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Bioarchaeology at Grand Bay and Tyrell Bay, two contemporary Amerindian sites on Carriacou Island, Grenada, West Indies

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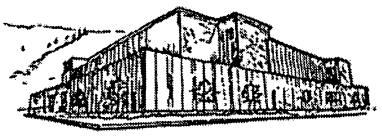

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BIOARCHAEOLOGY AT GRAND BAY AND TYRELL BAY, TWO CONTEMPORARY AMERINDIAN SITES ON CARRIACOU ISLAND, GRENADA, WEST INDIES

By

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Bioarchaeology at Grand Bay and Tyrell Bay, Two Contemporary Amerindian Sites on Carriacou Island, Grenada, West Indies

Chairperson: Randy Skelton R.S.

Human remains from two sites dating between 800 and 1000 BP were described and compared. Two primary hypotheses were tested: one, whether the people buried at Grand Bay were likely to have left the artifacts found at that site, and two, whether the people of Tyrell Bay belonged to the same cultural complex as the people at Grand Bay based on diet inferred from the rates and locations of carious lesions. Using standard laboratory procedures, age and sex were determined when possible. Skeletal and dental pathological conditions were identified and recorded.

Pottery and tools recovered from Grand Bay indicated that those four skeletons could have represented the people who left the cultural remains recovered there. These remains indicate a possible cultural link between the Greater and Lesser Antilles during this period around 1000 BP, and could belong to the Suaziod cultural complex. Artifacts and midden analysis indicated that the people of Grand Bay were hortaculturalists who probably depended upon domesticates for subsistence and may have also engaged in a regional cotton industry.

In addition to the human burials at Grand Bay, at least three individuals were recovered from a construction site at Tyrell Bay. The remains sat for many years in the Carriacou Museum, jumbled together in two boxes. Individuals were separated by identifying discrete dentitions. The dental remains from Tyrell Bay might indicate that the residents prepared their food differently than the people who lived at Grand Bay, relied on different domesticates for subsistence, or a combination of the two. Carbon ratio analysis from the two sites was unable to further illuminate this issue.

An active, highly destructive pathology was discovered at Tyrell Bay. The condition and recovery of the Tyrell Bay remains precluded a differential diagnosis, but this disease process is most likely attributable to either syphilis or tuberculosis.

This work expands what is known about the Suazoid cultural phase at Grand Bay and opens new and interesting avenues of future research at both Grand Bay and Tyrell Bay. Future research at Tyrell Bay may help to understand trade and other interactions between two different sites on Carriacou around 1,000 BP.

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I. CHAPTERS

CHAPTER 1 – INTRODUCTION

A. HYPOTHESES

There were two primary hypotheses tested. The first was that the skeletons recovered at Grand Bay were likely to represent the population that deposited the cultural remains found by the archaeological team at Grand Bay. There is evidence for several periods of occupation at Grand Bay during the ceramic age between 1400 BP and 800 BP. These cultures are thought to have placed an increased reliance on cultagens such as cassava (manioc) through time, as well as other marine and terrestrial resources (Kaye et al. 2004, 2005; Sutty 1990).

Hillson (1996) and Larsen (1997) described studies whereby diet was inferred from remains by documenting the location of carious lesions and other oral pathology. I collected similar data to test whether the oral pathology matched the diet inferred from the artifacts and middens at Grand Bay, and determine whether it was possible that the people interred at Grand Bay could have left the later Suazoid cultural remains. I also used carbon ratios obtained from radiocarbon dates collected from 04CGB000552, Feature 6 (see Table 3.1) to test this hypothesis.

The second hypothesis I wanted to test was whether the remains recovered near the Tyrell Bay site were likely part of the same cultural complex found at Grand Bay. While

there was no archaeological material besides the skeletal remains recovered from Tyrell Bay itself, I inferred diet by analyzing the location and type of carious lesions present on the dental remains. This inferred diet could then be compared to that at Grand Bay.

