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RECONSTRUCTING THE BIOLOGICAL CHARACTERISTICS OF PAST PHILIPPINE HUMAN POPULATIONS

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ABSTRACT

Archaeological investigations employing the methods of physical anthropology and the biological sciences have been done on Philippine human remains found in archaeological sites to reconstruct a working biological picture of past populations. These were characterized mostly as to the number of individuals in the site, age at death, stature, bodily deformities, cultural practice and anatomic affinity to other populations. Although almost all individual specimens revealed interesting morphological features while appearing to fall within the type referred to as Mongoloid, a generalization of past Philippine populations is still premature, considering the fact that there is a need for more of these kinds of investigation to expand the database.

INTRODUCTION

Man has been living in the Philippine archipelago for at least 23,000 years, as attested by the discovery of human bones associated with stone artifacts in the Tabon Cave, a Paleolithic site in Quezon, Palawan excavated by Robert Fox (Macintosh 1978). From this date in the Upper Pleistocene, the supposition could be extended back further in the chronological scale with other sites in the country. With its great antiquity, the human occupation of the Philippine Islands might well prove as a remarkable experiment in evolution and adaptation.

Since the birth of the New Archaeology, there has been a tendency to think holistically and consider the variables of the internal and external environment of the unit under study. The traditional focus of archaeology has been the investigation of past cultures through artifacts, but recently the analysis of biological remains, most especially of human remains in the archaeological record, has accelerated according to the precepts of the paradigm. This stands in contrast to the previous state of archaeology in the Philippines and other countries. Aside from the reports of Fox and Hutterer which attempted to determine the age of skeletal remains in the Calatagan (Batangas) and Cebu sites, respectively (Nishimura 1991), there is such a dearth of human skeletal analysis in past Philippine archaeological researches.

Much of the task pertaining to this line of study has been relegated to physical anthropology, which draws a large part from *osteology*, the study of bones, as most of human remains available are bones and teeth. During the past few decades when several breakthroughs took place in the biological sciences, another promising subdiscipline has come to the limelight—molecular biology. Together with allied fields like biochemistry, genetics and immunology, attention is shifting to the molecular level that could take advantage of even a very limited amount of the archaeological remains.

The characteristics of past Philippine peoples are still ambiguous. A few investigators during the pre-World War II period proposed various classifications: From the review of Bailen (1967) we come across the proposals by Sullivan in 1918 that divided Filipinos into Negrito, Indonesian and Malay, and by Tangco in 1938 that suggested five categories; then, the Migration Theory by Beyer categorized racial types into six: Primitive Human type, Australoid-Sakai, proto-Malay, Indonesian A, Indonesian B, and Malay. The last most especially came under severe attack by critics (Scott 1984), as it had no systematic evidence to support its statements.

The objective of this paper is to review the works conducted on Philippine specimens regarding the construction of the biological aspects of past peoples in our country while discussing the means by which this is done, presenting the basic underlying principles of the methods concerned. As implied, the elucidation of biological data in these studies is not an end in itself, but an avenue that would eventually give a clearer insight on its relationship with culture and the processes operating within it.

The ultimate goal of this kind of undertaking is to get a comprehensive profile of sequential populations in time and space. This could be used to determine human adaptation patterns, against which the issues of human evolution, racial types, disease ecology and environmental effects on man would be contributory to build a complete picture.

THE NATURE OF PHILIPPINE HUMAN REMAINS IN CONTEXT

Archaeology has disclosed considerable human remains, much of which are part of ancient grave sites. That is to say that the archaeological specimens likely to be encountered in context are basically dependent on funerary practices of the group to which the deceased was part of. Ancient Filipinos disposed their dead in a variety of ways. The most common way is through primary burial, which involves encasing the corpse and burying it directly. In many later cases, bodies are placed in a wooden coffin, as shown by sites in Butuan (Burton 1977; Galpo, n.d.), Marinduque, Masbate and the Cordillera Administrative Region (Scott, 1984), where even in historic times, coffins have been hewn out of pine logs to provide eternal resting places for the dead of Sagada and the mummies of Kabayan (Keith and Keith 1981).

