# 16. Neanderthals and modern humans: an example of a mammalian syngameon?

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## Abstract

Lotsy (1925) suggested that hybridizing plant species be grouped into larger interbreeding taxa that he named "syngameons." Such hybridizing taxa have long been well-documented among plants, but zoologists have traditionally downplayed the role of hybridization in animal evolution. Templeton (1989), however, has recently suggested that mammalian species which freely hybridize should also be grouped into syngameons. A literature survey suggests that the ability of any two mammalian species to hybridize successfully (i.e., produce viable, fertile hybrid offspring) is negatively correlated with time since phylogenetic divergence. In this regard, the genus *Homo* is a prime candidate for the presence of syngameons since the genus *Homo* (*sensu stricto* Wood and Collard, 1999) only emerged ca. 2.0 million years ago. The Late Pleistocene paleospecies *Homo neanderthalensis* is morphologically quite distinct from *H. sapiens*. The marked morphological (and genetic) distance between these two members of the genus *Homo* has led many human paleontologists to infer that these two taxa are separate species. From a current systematic perspective, such a position is justified, since in almost all species concepts species are defined by characters, of which the ability to interbreed is only one. In fact, the ability to interbreed is a plesiomorphic character, and as such we should not be surprised if two sister taxa, such as *H. neanderthalensis* and *H. sapiens*, retain this ability. There is, however, a relative dearth of paleontological evidence for such interbreeding – a somewhat surprising finding that warrants further exploration.

## Introduction

The marked morphological differences between the Neanderthals, especially the European Neanderthals, and their modern or nearly-modern human contemporaries (and subsequent modern human populations) are so great as to convince many paleoanthropologists today that Neanderthals should be placed in a species separate from *Homo*



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*sapiens* (Tattersall, 1992; Howell, 1994; Franciscus, 1996; Rak, 1998; Wood and Richmond, 2000; Schillaci and Froehlich, 2001). Specifically, in addition to the long-recognized distinctive morphology of the prognathic Neanderthal midface (Rak 1986, Trinkaus, 1987; Hublin, 1998), and the plesiomorphically long, low cranium, with an apparently apomorphic suprainiac fossa and "*en bombe*" shape (Hublin, 1998), the Neanderthals also possess a suite of seemingly autapomorphic postcranial characters that distinguish them from their non-Neanderthal contemporaries (Trinkaus, 1995; Churchill, 1996; Franciscus and Schoenebaum, 2000). If Neanderthals are a separate species, then *Homo neanderthalensis* King, 1864 has taxonomic priority as the specific nomen for these hominins. As a taxon the Neanderthals appear to have evolved sometime in the Middle Pleistocene in that peninsular cul-de-sac of Eurasia known as Europe, and were largely, if not completely, isolated from non-Neanderthal hominins in Africa and Asia. Later (during OI Stage 4) these Neanderthals spread into parts of western Asia, but the degree of interaction (if any) between them and the nearly-modern humans who had been, or may have continued to be living there at the time, remains uncertain (Holliday, 2000; Shea, 2003).

The statement that *Homo neanderthalensis* is a separate species from *H. sapiens* means different things to different researchers, due to the fact that debate rages among biologists as to how species should be circumscribed. As a case in point, Mayden (1997) suggested that there are 22 species concepts in the current scientific literature, but he has more recently argued that this figure should be increased to at least 27 or 28 (Mayden, pers. comm.). While not all of these species concepts are applicable to fossil taxa, some of them nonetheless cast a long shadow over the debate concerning the place of Neanderthals in the origin(s) of modern humans. Primary among these concepts, and the best known of them all, is the Biological Species Concept (BSC) of Ernst Mayr (1942, 1963, 2000). While this concept cannot be applied to fossil taxa, for reasons to be discussed below, it almost always underlies the debate surrounding the fate of the Neanderthals.

Mayr defined species as "groups of interbreeding natural populations that are reproductively isolated from other such groups" (Mayr, 2000: 17). Reproductive isolation can be present in many forms, but at its core, it is said to be present whenever reproductive isolating mechanisms are in place. These reproductive isolating mechanisms can either be pre-mating (e.g., mate recognition) or post-mating (e.g., zygote inviability) mechanisms, but once present, the following is the case: if two taxa are reproductively isolated from each other, they either (1) no longer recognize members of the other taxon as potential mates, or (2) they are no longer capable of cross-taxic mating to produce viable (i.e., consistent with life) and/or fertile (i.e., capable of reproduction) offspring. A simple accounting of morphological differences between modern humans and Neanderthals is insufficient to answer the question of whether they would have been capable of cross-taxic mating to produce viable, fertile offspring. In spite of this fact, at times it has been argued that as separate species, Neanderthals and modern humans would have been reproductively isolated from each other (Stringer and Andrews, 1988; Shreeve, 1995; Tattersall, 1999). This implies that the species concept being used to distinguish *H. neanderthalensis* and *H. sapiens* is Mayr's Biological Species Concept – a concept that cannot be tested with fossil taxa.

One must keep in mind, however, that reproductive isolating mechanisms tend to evolve over long periods of time. Therefore, for some time after initial divergence, reintroduced taxa, which through isolation have become morphologically, ecologically, and behaviorally differentiated to such a great