

## a5 Fossil and living organisms are related

< Darwin, Smith, evolutionary paleontologists >

Is nothing left? Have all things passed thee by?  
 The stars are not thy stars! The aged hills  
 Are changed and bowed beneath repeated ills  
 Of ice and snow, of river and of sky.  
 The sea that raiseth now in agony  
 Is not thy sea. The stormy voice that fills  
 This gloom with man's remotest sorrow shrills  
 The memory of the futurity!

—an excerpt from *Oldhamia*, a geological sonnet by John Joly (1859-1933) inspired by a trace fossil of the same name (honoring its discoverer Thomas Oldham (1816-1878), Director of the British Geological Survey, and once thought to be the oldest ever fossil and so a record of the “origin of life” in Early Cambrian sedimentary rocks of Bray Head, County Wicklow, Ireland: its fossil a witness to the ages and to the evanescence of existence.<sup>1</sup>

From insights published by James Hutton beginning in 1785, the vastness of geologic time entered common knowledge. And by half a century later, the way was paved for Charles Robert Darwin (1809-1882), beginning in 1837, to seriously consider for life's variety a natural process of gradual evolution. In 1858, relevant notes of his and a letter from Alfred Russel Wallace (1823-1913) were published: *On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection*. In 1859, Darwin published: *On the Origin of the Species*.<sup>2</sup> Geology then took on extra significance in that its study should also test the theory of evolution.

A succession of distinctive fossil assemblages were known to be preserved in layered sediments of the Midlands of England. In 1799, William “Strata” (his later given nickname)<sup>3</sup> Smith dictated his now-famous table of strata near Bath, Somerset, England, described from the top down.

In 1869, W. Waagen and A. Karpinsky were able to provide detailed evidence of evolution of extinct ammonoids (shellfish related to the living pearly nautilus).<sup>4</sup>



**Karl Alfred von Zittel**  
 (1839 -1904)<sup>6</sup>

A year later, T. H. Huxley had traced the descent of the living “one-toed” (viz, one toe per leg) horse *Equus* back via the fossil ass-like, dew-clawed, *Hipparion* to the three-toed Miocene *Anchitherium* and deeper to the tapirish *Palaeotherium*, to declare for a (yet shy of discovery) five-toed agouti-shaped ancestor (agouti or “gerbils” are herbivores that live in equatorial Brazil, Bolivia and Peru forests and are the only animal there that have the molars adequate to crack open hard shelled Brazil nuts from fallen pods).<sup>5</sup> The reverse narrative (just-so story) of Darwinian evolution selecting so for a horse that moves from the shelter of the forest to the hard plain and gains fleetness to survive in that exposed environment, was given by Vladimir O. Kovalevskii, the fictitious archaeologist husband to be of Sofia Vasilevna Kovalevskiaia (friend of Charles Darwin, T. H. Huxley, and Peter Kropotkin).

Of greater importance was an exhaustive four-volume compilation (1880-1890) of all known fossils by **Karl Alfred von Zittel**. This revealed (unintentionally) that all life was once in the sea. Evidently, land-dwelling plants and animals have evolved since then.<sup>7</sup>

A prediction of the theory of evolution is that life should tend to become more diverse (bushy as to lineages) in time. This trend, between extinction episodes (that thin and prune branches), is shown overwhelmingly to be the case.