Mats could have been used too as wrapping material, with the suggestion by Tenazas (n.d.) that some bodies interred in a Pila (Laguna) site might have been covered in shrouds, as observed on a few iron blades with mat impressions buried with them. Other grave sites with pre-Hispanic skeletal remains like those in Calatagan (de la Torre 1996) and Verde Island (Legaspi n.d.) in Batangas, Sta. Rosa, Laguna (Ronquillo n.d.) and the Sta. Ana burial sites (Scott, 1984) were found to contain no evidence of the encasing materials, as are the remains in a Taguig churchyard (Bautista 1992), the Kang Hamtik site in Mulanay, Quezon (Bolunia 1998), the Ermita Church compound (Bautista n.d.) and the seeming mass graves of the Parian in Intramuros (Dizon 1993), all of which post-date the arrival of the Spaniards. Should there be an encasing material such as a wooden coffin in these cases, it is possible that it might have disintegrated due to tropical conditions unfavorable for preservation. Otherwise simple inhumation without putting the corpse inside a material could have also been done.

When the bones from a primary burial are retrieved, washed, arranged and reburied in a container, then it is said to undergo a secondary burial. The practice makes use of jars as containers for osteological remains, and was once widespread throughout the archipelago: recent work has disclosed more of this burial type in the Batanes Islands (Bautista 1996), and a good number of burial jars were unearthed in Solana, Cagayan, all indicative of adult secondary burials (Ronquillo *et al.* 1992). Together with other discoveries of stylistic urns from Southern Cotabato (Briones 1972) and anthropomorphic jars from Maitum, Saranggani (Dizon and Santiago 1996), burial jars with corporal remains from other Philippine localities have no more than disarticulated human bones and teeth, oftentimes fragmentary and with a stain of red ochre or hematite.

Lastly, an isolated evidence for the practice of cremation in pre-Hispanic times has been shown by a supposed crematory structure in Pila (Tenazas n.d.) dating to the 14th century A.D.

METHODOLOGY AND PREVIOUS WORKS

The literature involving local specimens have made use of several anthropometric methods as much of the remains encountered in Philippine archaeological sites are osteological remains. Ultimately from the determination of individual identities, we would be able to assemble a working picture of possible population characteristics in the future.

(1) Determination of species

Before anything else, it must be established whether the bones belong to a human or non-human species. Stewart and Kerley (1979) have presented some basic criteria to recognize parts of a disarticulated human skeleton that are most likely to be confused with other animal bones: compared with the upper fore extremities (radius and ulna) of a gorilla, those of humans are shorter, while the opposite holds true for the bones of the lower extremities. The human ribs should not be confused with those of other ungulates as the latter have well-formed rib elements between the ventral ends of the vertebral ribs and sternum. There is a similarity in appearance between the proximal phalanges of the human thumb and the terminal vertebrae (tail) of a horse, but the human phalanx has a semi-lunar central feature in cross-section. And in microscopic sections of cortical bone, human bone has a lesser area of laminae.

(2) Determination of the number of deceased individuals

This can be ascertained by counting the number of teeth or bone types deposited in the site (Winters 1974). In the case of the Cebu burials found by Miracle and co-workers (1991), at least three individuals are said to have been buried, two of which are represented by skeletons, while an isolated molar that neither fits these skeletons have been assigned to a third individual. The Ermita Church site studied by Bautista (n.d.) revealed two individuals through the presence of two distal epiphyses of right femors, while his work on the Ambangan pit grave in Butuan place the estimate at eleven inviduals based on the number of femora, mandibles and cranial bones (Bautista n.d.) The analysis by Winters (1973) of teeth in a Palawan metal age site made a safe estimate of 19 individuals, taking into consideration the fact that parts of

some molars were already worn out that it is hard to distinguish between upper or lower molars.

