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EXPERIMENTAL PALEOPARASITOLOGY: AN APPROACH TO THE DIAGNOSIS OF ANIMAL COPROLITES

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> 'Perhaps palaeopathology will reap its richest harvest during the next quarter-century if it aims to enter "the faeces phase." It is easy to see this as a neglected path of enquiry, with abundant rewards for a modest outlay of effort. If so, Cockburn will have helped to sign-post this elementary track.' (Calvin Wells)*

Coprolites have been the major source for the study of parasites in archaeological material. In the last three decades, paleoparasitology advanced because of the introduction of rehydration techniques that allowed the recovery of parasite eggs from desiccated material. Paleoparasitology thus became an important source for the study of the paleogeographical distribution of parasites as well as of host-parasite relationships. This paper deals with an experimental method proposed for the diagnosis of animal coprolites collected in the archaeological region of São Raimundo Nonato, state of Piauí, in the Brazilian Northeast.

Material and Methods

The study area is characterised by a ruiniform orography with a hot dry climate and scarce rainy periods. Nearly 350 archaeological sites were found in the region and studied by the Fundação Museu do Homem Americano, headed by Dr Niède Guidon. Since 1984, studies have been developed on coprolites collected from archaeological sites in this region. With the increasing number of animal coprolites to be diagnosed, field work to clarify their zoological origin was started. During seven expeditions, animals were trapped, identified, and set free after defecating. In order to obtain sound knowledge about the local fauna, feces found free in the wild, associated with footprints and tracks, were also collected, as well as skeletons and dead animals.

The fecal samples were dried at room temperature, then taken to the laboratory in plastic bags. Fresh feces of animals from the zoo were also used for comparison. The samples were photographed, measured, and rehydrated following standard rehydration techniques (Reinhard et al., 1988). After rehydration, the material was dissected under a stereoscope to identify plant and animal remains. Microscopic analysis was performed after spontaneous sedimentation in conical glass jars. The Duncan test (Johnson and Leone, 1977) was adopted to test differences in fecal length and width, with the use of the computer program SAS/SAST (1985).

*Cockburn, T.A. (1971) Infectious Diseases in Ancient Populations, Current Anthropology 12: 45-62

Results

Five characteristic groups of feces from the archaeological region of São Raimundo Nonato were distinguished according to their morphometric patterns (Figure 1). Based on the statistical analysis, our results point to significant differences between feces from great and small felids, and among feces from five rodent species, as distinguished by width. Measurements of deer feces are not sufficient to differentiate the two species found in the region. Rehydration solution colors showed different patterns ranging from light brown to brown and dark brown, opaque or translucent, including samples from the same animal species. These differences were also observed among field and zoo fecal samples of the same species. Four distinct groups can be differentiated by macro- and microscopic feces contents: carnivora; rodents; artiodactyla and primates; edentata. Food remains could be identified after rehydration, allowing the identification of some groups even to the species level. The parasite eggs that were found were measured and tentatively identified using the checklists available.

Discussion and Conclusions

Morphometric patterns, associated with macro- and microscopic remains, including specific parasites, are consistent parameters for the diagnosis of the zoological origin of feces and coprolites studied in the archaeological region of São Raimundo Nonato, Piauí, in the Brazilian Northeast. Although intraspecific variations in size, length, and width were observed, due to changes in the type and amount of food during different periods of the year, they can be used in some cases to separate species of the same taxonomic group. It was not possible to associate the color of the rehydration solution with a given diet or an animal group. The black-brown opaque color, regarded as specifically human (Bryant and Williams-Dean, 1975; Fry, 1976; Araújo et al., 1981) appeared in the rehydrated feces of primate, edentata, artiodactyla, and carnivora, animals with entirely different food habits, as discussed previously by our group (Chame et al., 1989) and by Holden (1990). The color of the rehydration solution, however, did not vary with the aging of the feces.

Experimental procedures allowed the diagnosis of animal and human coprolites in the archaeological region of São Raimundo Nonato (Ferreira et al., 1987 and 1989; Araújo et al., 1989) and the establishment of an identification method.

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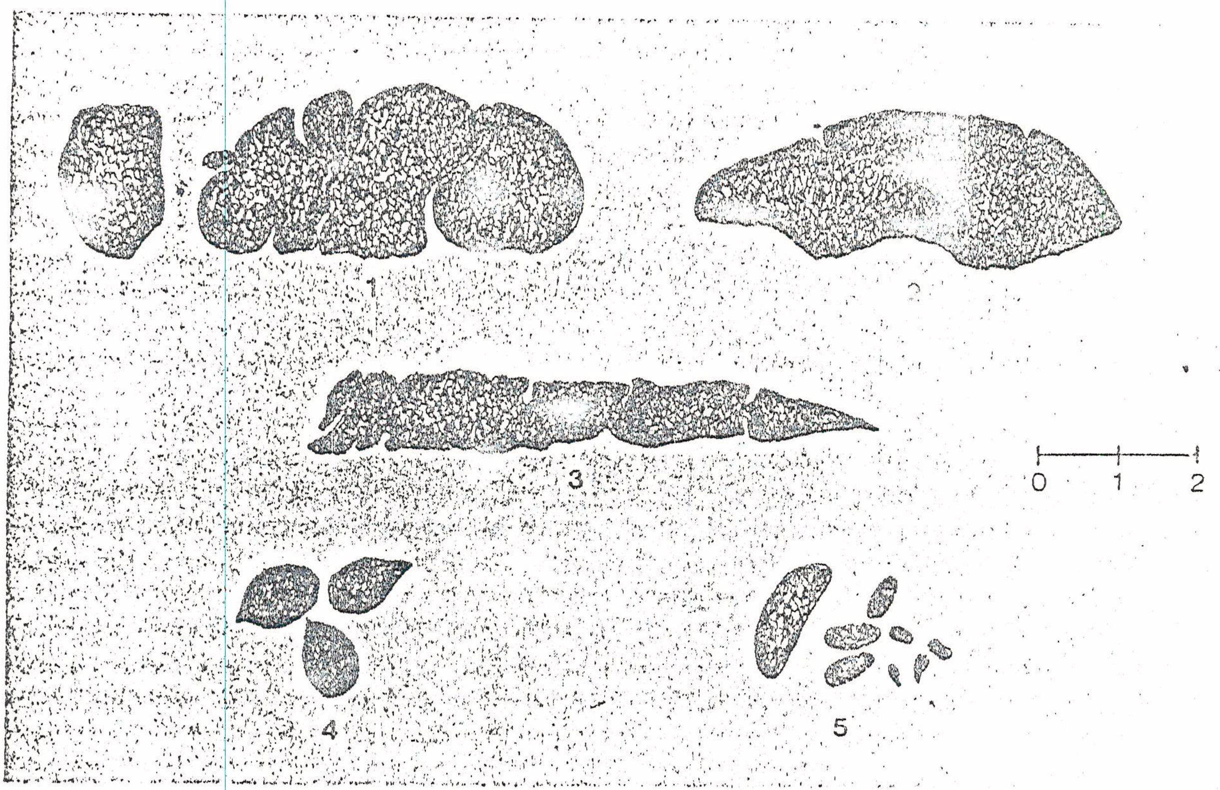

Figure 1. Mammal feces of the archaeological region of São Raimundo Nonato, Piauí, grouped by shape and size (bar = 2 cm)

1. Artiodactyla and Primates
2. Edentata
3. Carnivora
4. Artiodactyla
5. Rodentia