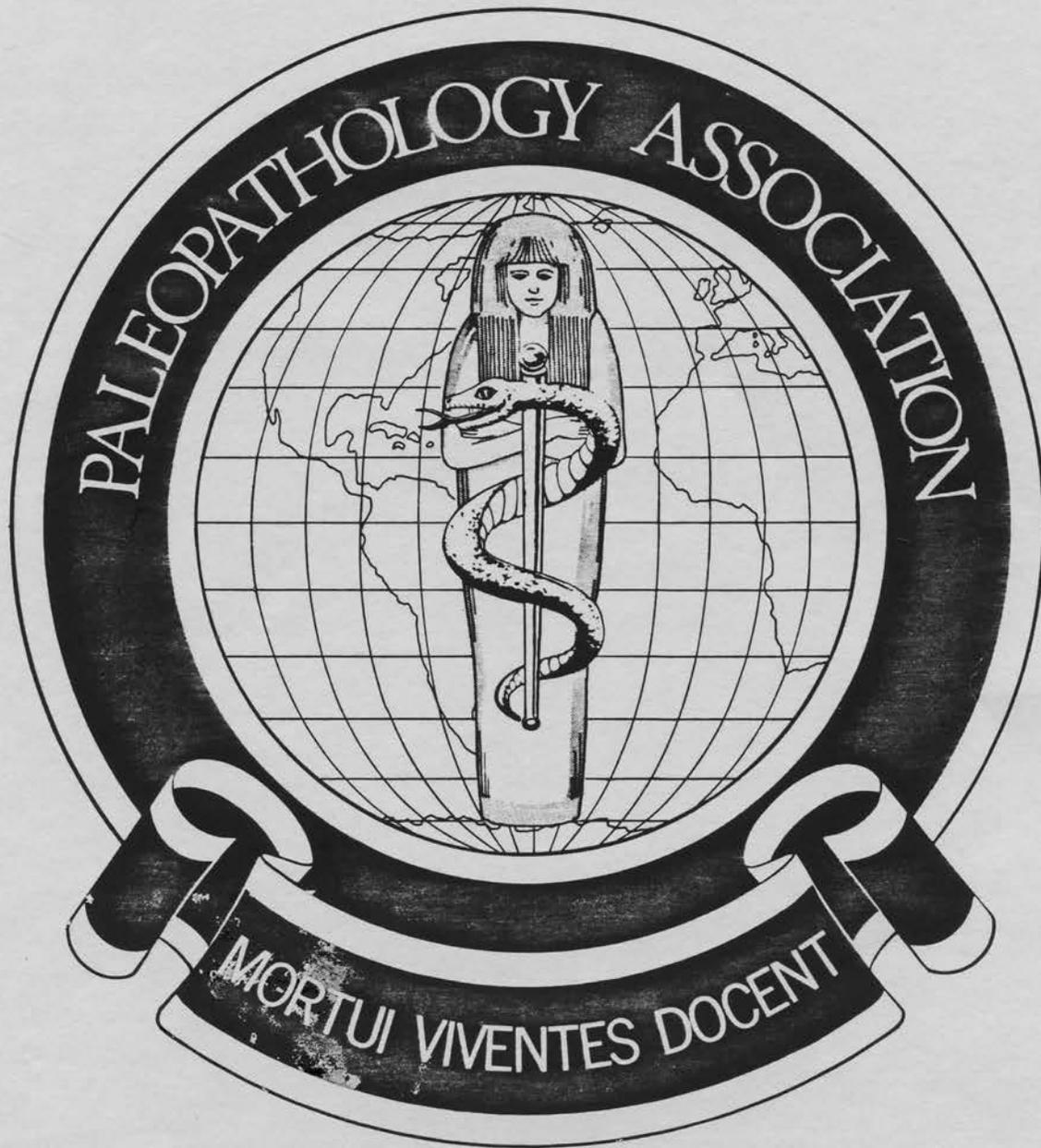


ELEVENTH ANNUAL MEETING



Saturday and Sunday, 14 and 15 April 1984

Philadelphia, Pennsylvania

SECTION 1: TUMORS IN ANTIQUITY

Convener: Guy R. Marrocco

INTRODUCTORY STATEMENT

Guy R. Marrocco, Cooley Dickinson Hospital

The topic for this year's symposium has been selected in order to bring together available information and ideas on neoplasia in ancient populations. Support for the hypothesis that neoplasia is purely a modern development depends on the paucity of evidence of tumors in antiquity as reflected in medical and anthropological literature: it should be noted, however, that earlier methods of study may have resulted in under-reporting. Several reasons for the small numbers of tumors known from antiquity will be considered: the difference in the average age of death between ancient and modern populations; problems in methodological aspects of the examination of skeletal remains; and existing environmental factors.