(3) Determination of Sex

Sex can oftentimes be inferred from artifacts like body ornaments and cloth that accompany the deceased in their burial while in instances of mummification, there is a good chance of morphological structures like breasts and genital organs or beards to be seen (Renfrew and Bahn 1996).

Otherwise the available materials present would only be bones. With skulls, bigger dimensions with more prominent brow ridges, mandible and mastoid processes are generally a feature of male specimens, although there are some populations with females having these features (Renfrew and Bahn 1996). Sexing of the incomplete mandible found in Pleistocene levels of the Tabon Cave could only make use of the available six (out of eleven) structural criteria for sexing. The score of the mandible based on these criteria extended well into the range for males (Macintosh 1978).

The humeral and femural bones also show this trend (Bass 1971), while tibial and pelvic bone measurements are said to produce a nearly accurate correlation with sex. The latter in females would be seen to have a wider and larger pelvic cavity (Renfrew and Bahn 1996). Philippine specimens found in Ambangan, Butuan (Bautista n.d.), Anda and Mabini sites in Bohol (Bautista 1985), the Chuhangin and Mahatao sites in Batanes (Bautista 1996) were sexed according to these parameters. For children and adolescents, it would be difficult to sex their remains (Bass 1971), although a high rate of accuracy turned up in using mandibular measurements as criteria on the Spitalfields remains in the United Kingdom (Renfrew and Bahn 1996).

(4) Determination of Age at Death

The teeth has been a reliable indicator for the age of the deceased individual. The sequential eruption of teeth in younger individuals have rendered this procedure more appropriate for juveniles, while tooth wear analysis proved to be of limited value (Bass 1971; Renfrew and Bahn 1996). In particular, the presence of the third molar eruption in mandibular molars is a helpful guide that indicates biological maturity of the individual. Various investigators have followed this method in determining the age at death of archaeological specimens in Ambangan grave, Butuan (Bautista n.d.), and isolated skeleton from the United States of America Embassy compound in Manila (Bautista 1994), Chuhangin and Mahatao burials in Batanes (Bautista 1996), the Anda and Mabini sites in Bohol (Bautista 1985), and two metal age sites in Quezon, Palawan (Winters 1974). For subadults, other useful criteria would be epiphyseal closure and bone length (Bass 1971), while in mature specimens the microstructure of bone shows that osteons increase in number with age (Renfrew and Bahn 1996); in osteoporotic remains, the degree of lipping also matches increasing age (Bass 1971).

(5) Determination of Stature

With preserved bodies, discrepancies due to dessication can be accounted for to obtain the individual's height in life (Bass 1971; Renfrew and Bahn 1996); for osteological remains height determination requires the use of regression equation between a bone and an individual's stature in life. The most favored correlations are those of the femural and tibial lengths to stature (Stewart and Kerley 1979), and from

studies conducted among Filipino samples, the femur was shown to have the best correlation (Oropilla *et al*. 1991). Calculations from both femurs of a robust male found in Duyong Cave (Palawan) and dated to the Neolithic (2680 B.C.) yielded a height of 179 centimeters (Fox 1970). The height of a young female from burials in the Santo Nino Church, Cebu City was based on the greatest length of her femur, while that of an older individual of undetermined sex from the same site was assessed through the greatest length of the humerus (Miracle *et al*. 1991). The heights in life of 10th century A.D.-individuals buried in Calatagan and the Tayabas Bay coast which showed a range of 140-183 cms. as cited by Bailen (1967) and Scott (1984) from the report of Fox were probably calculated from either of these bones.

(6) Elucidation of Pathologies, Manner of Death and Bodily Deformities

With intact bodies, dermatological abberations can tell a great deal about the nature of disease and sometimes, death of the individual. Nutritional and pathological stresses on the skeleton can be determined by the presence of Beau's lines on finger and toe nails, or Harris lines on bones upon X-ray (Renfrew and Bahn 1996). By applying instruments used in the field of medicine, workers have been afforded the oportunity to probe with minimal damage to the corpse. Ruling out bone and internal abnormalities through CT Scan, archaeologists have asserted that the *"Iceman"* of the Austrian Alps with his ample food supply did not die of trauma or starvation but maybe of exposure to cold (Ross 1992). Occupational stresses in life can also lead to osteological deformities, and several of the skeletons unearthed in the Syrian site of Abu Hureyra show unusual features in bone growth and muscular attachments in the vertebrae and lower extremities, attributed to the carrying of heavy loads and tedious grinding and pounding to process cereals which were important Neolithic human activities (Molleson 1994).

