

Phylogenetic analysis of *Homo luzonensis*: taxon, characters, phylogeny, and island evolution

Authors

Gousset P.¹, Rouget I.², Mijares A.S.^{3,4}, Déroit F.¹

1. UMR 7194 HNHP, CNRS, UPVD, Muséum National d'Histoire Naturelle, Paris, France
2. UMR 7207 CR2P, CNRS, Muséum National d'Histoire Naturelle, Paris, France
3. Archaeological Studies Program, University of the Philippines, Quezon City, Philippines
4. National Museum of the Philippines, Manila, Philippines

Abstract

Homo luzonensis is a species that lived until at least 50,000 to 67,000 years ago in northern Philippines, East of the Wallace line [1]. Likely to have been isolated on Luzon Island for tens to hundreds of thousands of years, they show both archaic features (*i.e.*, occurring in the australopiths) and derived characters (*i.e.*, occurring in the upper Pleistocene *Homo* species). Their archaic features could result either from a close phylogenetic relationship with the Australopithecines or the early members of the genus *Homo*. It may also result from the effects of island evolution that favored reversals (*i.e.*, return to primitive characters), correlated with a close phylogenetic relationship with a more derived hominin species (*e.g.*, Asian *Homo erectus*). To test these two main hypotheses, we carried out a cladistic analysis based on the dental (premolars and molars) and postcranial (hand and foot bones) remains of adult *H. luzonensis* and most of the modern and fossil species recognized in the family Hominidae. The matrix used for this analysis contains characters frequently found in paleoanthropological studies, such as frequency-defined ASUDAS characters [2], and new characters we created to describe hand and foot remains. The various trees obtained indicate that both hypotheses are possible. The phylogenetic hypotheses where *H. luzonensis* is derived from *H. erectus* are

supported by higher retention index and average group support after symmetric resampling. However, those where *H. luzonensis* is basal to the whole *Homo* genus are obtained using implied weighting [3], a method whose relevance is discussed when island taxa are analyzed. Moreover, *H. luzonensis* probably had reduced body dimensions and adaptations of his locomotor repertoire which have parallels in other insular mammals [4]. Besides, the tropical forest environment present on Luzon Island [5] could have favored the selection of such features. Combining our results with the state of the art concerning the hominin fossil record in Asia, island evolution and the environmental context of *H. luzonensis*, we conclude that *H. luzonensis* most probably results from an insular evolution with an Asian *H. erectus* ancestor.

References

- [1] Déroît, F., Mijares, A.S., Corny, J., Daver, G., Zanolli, C., Dizon, E., Robles, E., Grün, R., Piper, P.J., 2019. A new species of *Homo* from the Late Pleistocene of the Philippines. *Nature* 568, 181–186.
- [2] Scott, G.R., Irish, J.D., 2017. *Human Tooth Crown and Root Morphology*. Cambridge University Press.
- [3] Goloboff, P.A., 1993. Estimating Character Weights During Tree Search. *Cladistics* 9, 83–91.
- [4] Sondaar, P.Y., 1994. Paleoeecology and evolutionary patterns in horses and Island mammals. *Historical Biology* 8, 1–13.
- [5] Boivin, N., Fuller, D.Q., Dennell, R., Allaby, R., Petraglia, M.D., 2013. Human dispersal across diverse environments of Asia during the Upper Pleistocene. *Quaternary International*, The Middle Palaeolithic in the Desert 300, 32–47.