Paleoneurology, functional craniology, and evolutionary medicine

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Digital anatomy and computed morphometrics have provided in the last years new tools to analyze through quantitative approaches issues in morphological integration, modularity, and functional morphology. Digital tools provide the anatomical data, and geometrical modeling provides the methods to analyze data, through multivariate statistics and graphics. Such new methodological framework from one side generates new questions and solutions, but at the same time it represents the possibility to rescue old problems, left unresolved in the past century because of technical limits. Paleoneurology deals with the study of the brain form in fossil species, and has been definitely improved by these new toolkits. Brain and braincase can be studied in terms of reciprocal functional and structural relationships. Many characters useful in evolutionary neuroanatomy are not currently known for modern human populations. Hence, a strict collaboration between evolutionary biologists and medical doctors is necessary to develop robust research lines. First, traits and processes must be studied on large living samples before extrapolation to the fragmentary and incomplete fossil record. Second, many traits can have medical relevance, and important applied fields. Evolutionary biology can supply to medicine methods and long-range perspectives. Medicine can supply to evolutionary biology techniques and short-range applications. Some examples in this sense include Alzheimer's disease, vision impairment, and neurosurgery.

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