Dry bones and, to a lesser extent, mummified soft tissue remains serve as the primary sources of our endeavors in neoplastic paleopathology. The first portion of our program will focus on the multidisciplinary nature of the approach to diagnosing tumors in dry bones. The paleopathologist, in dealing with ancient skeletal remains, is faced with many of the same problems (though to a greater degree) as those of us today who attempt to make a diagnosis from clinical material. We must make a decision as to whether a lesion is neoplastic or due to some other condition. If it is neoplastic, is it benign or malignant? Is it a primary tumor of bone or metastatic from another site? If the latter, what is its origin? Pseudopathology and postmortem changes can mimic or be mistaken for pathological processes. This session will assist us in reaching logical and valid conclusions as we examine skeletal remains.

The second part of the symposium focuses on geographic aspects of paleoncology, explores the occurrence of neoplasia in various populations, and considers its incidence with relation to cultural, environmental and temporal factors. The impact of environmental factors associated with cancer, some of which have existed since antiquity, will be discussed. Re-examination of skeletal remains with the benefit of what we learn today may shed new light on the disease and expose heretofore undiagnosed examples of neoplasia. The development of a tumor registry of neoplasia in antiquity, one of the Association's goals, will serve scholars in achieving a better and more comprehensive understanding of the true incidence and nature of neoplasia in antiquity.

RADIOLOGIC DIAGNOSIS OF NEOPLASIA IN SKELETAL REMAINS

R. Ted Steinbock, Albuquerque, New Mexico

There are approximately 25 primary tumors or tumor-like processes that affect bone. A radiographic differential diagnosis is possible with many of these lesions, utilizing a variety of criteria. For example, the age of the individual can help in differentiating multiple myeloma from histiocytosis, leukemia, or metastatic neuroblastoma. Most bone tumors are monostatic, and therefore multiple lesions imply a systemic or hereditary condition. The location of the lesion is often characteristic, e.g. chondroblastoma in epiphysis, giant cell tumor involving both metaphysis and epiphysis, solitary bone cyst in central metaphysis versus fibrous cortical defect or non-ossifying fibroma that are eccentric.

The radiographic appearance of bone tumors centers on three areas: tumor matrix, bone destruction, and bone reaction. Tumor matrix is either radiolucent (water density), flocculent or flecked (calcified chondroid matrix), ground glass (uniform, lightly mineralized content), or veil-like (network of bone). Bone destruction follows characteristic patterns such as geographic (well-defined margins with or without sclerotic rim), permeative or moth-eaten (ill-defined, small areas of destruction producing a wide x zone of transition), expansile, and honeycombing. Bone reaction is limited to either endosteal or periosteal regions, and the periosteal appearance may be either laminated or spiculated. Utilizing a combination of the radiographic appearance (tumor matrix, type of bone destruction, presence of bone reaction), age and sex of the individual, and location of the lesion or lesions, a highly probable diagnosis can often be applied to archaeological remains.

AN APPROACH TO THE DIAGNOSIS OF TUMORS IN DRY BONE SPECIMENS

W. G. J. Putschar, Massachusetts General Hospital

There is a necessity for a multidisciplinary approach to the difficult problem of arriving at a tumor diagnosis on dry bone specimens. The main burden rests with the expert knowledge of bone pathology from the pathologist and on the radiologist, particularly concerning the aspects of the lesion not accessible to surface inspection. The osteological expertise of the physical anthropologist and the dating and association with artifacts by the cultural anthropologist can be important contributions.

The relation of tumors to bone can be summarized into two main characteristics: either production of new bone or destruction of pre-existing bone. The most sure diagnosis can be made in tumors producing bone of a considerable density to permit good archeological preservation. Purely lytic lesions may be difficult to differentiate from single or disseminated lesions of infection, and require most careful morphological analysis and consideration of the age and sex of the individual and the exact location within the involved bone in order to bring statistical possibilities into the differential diagnostic considerations. One has

to keep in mind that reactive bone formation in response to non-bone-forming tumors, as well as a variety of infections and other conditions, does occur.

A plea is made for detailed description of analysis and reluctance to offer a single firm diagnosis in a majority of cases, but rather to list a number of possible diagnoses in order of statistical probability.

PROBLEMS IN THE DIAGNOSIS OF DRY BONE TUMORS

Donald J. Ortner, Smithsonian Institution and W. G. J. Putschar, Massachusetts General Hospital

Skeletal lesions often pose a major and sometimes insurmountable challenge in diagnosis. The distinction between specific and even general categories of disease, such as infection and tumor, may be difficult. During the recently completed inventory of the entire skeletal collection at the Smithsonian, many problematic cases of skeletal pathology were discovered, some of which had lesions that may be the result of tumor. The essential pathological features of some of these cases were reviewed, with an emphasis on pathogenesis and differential diagnosis. Where appropriate, documented cases were used to illustrate the criteria on which differentiation is made.