Other questions investigated in this work centered on the Tyrell Bay remains. Were the Tyrell Bay and the Grand Bay remains contemporary? What factors contributed to the poor preservation at Grand Bay? Could the skeletal pathology at Grand Bay and Tyrell Bay be explained within the context of everyday activity?

B. ENVIRONMENTAL AND CULTURAL SETTING

i. GEOGRAPHY AND OCEANOGRAPHY

The Caribbean is a vast region whose islands stretch in a chain roughly four-thousand kilometers long, and link Florida, Mesoamerica, and South America (Keegan 1994). The Caribbean islands are generally divided into two groups, The Greater Antilles and the Lesser Antilles. The Greater Antilles comprise about ninety percent of the land area of the entire Caribbean, while the Lesser Antilles comprises only around three percent. The Lesser Antilles are broken up into two sub-groups, the Windward and Leeward Islands. The Windward Islands comprise the smaller, southern Lesser Antilles, while the Leeward Islands represent the larger, northern Lesser Antilles. Please see Figure 1.1 – General Map of the Caribbean States for reference.

Geographically, Carriacou is located on the southern tip of the Lesser Antilles, at exactly 12° 29 north and 61.28° west (Sutty 1990). This places Carriacou north of Grenada and south of St. Vincent (Sutty 1990). The island itself is a mere thirteen square

miles, has two principal summits, and has several freshwater springs unique to the region (Sutty 1990). Today there are several settlements, but most of the over five-thousand residents live in two communities; Hillsborough and Tyrell Bay (Sutty 1990). The remains of pre and post contact settlement can be found all over the island, and an early survey revealed at least fifteen pre-contact settlements on or near the coastline of Carriacou (Sutty 1990). Two of these shall be discussed later, Grand Bay and Tyrell Bay.

Carriacou is known to have some of the most productive fishing grounds anywhere in the Caribbean (Sutty 1990). Fishing is a key economic activity for the island, and the sugar, cotton, and lime industries have been almost completely abandoned (Sutty 1990). It is unknown whether fishing played as much of an economic role in pre-contact societies, but recent evidence from excavated middens and carbon ratio analysis from Grand Bay site suggests that fishing did play an important role in subsistence (Sutty 1990, Kaye et al. 2004, 2005).

ii. FLORA AND FAUNA

Data from other Suazoid sites and excavated middens from Grand Bay suggests that the people of Grand Bay, Carriacou were exploiting nearly every kind of terrestrial and marine resource available to them, including: sea turtle, crayfish, *Strombus gigas, Strombus raninus, Cittarium pica*, *Asaphis deflorata*, *Tivela mactroides, Codakia costata*, manicou, iguana, rice rat, wood pigeon, manatee, and gecarcinus land crab (sutty 1990). The latter is found rarely today near Grand Bay, which may indicate the prehistoric over-collecting of this species (Sutty 1990).

iii. CARIBBEAN SETTLEMENT

Caribbean settlement is generally divided into distinct ages, characterized by relatively homogenous cultural developments and/or settlement patterns. These ages, in chronological order, are known as the Lithic, Archaic, Ceramic, Formative, and Historic (Keegan 1994, pp 262).

Lithic peoples most likely migrated out of the Yucatan and into the Greater Antilles around 6,000 BP. In fact, lithic sites are only found in the Greater Antilles, where it is believed these peoples gathered shellfish and hunted terrestrial mammals and reptiles for subsistence (Keegan 1994). Lithic settlements have been dated as recently as 2,400 BP (Keegan 1994).

The Archaic Period represents a separate migration beginning at least by 7,000 BP by South American peoples into the Lesser Antilles (Keegan 1994). This migration started slowly, and immigrants may have remained on Trinidad until around 4,500 BP (Keegan 1994, 2000). The Archaic is defined by a lack of pottery, the use of ground stone and shell tools, and the focus on marine resource gathering with specific attention on mollusk collection as an economic activity (Keegan 1994, pp. 266). Archaic age peoples moved rapidly through the Lesser Antilles and into the Greater Antilles, rapidly populating the Caribbean region (Keegan 1994). By 4,500 BP Archaic people's had reached Hispaniola and Puerto Rico (Keegan 2000). Regarding the route taken by early Archaic settlers, there is still debate because early Archaic settlements have not yet been found on the Windward Lesser Antilles (Keegan 1994). Currently, it appears as if Archaic peoples may have raced through the Lesser Antilles and into the Greater Antilles (Keegan 1994). However, little archaeological investigation has been done on the Windward islands,