In the past few decades, molecular biology has opened up new techniques in analyzing ancient DNA and proteins (Renfrew and Bahn 1996). The so-called science of Molecular Archaeology utilizes organic molecules like nucleic acids and proteins from preserved human remains: DNA segments from the intact brain of a 7500-year old corpse preserved in a Florida (U.S.A.) peat pond allowed researches to construct the major histocompatibility complex (MHC), the genes that exert influence on the immune system, thus showing what kind of diseases the deceased was or was not resistant to; ancient antibodies might be able to shed light on the prevalence of syphillis in pre-Columbian America; while infant collagen from stone age and colonial Tennessee (U.S.A.) compared weaning patterns between these two periods (Ross 1992).

The phenomenon of cranial reformation seen in many Philippine skulls was first observed in a collection of at least forty individuals from a Masbate cave site in 1921 (Bailen 1967). With his studies on the reformed skulls of the Anda and Mabini sites in Bohol, Bautista (1985) mentions four types of this practice by cultural groups: lambdoid, occipital, fronto-parieto-occipital and fronto-vertico-occipital deformations. The last type characterized the majority of his specimens: a similar pattern was also observed in the Ambangan specimens found in Butuan (Galpo n.d.). A few studies on Philippine skulls gave metrical dimensions of the available specimens and even compared them with other foreign skulls (Fuentes and Malan 1989; Suzuki *et al*. 1993).

(7) Diet and Dental Habits

Teeth can give telltale clues as to the diet of its owner. Tooth wear and decay accumulate due to the nature of food ingested, its nutritive components, consistency, or the materials accompanying it such as grit or pebbles that cause teeth abrasion (Renfrew and Bahn 1996). It could also show cultural practices that involve teeth and the oral cavity. Among the skeletal remains recovered in a Palawan Metal Age site, incisors of mature adults were stained reddish brown to balck, suggesting the practice of betel nut chewing; the same population have also shown that the majority exhibited significant calculus deposition on tooth, and all have occlusal wear in varying degrees (Winters 1974). Remains examined by Fox in 1959 from the Calatagan excavations were categorized into age ranges according to teeth filing, on the assumption that teeth filing was started during the late teens (Nishimura 1991).

The shovel-shaped incisors in particular together with the four-cusped lower second molars are typical of Southern Mongoloid populations (Winters 1974; Turner 1985).

(8) Determination of Ethnicity

Morphologically, various parameters could be taken into account in establishing the ethnic group of the deceased, like the teeth, measurements of the skull and other bones (Solis 1978). A dichotomous grouping proposed by Turner (1979) classified teeth in the East Asian region into either Sinodont or Sundadont, the former characterizing the dental pattern of the Northeast Asia, while the latter the Southeast Asian region. The work of Uytterschaut (1988) which compared Philippine skulls from different groups with each other and to those of other Western Pacific populations suggest affiliations with the Southern Chinese and Japanese. While the anatomical features of the Pleistocene Tabon mandible were shown to be similar to Australian Aborigines in respects (Macintosh 1978; Scott 1984), a longitudinal ridge along the median part of Tabon man's nasal bone, also evident in Chinese *Homo sapiens* fossils, could well place the Tabon remains' affinity closer to the Mongoloid stock (Wu 1987).