TUMORS IN A NUBIAN POPULATION

Guy R. Marrocco, Cooley Dickinson Hospital and George J. Armelagos, University of Massachusetts

Methods used for the study of tumors in ancient times have suggested a low incidence of neoplasia. The sources for these data have been historical, literary, and artistic representations, as well as the disciplines of archeology, anthropology and paleopathology in the examination of skeletal and mummified remains. That this methodology may have resulted in an underestimation of the true numbers is considered. We report on five cases of neoplasia (two malignant tumors and three benign tumors) recovered from a cemetery in lower Nubia in the Republic of the Sudan. The skeletal remains of 225 individuals cover the cultural horizons of the Meroitic period (B.C. 350 to A.D. 350) and X-Group period (A.D. 350 to A.D. 500). Points considered are: the average age of death in the populations under study; completeness of examination; and environmental conditions. The reasons for re-evaluation and reconsideration of these factors are discussed.

TUMORS IN ANTIQUITY IN CANADA: A PRELIMINARY SURVEY

Jerome S. Cybulski, National Museum of Man, Ottawa

The earliest known human skeletal remains in Canada (older than 7,500 years B.P.) include two individuals at best and provide no evidence for primary or

secondary bone tumors. Remains of the Archaic or equivalent cultural period (7,500 - 3,000 years B.P.) number between 500 and 550 individuals from 17 sites. Destructive tumor or tumor-like bone conditions occur in two individuals of a Maritime Archaic population in Newfoundland (n = 123). One of these has been diagnosed as a probable case of histiocytosis-X in a child (Kennedy 1983). The second, an adult occurrence, suggests lesions due to metastatic carcinoma. Known later prehistoric remains are estimated at about 1,500 individuals. Benign osteomata (or chondromata) are known or have been reported in the literature for several sites. Similar types of changes have been found in remains of the protohistoric and early contact periods. Also in these periods there is evidence for malignant tumors in the form of multiple myeloma, metastatic carcinoma, and, possibly, osteogenic sarcoma. In all periods, bone changes suggesting malignant tumors have thus far been observed only in maritime oriented peoples. Benign osteomata occur in both coastal and inland groups, and in some cases appear to be related to trauma.

NEOPLASIA IN PERUVIAN AND CHILEAN MUMMIES

Enrique Gerszten, Marvin J. Allison and Russell A. White, Medical College of Richmond, Virginia and University of Tarapacá, Arica, Chile

A complete review of the literature of neoplasia in antiquity in the world shows only a few recorded cases. The majority of them are described in bones, although not all the malignant tumors produce metastases to the skeletal system. The tumors found in bones were osteochondroma, osteogenic sarcoma, multiple myeloma and cases of metastases, and those in soft tissues were histiocytoma, leiomyoma, lipoma, and rhabdomyosarcoma. It is impossible to re-collect the total number of skeletons and mummies examined since the initial studies were done by Ruffer early in this century. It is a wellknown fact that in those days people did not live long enough to develop tumors. Furthermore, it has been only in the last few decades that the majority of carcinogenic substances have been introduced into the environment or diet. Our present studies in Peru and Chile found very few benign or malignant tumors. Among the malignant tumors, there were two metastatic of unknown primary, and one primary rhabdomyosarcoma.

TUMORS FROM PREHISTORIC PERU IN THE HRDLIČKA COLLECTION

Rose A. Tyson, San Diego Museum of Man

The San Diego Museum of Man houses 900 prehistoric osteopathology specimens collected in 1913 by Aleš Hrdlička. Some of these show tumors and tumor-like growths, including examples of osteomas, osteochondroma, meningioma, chondrosarcoma, multiple myeloma, metastatic carcinoma, soft tumor evidence, and fibrous dysplasia. Most of these have been radiographically diagnosed, but there are a number of specimens that need further analysis.

