Part III - Parasite Findings in Archeological Remains: a paleogeographic view

24. The Findings in Oceania

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The Findings in Oceania

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Of all regions of the world, Oceania has the least research on parasites in archaeological remains. A few reports have discussed paleopathological aspects, including the description of lesions attributed to bacteria, especially *Mycobacterium leprae*.

For example, Trembly (1994) discusses the antiquity of *Mycobacterium leprae* infection in Micronesia. In a note published in the Symposium of the Society of Paleopathology, he discusses his role in examining 700 pre-Hispanic skeletons on the Mariana Islands. The author identified pathognomonic lesions of leprosy in eight individuals, confirmed by specialists, thereby attesting to the oldest cases of the disease in this region of the world.

One of the first articles on intestinal parasites discusses the finding of *Ascaris lumbricoides* eggs in coprolites from New Zealand (Andrews, 1979), dated from 150 to 200 years before present (BP). The author comments that no information existed on parasites that the Maori might have introduced into New Zealand, but highlights that such data could be obtained by examining material collected from archaeological sites. Andrews (1979) reports finding *Ascaris* eggs in human coprolites, the measurements of which were consistent with eggs of species *A. lumbricoides* (50 μ X 35 μ), dated to 150-200 BP. These would purportedly show that the Maori brought this parasite from their original homeland to New Zealand. However, his assertion is not definitive, since the dates are very close to the first contact with Europeans.

Andrews (1976a) had commented previously on these finds, discussing parasitic infections among the Maori prior to European contact and emphasizing the relevance for knowledge of infections on the continent, both introduced and autochthonous. He divides the parasitic infections recorded in New Zealand into three types: those he considers typical of humans, those transmitted from animals to humans, and those typical of humans, but introduced by humans from other continents during their migratory movements.

The author separates data on native populations from those referring to groups of European origin, emphasizing findings of *Enterobius vermicularis* and *Trichuris trichiura* as autochthonous, i.e., prior to European contact. However, the evidence is not the same for infection with *Ascaris lumbricoides*, found at much lower prevalence rates in the

native population and apparently more common among individuals of European origin, thus raising the hypothesis that ascariasis was introduced during the European period.

Infestation with head lice (*Pediculus humanus capitis*) appears to have been common in the past, although body lice (*Pediculus humanus corporis*) were no longer found. This assertion on head lice (Andrews, 1976b) is based on the historical record of Joseph Banks, in his diary during the voyage with Captain Cook, from 1768 to 1771. In the diary, Banks reports his alarm at the amount of lice, which he had never seen on anyone before meeting the native Maori. This must have been truly amazing, given that lice on human hair or on the wigs of elegant Europeans from the previous centuries were actually quite common. Such infestation even led to the use of little hooks that allowed people to scratch their wigs and their own hair. Andrews (1976a) suggests that malaria, hookworm infection, and filariasis (*Loa loa* and *Wuchereria bancrofti*) were introduced by immigrants.

These and other parasitic infections suggest interpretations on the possible origins of such infections in New Zealand or elsewhere, with repercussions for interpretations on prehistoric migrations and the peopling of other continents, especially the Americas (Araújo, Ferreira & Confalonieri, 1981).

The study by Andrews (1976a) is especially important because it explores clues on the presence of parasitic infections in the region's indigenous peoples and those introduced by immigration, although it does not explore the paleoparasitological record. Importantly, the author again reported finding *Ascaris lumbricoides* eggs in human coprolites (Andrews, 1979), but dated to post-European contact.

Goldsmid (1984) takes a historical perspective to extend the discussion on diseases and vectors introduced into Australia, but without the proper basis in paleoparasitological evidence.

Don Brothwell (1976) cites the descriptions by Stewart & Spoehr (1952) of diseases in skeletons dated to 800 AD, and specifically the presence of yaws in prehistoric Oceania. The author reports on new evidence of this disease prior to the arrival of Europeans. Although the bones were mixed together, it was possible to identify at least 169 individuals. Of these, at least 2% had lesions consistent with treponematoses. Brothwell (1976) thus concluded that when Australia was discovered, *Treponema* infection already circulated among the Aborigines, as well as in other areas of the Pacific. However, there is no evidence of syphilis. The researcher mentions the hypothesis (raised by other researchers and based on the existence of native words) of the introduction of yaws by Portuguese traffickers of African slaves. However, the paleopathological findings confirm the antiquity of yaws prior the arrival of Europeans.

According to Talhari & Talhari (2005), yaws emerged in Africa with *Homo erectus* around 1.5 million years ago. This antiquity is confirmed by findings in skeletons from Micronesia, in which Trembly (1998) shows a high prevalence of yaws (17 to 27% of adults and 10% of children with bone lesions), dating to around 800 AD. With these findings, the author challenges the theory that treponematoses was carried from the New World to Europe by Nordic navigators, showing that it was already present in Oceania long before these contacts. The results corroborate previous findings by Hope, Goldson & Allen (1983), who demonstrated bone lesions typical of anemia, leprosy, and yaws, dated to 1,000 to 300 BP.

Clark & Kelly (1993) discuss the implications of relations between the genetics of gamma globulin, the paleoenvironment, malaria, natural selection, and prehistoric occupation of the Bismarck Archipelago in Oceania. Around 3,600 years ago, prehistoric groups from the region developed a style of pottery called Lapita, which later spread across Melanesia. The archaeological sites are located mainly along the coast of endemic malaria areas.

