# ARTIFICIAL INTELLIGENCE/MACHINE LEARNING APPROACH FOR TAXONOMIC SPECIES DISCRIMINATION USING HELMINTH COLLECTIONS DATA: APPLICATION ON ARCHAEOLOGICAL MATERIAL FROM THE NEW AND OLD WORLDS

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Modern parasitological records show that around 300 species of helminth capillariids have been described in all vertebrate taxa, making it a very diversified group. Capillariid eggs have been reported in archaeological material in both the New and Old Worlds, mainly in Europe and South America. They have been found in coprolites, sediments from latrines, pits, or burials. The main proposal of this study was to characterize and identify capillariid eggs found in Brazilian and European archaeological sites, using an artificial intelligence/machine learning approach for taxonomic species discrimination based on helminth collection data.

A total of 39 archeological samples from Europe, deposited in the Paleoparasitological Collection of the University Marie et Lois Pasteur, Besançon, France was analyzed. In addition, 80 coprolites from the pre-Columbian archaeological site *Gruta do Gentio II*, Brazil, deposited in the Paleogenetic Laboratory at IOC, FIOCRUZ, Rio de Janeiro, were evaluated. Capillariid eggs were classified according to morphometric, morphological, and ecological parameters and processed using artificial intelligence/machine learning technology and reference dataset of specimens by both Institutional Helminthological Collections.

Ten samples from Europe and 4 from Brazil were positive for capillariid eggs with 13 different morphotypes. As European samples were mainly collected from latrines and pits, parasite-host information was absent, and consequently, species identification was impaired, in contrast to the Brazilian coprolites. In the Brazilian sites, the new methodology indicates *Capillaria exigua* in feline coprolite, *Baruscapillaria resecta* in opossum, *Aonchotheca bovis* in bovid. In European sites, *C. venusta*, *A. myoxinitelae*, *Eucoleus madjerdae*, *B. spiculata* were found.

The study provides new results by applying an innovative methodology for parasite species identification and gaining insights into past human or animal host-parasite relationships.

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