To mark the anniversary of Darwin’s birth on 12th February 1809, we begin with one of the lesser-known but highly important discoveries made by Darwin on the *Beagle* voyage. As the *Beagle* plied the coasts of Argentina and Chile, Darwin noticed a succession of flat terraces behind the sea cliffs. On land, he found that they were strewn with marine shells of the same species found on the modern beach, and correctly interpreted them as raised beaches, the land having become elevated in recent geological times. We now know that marine terraces form from the interplay of rising land and the alternating rise and fall of global sea level due to ice ages. These dramatic oscillations have, over the past two million years, had profound effects on coastal and island environments. Examples of animal dispersal and evolution driven by these changes will be given from the work of the author and his colleagues on ice-age mammals, focussing especially on the dwarfing of large mammals on offshore islands. Darwin himself realised, even while on board the *Beagle*, that the ‘zoology of archipelagos will be well worth examining’ for evidence of what later became known as evolution.