The article's discussion centers on the natives' resistance to *Plasmodium* infection, resistance which is not found in groups from other regions. The arguments are based on linguistics and human biology, showing that in fact

Lapita pottery originated among Austronesian (Australo-Asian) speakers. The authors thus reach the conclusion that multidisciplinary studies provide mutually complementary data to support or refute theories on humankind's past.

One obligatory citation is a Master's thesis, innovative but difficult to access, since the author (Byrne, 1973) never published any further work on coprolite analysis. Byrne compares diets on the basis of food remains in human and dog coprolites from the North Island of New Zealand. Although the thesis failed to achieve the objective of identifying all the plant remains consumed by humans, the animal bones in the dog coprolites were diagnosed, showing a wide diversity in their diet.

One interesting aspect of paleoparasitological data in Oceania (besides producing knowledge on infections in native populations prior to outside contact) is their possible relationship to maritime migrations or contacts with prehistoric American peoples. Fonseca Filho (1930) called attention to this issue when studying and comparing parasitic infections in native peoples that were relatively isolated from contact with colonizers in the Americas, Asia, and Oceania. One example he studied was *Tinea imbricata*, a lesion caused by *Trichophyton concentricum*, called *tokelau* in Asia and Oceania and *chimberê* by Brazilian indigenous peoples. When European navigators reached the islands of Oceania and the coast of the Asian continent, they were impressed by the lesion's peculiar appearance. There, *tokelau* is known by various names in different dialects, thus attesting to its origin in the region, according to the author.

Fonseca Filho (1930) studied a Brazilian indigenous people called Purú-Borá living in the hinterlands of Mato Grosso and at the time still quite isolated from contact with any other human group. Lesions characteristic of *Tinea imbricata* were found in all fifty members of the group, from children to the oldest adults. The Purú-Borá called the disease *chimberê*, characterized by circinate, confluent, scaly, and pruritic plaques with marked achromia (clinical diagnosis should be accompanied by direct mycological examination and culture).

The two groups of diseases, *tokelau* and *chimberê*, display a well-defined geographic distribution. Fonseca Filho (1930) explains their existence in two such distant locations based on prehistoric human migrations from Oceania to South America. He was the first author to raise the hypothesis of transpacific migrations of Asian peoples to the Americas, based on the absence of infection with *Ascaris lumbricoides* among isolated tribes in South America and Oceania. This argument is based on negative data: the fact that the most isolated human groups of the two continents are not parasitized by this helminth, one of the most common in the entire world, although other intestinal parasites (hookworms, see Chapter 8) were introduced by maritime migrations, would serve as counter-proof of this contact.

However, this negative counter-proof proved erroneous when the molecular paleoparasitological data began to show that infection with *Ascaris lumbricoides*, although rare, already existed in pre-Columbian America (Leles et al., 2008).

The case of malaria also merits reflection. Human infection with genus *Plasmodium* is believed to have occurred first in Africa, spreading thence to other regions with favorable environmental conditions, including vectors. Humans are parasitized by three exclusive (thus stenoxenic) species: *Plasmodium vivax*, *Plasmodium falciparum*, and *Plasmodium ovale*. A fourth species, *Plasmodium malariae*, is shared by humans and chimpanzees.

In Africa, *Plasmodium vivax* infection led to selection of the Duffy-negative genetic trait, which makes carriers resistant to the infection. Other genetic factors affect susceptibility to malaria. Heterozygous individuals for abnormal hemoglobin S have benign infections from *Plasmodium falciparum*, since the parasite is unable to complete its cycle in sickle red cells. In some populations in malaria-endemic areas, natural selection increases the frequency of genetic traits that protect individuals, making them more resistant to infection (Rey, 2008).

The discussion by Clark & Kelly (1993) concerning malaria resistance in regions of Oceania (as occurred in regions of the Mediterranean) raises issues on the dispersal of *Plasmodium* species that parasitized prehistoric humans. The paths travelled by migrants must always have crossed regions with vectors, which are indispensable for completing the cycle and maintaining the parasite's transmission. However, maintenance of the disease in populations led to changes and to the selection of individuals with genetic traits capable of maintaining the infection with low parasitemia.

The paths of malaria in prehistoric populations can also be followed by the genetic characteristics imposed by the parasite-host relationship, as long as properly recovered from the archaeological material.

Although few articles have reported parasite finds in archaeological material throughout the vast territory of Oceania, there are interesting cases such as the description of ocular lesions typical of trachoma, resulting from infection with *Chlamydia* species (Webb, 1990). Euber, Spencer & Cook (2007) discuss the occurrence of trachoma in prehistoric populations in North America and conduct a review of other findings, citing Webb (1990) on trachoma in aboriginal populations in Australia, on which they based their description of the lesions.

Another case is that of elephantiasis, caused by the filaria *Wuchereria bancrofti*. The disease is known for lesions in the lymphatic circulation, leading to deformity of the affected parts, especially the lower limbs, but also occasionally affecting other areas of the body. Laurence (1968) discusses the diagnosis of elephantiasis among Polynesians at the time of the arrival of the first explorers and the way *Wuchereria bancrofti* infection was introduced into Polynesia.

Captain Abel Tasman described lesions in inhabitants of the region in 1643, followed by Captain Cook more than a hundred years later. The characteristic swelling (edema) of the limbs was known as "the curse of St. Thomas". Laurence (1968) especially discusses filarial transmission by vectors from genera *Aedes* and *Culex*, showing that the parasite circulated both during the day and at night, according to presence of the respective mosquito species.

Paleoparasitology has made comparatively little progress thus far in Oceania, and many fascinating aspects remain to be studied.

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