 268: 2515-2523.

Pough, F. H. 1980. The advantages of ectothermy for tetrapods. - American Naturalist 115: 92-112.

Supplementary material Appendix 3

Island extinctions

Table A3.1. Pre-extinction species richness, recorded species extinctions, proportional extinction and proportional loss of mean body mass across 74 islands within 20 archipelagos worldwide. Data show the species richness of frugivorous vertebrates (birds, mammals, reptiles) before extinctions during the Late Holocene and recent present, the number of recorded extinctions and the proportion of richness that has gone extinct (n = 33 islands), and the proportional loss of community-level mean body mass.

Archipelago	Island	Pre-extinction species richness	Recorded species extinctions	Proportional extinction	Proportional loss of mean body mass
Australia	Lord Howe	17	3	0.1765	0.0644
Azores	Corvo	9	0	0	0
Azores	Faial	11	0	0	0
Azores	Flores	9	0	0	0
Azores	Graciosa	10	0	0	0
Azores	Pico	11	0	0	0
Azores	Santa Maria	10	0	0	0
Azores	Sao Jorge	10	0	0	0
Azores	Sao Miguel	13	0	0	0
Azores	Terceira	12	0	0	0
Bismarck	Lavongai	39	0	0	0
Bismarck	Manus	33	0	0	0
Bismarck	Mussau	28	1	0.0357	0.0567
Bismarck	Umboi Island	47	0	0	0
Bonin Islands	Haha-Jima	10	1	0.1000	0.2013
Canary Islands	La Gomera	15	1	0.0667	0.1040
Canary Islands	Lanzarote	7	0	0	0
Canary Islands	La Palma	14	1	0.0714	0.2402
Cape Verde	Boa Vista	3	0	0	0
Cape Verde	Santiago	3	0	0	0
Cape Verde	Santo Antao	3	0	0	0
Cape Verde	Sao Nicolao	3	0	0	0
Comoros	Anjouan	17	0	0	0
Comoros	Grande Comore	20	0	0	0
Comoros	Mayotte	22	0	0	0
Comoros	Moheli	18	0	0	0
Cook Islands	Atiu	7	3	0.4286	0.09643
Cook Islands	Mangaia	12	9	0.7500	0.11352
Cook Islands	Mitiaro	3	0	0	0
Cook Islands	Rarotonga	7	1	0.1429	-0.17934
Fernando de Noronha	Fernando de Noronha	4	0	0	0
Fiji Islands	Kadavu	21	0	0	0
Fiji Islands	Taveuni	25	0	0	0
Galapagos	Fernandina	18	1	0.0556	0.32196
Galapagos	Isabela	19	0	0	0
Galapagos	Pinta	13	1	0.0769	0.4502
Galapagos	San Cristobal	15	0	0	0
Galapagos	Santa Cruz	20	1	0.0500	-0.03102
Galapagos	Santiago	19	0	0	0
Hawaii	Kauai	4	2	0.5000	0.1529
Hawaii	Lanai	3	3	1.0000	1.0000
Hawaii	Maui	6	5	0.8333	0.8316
Hawaii	Molokai	5	4	0.8000	0.5079