PANEL DISCUSSION

Panelists: J.P.Hart Hansen, University of Copenhagen, Guy R. Marrocco, Cooley Dickinson Hospital, Frank P. Saul, Medical College of Ohio and Michael R. Zimmerman, Jeanes Hospital (Philadelphia)

MRZ: One point that Drs. Steinbock, Ortner and Putschar mentioned very briefly, which perhaps needs a little more attention, is the impression that soft tissue tumors can make on bone. I have seen several skulls with small rounded depressions on the inner table, which may represent small meningiomas. It is important to keep in mind that soft tissue lesions, not necessarily even tumors, can make impressions upon bones, such as the aneurysms that Marc Kelley has described. Another interesting point is that until Dr. Gerszten, in discussing modern disease, did so, no one mentioned lung cancer. If we look at modern material and see metastatic tumor in bone, that is the first lesion we think of. It is clear that the modern cultural practice of smoking has caused a major change in disease patterns since antiquity. I was also wondering whether Dr. Marrocco, in the first case that he presented, a case diagnosed as metastatic breast cancer, considered leukemia in the differential diagnosis.

GRM: We did not see a proliferative or expansile lesion of the medullary cavity, as one would in leukemia. The diagnosis was based on the distribution of the disease and the age of the patient.

MRZ: For many years, I have been saying that no-one has ever produced a satisfactory histologic section of a malignant tumor, and most of my discussions of paleopathologic malignancy have revolved about that point. Now, after Dr. Gerszten's talk, I must recant that statement. I find these photomicrographs very convincing, and I am sure that that is a malignant tumor. Was electron microscopy done on that material?

EG: Yes; we did not find cross-striations on electron microscopy or with PTAH stains.

MRZ: The last point is one that always bothers paleopathologists, the fact that we are applying modern criteria to ancient specimens. This almost neglects the possibility that diseases have changed. Manifestations of disease may have changed entirely since antiquity. To give an extreme hypothesis, it is conceivable that, 500 or 1,000 years ago, malignancies manifested themselves not as the solid tissue tumors we see now, but perhaps entirely replaced the bone marrow, without producing structural changes in the bone. The resulting loss of antibody forming cells would cause a very rapid death from fulminant infection, without necessarily producing any anatomical alterations. Granted this is an extreme hypothesis, but the point is that factors causing malignancies in the modern world may have caused an entirely different process in antiquity, a process that we are not capable of recognizing. In the context of that statement, I find it very reassuring to see a lot of recognizable tumor pathology in the material that was presented today. It seems quite likely that carcinogens were producing the same type of pathology in antiquity as today, and we do not have to worry quite so much about the possibility that we are seeing a different manifestation of the disease in modern populations.

GRM: Today we have seen a great variety of tumors from different populations

in the past. This would be an excellent opportunity for the Association to start a tumor registry. The point that Dr. Putschar made, emphasizing the importance of cooperation among the various disciplines of anthropology, archaeology, pathology and radiology in the diagnosis of these lesions, is very important.

JPHH: I was especially impressed by Dr. Gerszten's paper, and the importance he placed on epidemiologic factors. I have been working with Greenland Eskimo material, and tomorrow will report on a malignancy of the nasopharynx, a disorder that we know is very common today among the Inuit. The incidence is 25 times higher than it is among Danish Caucasians living in Greenland. Similar findings are seen in Alaska and Canada. Cancer experience in Eskimos is very different from that in Caucasians. The famous Arctic explorer, Stefansson, wrote a book called Cancer, A Disease of Civilization, in which he claimed that it was impossible for the Inuit to contract cancer. Even as recently as 1954, a paper was published in Cancer, in which a case was reported as the first example of cancer in an Eskimo. However, in the early 20th century, the Danish Medical Association produced a study in which eleven histologically documented cases of cancer in the small Eskimo population of Greenland were reported. All of them were examples of cancers that are very easily diagnosed, including the nasopharynx, salivary glands, and breast. No case of cancer of the internal organs was diagnosed. The explanation was probably that the diagnostic apparatus was very restricted at that time, and the conclusion was drawn that cancer was just as common in Eskimos as in other population groups. Although the cancer picture is changing rapidly a very high incidence of special tumors is seen among the Eskimos. Nasopharyngeal carcinoma and a very high incidence of an anaplastic salivary gland carcinoma may be related to infection by the Epstein-Barr virus. The females have the world's highest incidence of cervical carcinoma, equal to that in Cali, Colombia, apparently related to the very high incidence of venereal disease and promiscuity. Breast cancer has always been low in the Arctic, and at present is somewhat higher than in Japan but lower than in Western countries. The incidence of lung cancer has been rising rapidly and is now the most common cause of death by malignancy in Eskimos. Hormonally related cancers, such as cancer of the endometrium or prostate, are very rare, and are almost never seen among the Inuit.

FPS: In speaking as the only anthropologist, non-pathologist, on the panel, I think there are a few things that should be said. First of all, in support of what Dr. Putschar said earlier, I have been unable to find the kind of pathologist you are, people who are happy working with dry bones. I have been able instead to make use of radiologists. There seem to be enough of them to go round, and they don't need the tissue. You can bring them a bone, and as long as you ask them to go ahead and make a radiograph, they are happy to work with you. We are very fortunate to have this resource.