From serology, the study of blood components, serum typing has been widely applied to the analysis of genetic polymorphisms. Polymorphism is defined as "a gene with a variant allele having a frequency above 10 percent in some human populations...too high...to be explained by mutation or random genetic drift" (Lasker and Tyzzer 1982). An examination of the ABO Blood Group demonstrates this. In a certain population, different blood types could be encountered, some with increased frequency than the others. The ABO alleles of the parents segregate and assort to give the offsprings their blood type or genotype which could be similar or different from their parents. In succeeding generations, factors operate that make conditions more favorable for some parents to survive longer, to produce more offsprings, or to become a founder of a new community. In effect, the genotypes of their descendants would be shifted, some becoming more increased than the others.

Studies of this kind have been done on skeletons from Manunggul and Leta-leta Caves, demonstrating that the former has an ABO distribution more like those of present-day Filipinos (Bailen 1967). This suggests that the Leta-leta samples may have been representatives of an earlier migration within the Western Pacific region, while the Manunggul remains may have been of a later, locally-evolved population.

Likewise, there are other procedures yet to be done on our archaeological specimens if conditions permit, such as in an older specimen but still in a good state of preservation. These procedures will in no doubt become important when Pleistocene hominid studies become an integral part of Philippine Archaeology:

(1) Determination of Weight

Several experts suggest that the femural weight has a reliable correlation with skeletal weight and from these the metrical relation of the bone and the rest of the fat-free tissues could be arrived at (Stewart and Kerley 1979). For preserved bodies, dry weight was estimated to be about 25-30 % of live weight; but perhaps the live weights of deceased individuals can be deduced from prepared charts based on studies of individuals whose parameters fall within the normal range (Renfrew and Bahn 1996).

(2) Reconstruction of Facial Features

Mummified bodies can accurately show the facial features of the deceased in life, as can portraits and statues (Renfrew and Bahn 1996). Forensic experts and artists on the other hand have made do of what little information is left on skulls. While some have used sketches of the face that were then superimposed on the skull, others have reconstructed three-dimensional facial features based on detailed tissue thicknesses on various parts of the skull's face (Stewart and Kerley 1979).

(3) Characterization of Locomotion

This is important in studies of early hominids. The skull can tell the manner of locomotion by the position of th foramen magnum and the semicircular canals, and so, too via pelvic bone and femur alignment; footprints can give clues to the features of the foot and weight-bearing pressure patterns (Renfrew and Bahn 1996).

(4) Determination of Handedness

This could be gleaned from stencils and depictions performed by the hand, artifact marks and features that show a patterned frequency in the preferred side of working, and also of bones that show where muscular attachments are more larger because of work (Renfrew and Bahn 1996).

(5) Structure of Past Populations

Two subfields are involved in the study of past populations: *Demographic Archaeology* attempts to determine population size, density and growth rates from archaeological data, while *Paleodemography* estimates population parameters like fertility and mortality rates from human remains (Renfrew and Bahn 1996). Inference of population size and density could either be derived from settlement studies, or by determining the carrying capacity of an ecological system.

Human population in the Philippine islands have fluctuated according to various living conditions. One demographic that may well be a function of morbidity and mortality factor is the occurrence of epidemics. With the development of wet rice agriculture and trade, and a concommitant rise in population, infectious diseases were increased and colonized a larger number of hosts. Malaria, dengue and schistosomiasis then might have been well-established in parts of the islands since prehistoric times, while contacts with China and Japan hastened the spread of typhoid

fever, tuberculosis and leprosy, these diseases becoming endemic in those countries by 1500 A.D. (Newson 1998).

SUMMARY AND CONCLUSIONS

This has been a summary of the studies done on ancient Philippine specimens. From these meager researches on Philippine human remains, morphological features have elucidated the sex, age at death, stature, bodily deformities, dentition, cultural practices and the anatomic affinities, including the number of the individuals present in the site. While it seems that almost all specimens studied so far belong to the Mongoloid stock, it is still too early to draw a generalization of past Philippine populations. Perhaps it could be started from the locality of the archaeological site if it could be ascertained that the deceased once lived there, then be extended gradually to contiguous areas as the database becomes larger. In order to come up with a good interpretation of the archaeology of Philippine human remains, more archaeological work should be done, together with the upgrading of technology for examination and the training of personnel who would perform the task.

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