

Focus

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What makes us human? A biased view from the perspective of comparative embryology and mouse genetics

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Abstract

For a neurobiologist, the core of human nature is the human cerebral cortex, especially the prefrontal areas, and the question "what makes us human?" translates into studies of the development and evolution of the human cerebral cortex, a clear oversimplification. In this comment, after pointing out this oversimplification, I would like to show that it is impossible to understand our cerebral cortex if we focus too narrowly on it. Like other organs, our cortex evolved from that in stem amniotes, and it still bears marks of that ancestry. More comparative studies of brain development are clearly needed if we want to understand our brain in its historical context. Similarly, comparative genomics is a superb tool to help us understand evolution, but again, studies should not be limited to mammals or to comparisons between human and chimpanzee, and more resources should be invested in investigation of many vertebrate phyla. Finally, the most widely used rodent models for studies of cortical development are of obvious interest but they cannot be considered models of a "stem cortex" from which the human type evolved. It remains of paramount importance to study cortical development directly in other species, particularly in primate models, and, whenever ethically justifiable, in human.

Report

What makes us human?

A reader: "Gosh, who does he thinks he is, he who claims to answer that question?"

Indeed, so complex is the question that one may legitimately wonder whether it is worth asking it. A check on the internet as of this year (2006) returns different web-sites, from the reputed Smithsonian Institution to some that sound rather like crackpots. Most religions will tell us that Man was created by God and that our human condition will forever remain a mystery. Starting from a different viewpoint, information theory – and common sense – teach us that understanding something requires more

analytical power than the object under investigation itself, thus leading to a similar conclusion. As a scientist, however, I am drawn almost inexorably to think about our "humanness" as a scientific question: even though there is no global answer, it is a question about which we can at least formulate ideas and hypotheses that can be checked by observation (e.g. fossil record) or experiment. This short commentary is aimed to those who share this endeavour.

Let me begin with two preambles. First, even the standard response "what makes us human is our brain" has obvious limitations. Imagine a creature with a human brain in the body of an ape: would she/he feel human? Would we