Today's presentations were very stimulating, and I am eager to go back to Toledo and look again at my specimens of the Maya. Many bones have been labeled as showing insect damage or root damage, and I am going to look for evidence of reaction around these openings. I will look at the radiographs again in relation to these changes. I think we have to push some of the specimens that have been dismissed as showing insect or root damage, and I intend to go over this material with Ted Steinbock in particular. I will be happy to share them with others who may be interested.

I agree wholeheartedly with the cautions that have been offered about pushing these specimens and interpretations too far. I have been guilty of this sometimes myself, by not providing a complete differential diagnosis. Critical radiographs should also be published. Jane Buikstra has done an exemplary job along these lines.

There is another caution, sort of on the other foot. One should be careful about ascribing a single age to a specimen. We all do this from time to time, as a shorthand, but the practice can be misleading. As you work more and more with skeletal material, you tend to say 20 to 24 years, or young adult, not 21 years.

Another point is that those of you who are physicians have to help us sort out that which is important in terms of function, the ability of a disorder to affect the way of life of an individual. We should continue to list all the button osteomas and osteochondromas, but we should also point out that such lesions did not have any effect on the life of the individual. The late Calvin Wells was particularly good about helping us picture how a disorder might have affected a person's life. He perhaps went too far in some instances, but I think it was a very stimulating and relatively safe thing to do, if we have in the record the information on which he was building his case. One more caution is that, in looking at dents and impressions upon bones, one must bear in mind what soft tissues are normally located in those areas, and what effect they might have on the bone, within normal limits.

One last point is in the differentiation between ossified hematomas and tumors. Some of us are beginning to examine these points, but we need more help from radiologists and pathologists. We need to do this with material of known clinical context, and I for one will be very happy to join in the effort with any of those who are interested.

(Discussion transcribed and summarized by M. R. Zimmerman)

SECTION 2: ROUND TABLE DISCUSSIONS

Convener: Donald J. Ortner, with Arthur C. Aufderheide

METABOLIC AND CONGENITAL DISEASES OF THE SKELETON

Donald J. Ortner, Smithsonian Institution and Frank P. Saul, Medical College of Ohio

The discussion concentrated on metabolic diseases and included a review of scurvy, rickets, and fluorosis. Saul brought a specimen from Altar de Sacrificios, which he had published as an example of scurvy. Ortner has challenged this diagnosis and these 'bones of contention' were the initial focus for the round table discussion. Both Saul and Ortner defended their respective opinions vigorously, and the debate provided a useful vehicle to explore the various aspects of skeletal changes in scurvy. Ortner presented a possible case of scurvy, which consists of the skull and mandible of an Eskimo child about eight years of age. The specimen had porous, expansive lesions of the orbital roof and evidence of alveolar resorption and inflammation on both the maxilla and the mandible. Participants in the discussion emphasized that differentiating between the skeletal manifestations of scurvy, rickets, and anemia (resulting from malnutrition) is likely to be difficult, because a child suffering from malnutrition may have all three diseases.

SOFT TISSUE PALEOPATHOLOGY

Arthur C. Aufderheide, University of Minnesota, Duluth, Michael R. Zimmerman, Jeanes Hospital and Rose A. Tyson, San Diego Museum of Man

Approximately 25 people attended the session, about two-thirds of whom were physicians: the remaining third included physical anthropologists, a museum curator, and several students. The initial discussions involved the staining of histologic sections, with a demonstration by the chairman of a pentachrome that differentially stains five different mesodermal tissues in a single stain; copies of the method were handed out.

Subsequent discussion focussed on the following two points of interest:

1. Value of knowledge regarding location and nature of stored paleopathology soft tissue samples available for potential research study. It was pointed out that the ideal situation would involve a central storage area, but the Paleopathology Association itself is not structured to deal with such a major project. If no institution can initiate this independently, some method of sharing the information would be useful, perhaps via computerized registry;

2. Future of similar roundtables: There is a distinct interest. Suggestions included a more narrowly focused subject area (or areas), particularly regarding skills not normally a part of a physician's training. This could include some workshops on principles involved in estimation of age, sex, stature, etc. in skeletal specimens. Similarly, non-physicians in the audience acknowledged interest in the same type of workshop on various methodologies of soft tissue techniques, both anatomic and non-anatomic.