Hawaii	Oahu	4	4	1.0000	1.0000
Madeira	Madeira	10	0	0	0
Madeira	Porto Santo	5	0	0	0
Mascarene	Mauritius	24	10	0.4167	0.7673
Mascarene	Reunion	16	10	0.6250	0.8218
Mascarene	Rodrigues	14	12	0.8571	0.8135
New Caledonia	Ile des Pins	19	5	0.2632	0.3830
Revilla gigedos	Socorro	7	1	0.1429	0.2767
Seychelles	Aldabra	7	0	0	0
Seychelles	La Digue	6	2	0.3333	0.7507
Seychelles	Mahe	7	3	0.4286	0.8363
Seychelles	Praslin	7	3	0.4286	0.7754
Seychelles	Silhouette	6	3	0.5000	0.8562
Solomon Islands	Bellona	9	0	0	0
Solomon Islands	Buka	46	8	0.1739	0.1767
Solomon Islands	Choiseul	48	1	0.0208	0.0175
Solomon Islands	Makira	42	2	0.0476	0.0486
Solomon Islands	Malaita	45	1	0.0222	0.0355
Solomon Islands	Rennell	19	0	0	0
Solomon Islands	Santa Isabel	42	0	0	0
Tonga Islands	Eua	21	14	0.6667	0.5214
Vanuatu	Ambrym	23	1	0.0435	-0.0326
Vanuatu	Aneityum	16	0	0	0
Vanuatu	Efate	26	2	0.0769	0.2935
Vanuatu	Espiritu Santo	23	0	0	0
Vanuatu	Futuna Vanuatu	11	0	0	0
Vanuatu	Lopevi	18	0	0	0
Vanuatu	Maewo	18	0	0	0
Vanuatu	Mere Lava	13	0	0	0
Vanuatu	Tanna	22	2	0.0909	0.0715
Vanuatu	Tongoa	16	0	0	0

Supplementary material Appendix 4

Results of generalized linear mixed effects models (GLMMs) on island characteristics

Table A4.1. Relationship between proportional extinction of frugivorous vertebrates and island characteristics across islands worldwide (n = 74). The relationship is shown for eight generalized linear mixed effects models (GLMMs) that show similar support. Support was assessed using the Akaike Information Criterion corrected for small sample sizes (AICc), rejecting models with $\Delta AICc \geq 4$ compared to the best model ($\Delta AICc = 0$). For these eight GLMMs, model averaging was used to obtain the most parsimonious model (see Supplementary material Appendix 4 Table A4.2 for the averaged final GLMM). Archipelago was used as a random effect and the model was weighted by pre-extinction species richness. Island characteristics (scaled before analysis): AREA = island area (km^2); DIST = distance to mainland (km^2); ELEV = maximum elevation (m); PREC = annual precipitation (mm/yr); SLMP = surrounding landmass proportion (log_{10} proportion); TEMP = annual mean temperature (°C).

Model	AREA	DIST	ELEV	PREC	SLMP	TEMP	AICc	Δ AICc
1	-0.7866	1.437	0.3753				192.6	0
2	-0.6580	1.597	0.4061	-0.4185			193.4	0.76
3	-0.8067	1.237	0.4128		-0.3232		194.5	1.87
4	-0.6669	1.339	0.4604	-0.4725	-0.4484		194.9	2.28
5	-0.7886	1.414	0.3806			0.1562	194.9	2.28
6	-0.5210	1.280					194.9	2.34
7	-0.6525	1.564	0.4173	-0.4484		0.2802	195.5	2.93
8	-0.4150	1.390		-0.2995			196.4	3.76
Average	**-0.7021**	**1.427**	**0.4005**	**-0.4228**	**-0.3794**	**0.2082**		

Table A4.2. Final generalized linear mixed effects model (GLMM) showing the relationship between proportional extinction of frugivores (birds, mammals, reptiles) and six island characteristics across 74 islands worldwide. The final GLMM was derived by model averaging of eight GLMMs with similar support (Δ AICc < 4; Supplementary material Appendix 4, Table A4.1). All predictor variables were scaled before the analysis. Archipelago was used as a random intercept and the GLMMs were weighted by pre-extinction species richness of each island. Abbreviation of island characteristics: AREA = island area (km^2); DIST = distance to mainland (km^2); ELEV = maximum elevation (m); PREC = annual precipitation (mm/yr); SLMP = surrounding landmass proportion (log_{10} proportion); TEMP = annual mean temperature (°C).

