Dwarfism and gigantism are common occurrences for island populations of vertebrates. Size affects many life history and fitness components and is subject to a large number of selective forces. The so-called island rule states that on an island small species will become large, and large species will become small. Many studies have aimed at determining the viability of this island rule is and different species and populations show mixed results in favor of and against the island rule.

We will look at several selective forces that incur the island rule and we will analyze why this is. Additionally we will look at several other selective forces that may counteract the island rule. In the end we would like to formulate a predictive model for body size change in insular vertebrates according to these selective forces.

Predator density and interspecific competition are generally lower on islands and these selective forces seem to confirm the island rule, by allowing character release on body size. However several other selective factors, are unaffected by character release or initial body size. For example, resource density is positively correlated with body size regardless of ancestral bodysize. Shifts in available diet may affect body size in both directions. Again this is not correlated with initial body size and can diverge from the island rule. Each of these selective forces may have a different effect in different species. Indeed selective forces acting on herbivores, may have no effect on predators. Even utilization of terrestrial versus aquatic prey may result in opposite bodysize effects.

The island rule certainly is not a law. The main problem is the large number of relevant selective forces acting on populations in nature. Some of these forces may be more important for certain species under certain conditions. However when looking at all selective forces separately in many cases a pattern exists. Unfortunately this may also reflect a biass fór the island rule in the literature. Any populations' body size may diverge either up or down, resulting in a 50/50 chance for each population to follow the island rule. Furthermor studies that find no effect are less likely to be published.
We conclude the island rule is not universally correct, but may have been acknowledged through biases that magnify the actual effect.

References

Adler, G., & Levins, R. (1994). The island syndrome in rodent populations. *The Quarterly Review Of Biology*, *69*(4), 473-490.

Aubret, F. (2014). Island colonisation and the evolutionary rates of body size in insular neonate snakes. *Heredity*, *115*(4), 349-356. http://dx.doi.org/10.1038/hdy.2014.65

Blumstein, D., & Daniel, J. (2005). The loss of anti-predator behaviour following isolation on islands. *Proceedings Of The Royal Society B: Biological Sciences*, *272*(1573), 1663-1668. http://dx.doi.org/10.1098/rspb.2005.3147

Bowen, L., & Vuren, D. (1997). Insular Endemic Plants Lack Defenses Against Herbivores. *Conservation Biology*, *11*(5), 1249-1254. http://dx.doi.org/10.1046/j.1523-1739.1997.96368.x

Brown, J., Marquet, P., & Taper, M. (1993). Evolution of Body Size: Consequences of an Energetic Definition of Fitness. *The American Naturalist*, *142*(4), 573-584. http://dx.doi.org/10.1086/285558

Clegg, S., & Owens, P. (2002). The 'island rule' in birds: medium body size and its ecological explanation. *Proceedings Of The Royal Society B: Biological Sciences*, *269*(1498), 1359-1365. http://dx.doi.org/10.1098/rspb.2002.2024

Durst, P., & Roth, V. (2015). Mainland size variation informs predictive models of exceptional insular body size change in rodents. *Proceedings Of The Royal Society B: Biological Sciences*, *282*(1810), 20150239. http://dx.doi.org/10.1098/rspb.2015.0239

Grant, P. (2006). Evolution of Character Displacement in Darwin's Finches. *Science*, *313*(5784), 224-226. http://dx.doi.org/10.1126/science.1128374

Jessop, T., Madsen, T., Sumner, J., Rudiharto, H., Phillips, J., & Ciofi, C. (2006). Maximum body size among insular Komodo dragon populations covaries with large prey density. *Oikos*, *112*(2), 422-429. http://dx.doi.org/10.1111/j.0030-1299.2006.14371.x

Keogh, S., Scott, I., & Hayes, C. (2005). Rapid and repeated origin of insular gigantism and dwarfism in australian tiger snakes. *Evolution*, *59*(1), 226-233.

Kavanagh, P. (2014). Herbivory and the evolution of divaricate plants: Structural defences lost on an offshore island. *Austral Ecology*, *40*(2), 206-211. http://dx.doi.org/10.1111/aec.12196

Lomolino, M., Sax, D., Palombo, M., & van der Geer, A. (2011). Of mice and mammoths: evaluations of causal explanations for body size evolution in insular mammals. *Journal Of Biogeography*, *39*(5), 842-854. http://dx.doi.org/10.1111/j.1365-2699.2011.02656.x

McNab, B. (1994). Energy Conservation and the Evolution of Flightlessness in Birds. *The American Naturalist*, *144*(4), 628-642. http://dx.doi.org/10.1086/285697

Meiri, S. (2007). Size evolution in island lizards. *Global Ecology And Biogeography*, *16*(6), 702-708. http://dx.doi.org/10.1111/j.1466-8238.2007.00327.x

Meiri, S., Dayan, T., & Simberloff, D. (2007). Guild composition and mustelid morphology – character displacement but no character release. *Journal Of Biogeography*, *34*(12), 2148-2158. http://dx.doi.org/10.1111/j.1365-2699.2007.01771.x

Pafilis, P., Meiri, S., Foufopoulos, J., & Valakos, E. (2009). Intraspecific competition and high food availability are associated with insular gigantism in a lizard. *Naturwissenschaften*, *96*(9), 1107-1113. http://dx.doi.org/10.1007/s00114-009-0564-3

Palkovacs, E. (2003). Explaining adaptive shifts in body size on islands: a life history approach. *Oikos*, *103*(1), 37-44.

Raia, P., & Meiri, S. (2006). THE ISLAND RULE IN LARGE MAMMALS: PALEONTOLOGY MEETS ECOLOGY. *Evolution*, *60*(8), 1731. http://dx.doi.org/10.1554/05-664.1

Remmel, T., & Tammaru, T. (2009). Size-dependent predation risk in tree-feeding insects with different colouration strategies: a field experiment. *Journal Of Animal Ecology*, *78*(5), 973-980. http://dx.doi.org/10.1111/j.1365-2656.2009.01566.x

Runemark, A., Brydegaard, M., & Svensson, E. (2014). Does relaxed predation drive phenotypic divergence among insular populations?. *Journal Of Evolutionary Biology*, *27*(8), 1676-1690. http://dx.doi.org/10.1111/jeb.12421

Runemark, A., Sagonas, K., & Svensson, E. (2015). Ecological explanations to island gigantism: dietary niche divergence, predation, and size in an endemic lizard. *Ecology*, *96*(8), 2077-2092. http://dx.doi.org/10.1890/14-1996.1

Sinclair, A., Mduma, S., & Brashares, J. (2003). Patterns of predation in a diverse predator–prey system. *Nature*, *425*(6955), 288-290. http://dx.doi.org/10.1038/nature01934

van der Geer, A., van den Bergh, G., Lyras, G., Prasetyo, U., Due, R., Setiyabudi, E., & Drinia, H. (2016). The effect of area and isolation on insular dwarf proboscideans. *Journal Of Biogeography*, *43*(8), 1656-1666. http://dx.doi.org/10.1111/jbi.12743

WU, Z., LI, Y., & MURRAY, B. (2006). Insular shifts in body size of rice frogs in the Zhoushan Archipelago, China. *Journal Of Animal Ecology*, *75*(5), 1071-1080. http://dx.doi.org/10.1111/j.1365-2656.2006.01126.x