INFECTIOUS DISEASES OF THE SKELETON

Jane E. Buikstra, Northwestern University, Walter G. J. Putschar, Massachusetts General Hospital and George J. Armelagos, University of Massachusetts

If the number of people who attended this roundtable is any indication, there is a great deal of interest in the expression and evolution of infectious disease(s). Given a fear of overburdening our single round table, we divided our time between informal examination of the various specimens present and a more structured discussion, capably led by Drs. Putschar and Armelagos. We initially considered the probable diagnosis of adult prehistoric Indian remains from Virginia, which had been provided by Donald Ortner. Archaeological documentation for the remains indicated that juveniles from the same site also showed osteomyelitis and periostitis, conditions that were obvious in the adult remains viewed here. Given the pattern of this pathology, the treponematoses were cited extensively in differential diagnosis, with ensuing discussion centering on treponematoses in the New World. It was concluded that the time had come for a session on this topic, perhaps at the next Annual Meeting of the Association.

A second topic considered by the group was the subject of leprosy in the Middle East. Professor Joe Zias had circulated photographic documentation of some early cases of leprosy recovered from isolated Christian monasteries and from sites reported to have been places where 'the washing of the lepers' occurred during the fifth and sixth centuries A.D. There was consensus among the 'roundtablers' that these were classic examples of leprosy, and that the prospect of research with these collections showed great promise. This led to another suggestion for a session at a future meeting, to center on the development and evolution of the mycobacterial diseases.

Given the popularity of this session, I would suggest that infectious diseases, both origins, and comparisons of Old and New World developmental patterns, should be a subject for future Paleopathology Association study.

SECTION 3: CONTRIBUTED PAPERS

PALEOPATHOLOGICAL INVESTIGATIONS OF 500-YEAR-OLD ESKIMO MUMMIES

J. P. Hart Hansen, University of Copenhagen

Around the year A.D. 1460, six adult and two sub-adult Eskimos were entombed in two rock clefts near the abandoned settlement of Qilakitsoq in the Umanak district of northwest Greenland. The bodies were fully dressed, wrapped in clothing and furs, and covered with stones. The remains were well preserved by mummification due to cold and dry conditions.

A multidisciplinary program of preservation and investigation was undertaken, involving several groups of scientists, with the aim of obtaining as much knowledge as possible of the Greenlandic Eskimo of that time, of his life and lifeways, culture, diseases, environment, and subsistence animals.

Many different methods of natural and medical science have been employed, e.g. radiological and pathological investigations have given evidence on congenital defects and acquired diseases. The cause of death has been clarified with some certainty only in one case with a malignant destructive process in the base of the skull, probably due to nasopharyngeal carcinoma, which in recent times occurs with high incidence in Eskimos.

Much information on diseases, cultural habits and environmental hazards has been obtained. The range of investigations undertaken include radiological, anthropological, odontological, microbiological (particularly mycological and parasitological), pathological, dermatological, toxicological, biochemical, geological, zoological and botanical examinations. Furthermore, blood and tissue (HLA)-typing, registration of dermatoglyphics, analyses of mineral content of bones and heavy metals in human and animal material, and investigations for diatoms should also be mentioned.

STUDIES IN TAPHONOMY: REPORT OF A PILOT EXPERIMENTAL MUMMIFICATION PROJECT IN RATS

Arthur C. Aufderheide, University of Minnesota, Duluth

The purpose of this pilot study was to establish a model for measuring variables operational in the process of natural mummification in humans. Rats were sacrificed and suspended in a low humidity environment at varying temperatures (4°, 25°, 43° C). Individual cadavers were removed at regular intervals over a one month period. Effects of these conditions were measured on gross and microscopic anatomy, body and individual weight loss, organ microbiology, and the molecular integrity of immunoglobins

and hemoglobin. The model proved to be an effective measure of the studied variables.

THE SKELETON FOUND IN TOMB NUMBER 55, THE VALLEY OF THE KINGS

James Harris, Fawzia Hussien and Brian Ingalls, The Egyptian Museum, Cairo

There has been considerable discussion as to the identity of the mummy found in poor condition in Tomb 55, which includes Amenhotep IV, Nefertiti, and Smenkhare (Elliot Smith, Theodore Davis, Cyril Aldred, and most recently Reeves - 1982). The Egyptian Museum provided, in 1983, the opportunity not only to re-x-ray the skull with a more precise laser technology, but also to examine this skull while articulating the mandible with the glenoid fossa of the cranium. This study indicated the improper reconstruction of the maxilla and the incorrect position of the mandible as found in previously published photographs and x-rays. This paper presents the recently (March 1984) reconstructed skull and skeleton of Tomb 55, and attempts to locate morphologically its position in the royal succession of the late eighteenth dynasty, leading to Tutankhamon.