Predictor	B	SE(β)	P-value	
Fixed effects				
Intercept	-2.7603	0.5242	2e-07	***
AREA (scaled)	-0.7021	0.2457	0.00485	**
DIST (scaled)	1.4271	0.4754	0.00316	**
ELEV (scaled)	0.4005	0.1816	0.03019	*
PREC (scaled)	-0.4228	0.3420	0.22456	
SLMP (scaled)	-0.3794	0.4639	0.42174	
TEMP (scaled)	0.2082	0.5354	0.70243	

Supplementary material Appendix 5

Results of generalized linear mixed effects models (GLMMs) on traits

Table A5.1. Relationship between extinction probability and functional traits (body mass, amount of fruit in the diet, and ability to fly) of frugivorous vertebrates on islands worldwide. The relationship is shown for four generalized linear mixed effects models (GLMMs) with different combinations of the fixed effects body mass (g) and amount of fruit in the diet (categorical: low, medium or high). In all GLMMs, the ability to fly (volant or non-volant) and taxonomic class (bird, mammal, reptile) are included as random effects. The continuous variable body mass was always scaled with a Z-transformation. The Akaike Information Criterion corrected for small sample sizes (AICc) shows how models perform relative to the best model (ΔAICc = 0). Only GLMMs with ΔAICc ≥ 4 were used (highlighted in bold). Details of the final GLMM are given in Supplementary material Appendix 5, Table A5.2. The GLMMs are calculated using 1185 (extinct or extant) occurrences of 387 unique vertebrate species on 74 islands worldwide.

Model	Variables	AICc	Δ AICc
1	**Body mass**	**744.6**	**0**
2	Body mass + Diet	748.6	4.01
3	No fixed effects	764.7	20.08
4	Diet	765.8	21.16

Table A5.2. Generalized linear mixed effects model (GLMM) illustrating the effect of traits on extinction probability of frugivores (birds, mammals, reptiles). The binary extinction status (extinct = 1, extant = 0) of species on islands was used as response variable, body mass (g) as fixed effect, and ability to fly (volant or non-volant) and taxonomic class (bird, mammal, reptile) as random effects. The model corresponds to the model highlighted in bold in Supplementary material Appendix 5, Table A5.1. The GLMM is based on 1185 species occurrences of 387 unique species on 74 islands worldwide.

Predictor	β	SE(β)	P-value
Fixed effects			
Intercept	-2.42387	0.40652	2.49e-09 ***
Body mass (scaled)	0.35259	0.08764	5.74e-05 ***
Random effects	Intercept	Flying	
Class Birds	3.11333	-2.98867	
Class Mammals	1.29980	-1.24776	
Class Reptiles	0.14220	-0.13651	

Supplementary material Appendix 6

Representativeness of vertebrate classes within archipelagos

Table A6.1. Representativeness of different vertebrate classes (birds, mammals, reptiles) within 20 archipelagos worldwide. Representativeness is measured as the number (#) and percentage (%) of species in a given vertebrate class relative to the total number of species. Only frugivorous species are included.

Archipelago	Total	Birds		Mammals		Reptiles	
	#	#	%	#	%	#	%
Azores	13	13	100	0	0	0	0
Bismarck Archipelago	62	47	76	12	19	3	5
Bonin Islands	10	9	90	1	10	0	0
Canary Islands	20	13	65	0	0	7	35
Cape Verde	3	3	100	0	0	0	0
Comoros	29	18	62	3	10	8	28
Cook Islands	14	11	79	1	7	2	14
Fernando de Noronha	4	3	75	0	0	1	25
Fiji Islands	26	21	81	4	15	1	4
Galapagos Islands	34	16	47	5	15	13	38
Hawaii	14	14	100	0	0	0	0
Lord Howe Islands	17	16	94	0	0	1	6
Madeira Archipelago	11	8	73	0	0	3	27
Mascarene Islands	49	28	57	3	6	18	37
New Caledonia	19	16	84	2	11	1	5
Revilla Gigedos Islands	7	6	86	0	0	1	14
Seychelles	14	11	79	2	14	1	7
Solomon Islands	85	59	69	22	26	4	5
Tonga Islands	21	20	95	1	5	0	0
Vanuatu	29	24	83	3	10	2	7