PSEUDOPATHOLOGY AND VASCULAR IMPRESSIONS: CLUES FROM ANATOMY

Frank P. Saul and Julie M. Saul, Medical College of Ohio

An otherwise invaluable article by Zimmerman (1981) on the paleopathology of a Peruvian mummy includes a photograph of what is described as a 'curving incised wound' on the right frontal bone. We believe that this is the impression sometimes produced by the pulsation of the frontal branch of the superficial temporal artery. We have previously observed similar impressions and assumed that they were vascular impressions of the sort that T.D. Stewart indicated had been 'erroneously interpreted as results of cauterization of long bones' (1937 and 1966).

In further support of a vascular basis for this feature, we offer a specimen from our dissecting room showing the scalp peeled back to demonstrate a direct relationship on both sides between the frontal branch of the superficial temporal artery (embedded in the scalp) and groove in the frontal bone. A preliminary examination for this feature in 10 males and 10 females from the Hamann-Todd Collection shows an overall frequency of 50% (40% in males and 60% in females) in this small sample. It does not appear to be age related, inasmuch as it occurs in both the oldest (age 70) and the youngest (age 19), and we have also found it in a commercially prepared neonate skull from India. We suspect that the impression is produced when the vessel lies on the bone between temporalis m. and frontalis m., but does not occur if the vessel is superficial to the frontalis m. Campillo (1977) included similar grooves under pseudopathology, following Testut, who had listed this vascular groove (frequency 20 - 25%) at least as early as 1911.

OLD INCISED WOUND OR VASCULAR IMPRESSION? DIAGNOSIS BY SCANNING ELECTRON MICROSCOPY

D.J.Allen, Frank P. Saul, Julie M. Saul, R.A.Burns, Medical College of Ohio and Michael R. Zimmerman, Jeanes Hospital (Philadelphia)

Following the study described in the preceding abstract on the Peruvian skull cap with the groove, an SEM examination was performed. In order to avoid damaging the specimens, a groove impression was made, using Reprosil (Heavy Body). Ordinarily, this impression would then be used for production of a replica that would then be coated and examined by SEM. Unfortunately, the impression was contaminated by small foreign objects that caused it to be discarded and a new impression made. This latter impression appeared to be ragged and potentially inaccurate, so we decided to remove a small portion of the bone itself for gold coating and direct examination. This examination at varying magnifications (20 - 233X) reveals smooth channels and pores of a vascular configuration that is unlike the striae associated with incisions. Curiosity then dictated that the 'ragged' impression be gold coated and examined, with the unexpected finding that the perceived 'raggedness' was due to casting of what appear to be smaller vessels branching off the groove (=vessel?). Hindsight suggests that the contamination observed in the first and discarded impression was probably sand or similar particles blocking these channels. We now plan to use this coated impression technique to examine other specimens, as it eliminates the potential inaccuracies inherent in the standard replica production approach, and may also provide additional insights where vessels and similar structures are concerned.

SIGNS OF ANAEMIA IN HUMAN SKELETAL COLLECTIONS

P. Stuart Macadam, British Museum (Natural History)

Porotic skull lesions known as porotic hyperostosis have been of interest to researchers since the mid-19th century. The aetiology of these lesions has long been a matter for speculation. The most recent theories suggest that anaemias of both acquired and inherited origin may be responsible for lesion development. The present study tests this hypothesis, using criteria that were developed from the examination of clinical radiographs of patients with anaemia. These criteria include the presence of 'hair-on-end' trabeculation, outer table thinning, texture changes, diploic thickening, orbital roof thickening, orbital rim changes, and the lack of frontal sinus development.

A comparison of x-rays from these clinical cases with x-rays of skulls with porotic lesions provides a more rigorous, repeatable, and standardized method upon which to base a diagnosis. This approach enables radiography to provide the necessary link between the clinical and anthropological with which to investigate the origin of porotic skull lesions.

PALEOPATHOLOGY OF THE LA PURISIMA MISSION INDIAN POPULATION

Phillip L. Walker, University of California (Santa Barbara)

The skeletons of approximately 40 Indian neophytes buried in the La Purisima Mission cemetery during the early nineteenth century were studied for evidence of pathological conditions and nutritional stress. Lesions present include periosteal reactions, osteomyelitis, and healed fractures. Although there is no evidence of tuberculosis, one individual has postcranial lesions suggestive of syphilis. The prevalence of lesions in this collection shows that a dramatic decrease in good health occurred when the local Indians left their native villages and moved to the mission. Dental hypoplasia, for example, is rare in prehistoric skeletal remains from this area, but very common in the mission population. The long bones of the La Purisima burials are smaller than those of their protohistoric predecessors. It seems likely that this decrease in skeletal dimensions is a phenotypic response to a nutritionally inadequate corn based diet.

THE RELEVANCE OF NON-HUMAN PRIMATE SKELETAL REMAINS TO PALEOPATHOLOGY

D. S. Weaver, C. Jerome and S. Klumpp, Wake Forest University

The study of skeletal lesions and anomalies in non-human primates can prove useful to human paleopathology. Non-human primate skeletal materials can be of special value because: 1) the animals' histories are known; 2) the animals' physiologies are similar to human physiology; 3) the observed conditions may mimic paleopathological conditions more than do modern human clinical cases, as the conditions may not have been exposed to the onslaughts of clinical treatment. The application of non-human primate skeletal pathology to points in human paleopathology is illustrated. Several of the cases should serve as cautionary tales, in that incorrect diagnoses might well have ensued if the animals' histories had not been known and complete skeletons available. Other skeletal conditions among our non-human primate skeletal collection suggest topics that might be studied effectively using non-human primate skeletal models.

OSTEOCHONDRITIS DISSECANS OF THE KNEE IN VARIOUS ANCIENT POPULATIONS

D. A. Birkett, Middlesbrough, England

A number of cases of osteochondritis dissecans of the knee were studied in a variety of populations -- pre-Columbian Peruvians, late 19th century immigrants to the U.S., Romano-British, Anglo-Saxon, and medieval populations in Britain. Examples were found in all series, and there was no great variation among the various populations. It is therefore impossible to draw any conclusions regarding activity levels in these populations.

SECTION 4: EXHIBITS

BONEY EFFECTS OF VANITY: 18TH CENTURY STAYS VERSUS 19TH CENTURY CORSETS

J. Lawrence Angel, Jennifer Olsen Kelley and Gretchen Schneider,
Smithsonian Institution

For millennia, clothing has underscored culturally patterned actions, modifying muscle use and child growth. A powerful example is the Western European corset, displacing waist and shoulders. Stays used straight supports to brace ribs with pelvis, pressing most projecting ribs and lower sternum. Skeleton GP 4 from the British Yorktown cemetery (excavated by Alain Outlaw) shows side-flattening of ribs 6 - 8, plus incurved sternum; Governor's Land 366 B shows reactions on the posterior ilia. Corsets used sharply concave (sides) or straightish baleen or steel to achieve a waist, compressing lowermost ribs and spinous processes, Thoracic 11 to Lumbar 3. Terry Collection ladies, born 1846 and 1896, show ridged lateral flattening and anterior twisting of ribs 9 - 12. These observations on bones fit with the medical statements on displacement of viscera.

RESOURCES IN PALEOPATHOLOGY

Michael R. Zimmerman, Jeanes Hospital (Philadelphia) and Robert I. Sundick, University of Kalamazoo

Over the past two decades there has been increasing organization in the study of paleopathologic specimens, with the participation of scientists from many fields. Specimens, including skeletal material and mummified bodies, come from museum collections and new finds in archeologic sites. In the latter case particularly, there are often severe time constraints, making it necessary to assemble a team of investigators with minimal delay. A centralized listing of workers in the various fields applicable to paleopathology has become a necessity.

A form listing investigators' locations and capabilities was developed and distributed by the Paleopathology Association, and also published in the American Journal of Physical Anthropology. A copy of the form is available on request. The returns were tabulated on a Heathkit H89 Microcomputer, utilizing the Data Base Management Program DBII. This program allows us to sort by individual, by interest area, or by geographic location. The information is available from the Paleopathology Association at nominal cost, and periodic updatings are anticipated.

PHYSICAL ANTHROPOLOGY OF THE ANCIENT MAYA FOOT

T. J. Bocklage, Medical College of Ohio

Foot bones of 15 individuals from Altar de Sacrificios (Guatemala) and Cuello (Belize) show bone spurs, lipping around articular surfaces, and unusual pressure facets on metatarsals from both sexes, young to old adult, but no indications of either squatting or kneeling facets on the tali and metatarsals. A method was devised to assess quantitatively the degree of lateral bowing of the 5th metatarsal, to determine whether depicted foot gear might have accentuated the curvature, but the range found may represent only normal statistical variation. Osteometric analysis using standard measurement techniques indicate a generally homogeneous sample. Ongoing radiographic studies may provide information regarding general nutritional status. Individual variation included a spectrum of development of the peroneal tubercle and two types of facet patterns on the calcaneus for the talus, but no grossly abnormal pathology has been found to date (possibly due to small sample size and relatively young average age). It is hoped that this study will facilitate comparison between the Maya and other ancient and modern populations.

THE MÜTTER MUSEUM

Gretchen Worden, Mütter Museum

This small display described the function of the Mütter Museum, College of Physicians of Philadelphia, and optional tours of the museum were made available to meeting participants.

Committee for the Eleventh Annual Meeting

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