especially with regards to early Archaic settlement (Keegan 1994). Regardless, the Archaic is well represented on most every Leeward island, and further research may soon clarify the issue (Keegan 1994). What is apparent is that by the time Ceramic-age peoples migrated into the Caribbean, there were archaic settlements on many Leeward islands (Keegan 2000).

The Ceramic Age is characterized by the use of pottery, and a general subsistence shift towards more permanent settlements and horticultural practices (Kaye et al. 2004, 2005, Keegan 2000). It has been estimated that perhaps ninety percent of all prehistoric artifacts from the Caribbean are ceramic in nature, which makes the ceramic age the most widely documented of all the previous ages (Keegan 2000). Within the ceramic age, several different regional cultures are hypothesized to have existed, each identified by pottery style, decoration, and/or the use of other ceramic tools (Keegan 2000). The first pottery users probably came into the Caribbean region rapidly from the Orinoco River Basin in modern Venezuela, mostly bypassing the Windward Islands until later (Keegan 2000). There are two probable hypotheses for how ceramic technology spread so quickly through the Caribbean (Keegan 2000). The first is a direct replacement hypothesis, whereby ceramic peoples from Venezuela rapidly replaced archaic populations (Keegan 2000). The other hypothesis involves a cultural diffusion of technology and subsistence strategy (Keegan 2000). Regardless, it appears probable that ceramic-age society was well-established on Carriacou, Grenada by 1200 BP (Kaye et al. 2004, 2005; Keegan 2000; Sutty 1990). By the end of the ceramic age, the peoples of Carriacou participated in what appears to have been a very active cotton trade (Sutty 1990). The ocean was undoubtedly seen as a highway and a food source by the ceramic age peoples of the

Caribbean, as evidenced by their apparent ability to voyage at will, and the numerous species of reef fish and mollusks that show up in middens (Kaye 2004, 2005; Keegan 2000; Sutty 1990). It is apparent that the sea was also an important factor in settlement location on Carriacou during the ceramic age because all fifteen sites documented by Sutty were either right on the coast or within a short hike, and all those sites were identified by pottery shards (Kaye et al. 2004, 2005, Sutty 1990).

C. BACKGROUND INFORMATION

i. CARRIACOU ARCHAEOLOGY

There were two previous investigations into Carriacou archaeological sites; one published in 1972 by Ripley P. and Adelaide K. Bullen, and one by Lesley Sutty in 1990. The 1972 study could be characterized as a ground survey, and no true archaeology was ever performed until 1990 (Bullen & Bullen 1972; Sutty 1990). Sutty identified fifteen prehistoric sites in 1990, with Grand Bay being marked as the most important of these because of its size and apparent continuous occupation (Sutty 1990). Preliminary investigations revealed a thriving ceramic-age culture and unearthed ceramics, middens, and burials with grave goods (Sutty 1990). No further work was done by Sutty, and the island laid virtually undisturbed by archaeologists for over a decade.

ii. GRAND BAY ARCHAEOLOGY

Grand Bay is one of the largest sites in the southern Lesser Antilles, and stretches perhaps 12 acres (Sutty 1990). The site faces east towards the Grenada Bank, and a reef one-half mile from shore is rich with a diverse array of marine species including *Strombus gigas, Codakia costata*, and *Cassis tuberose* (Sutty 1990). The preliminary archaeology at Grand Bay in 1990 revealed three principal cultural phases using recovered pottery shards: the Early Modified Saladoid [500-700 AD], the Modified and Suazoid [600-1200 AD], and the Calivignoid/Suazoid-Cayo Carib transition up to the 17th century (Sutty 1990). The ceramics of the Early Modified Saladoid appears to be very similar to contemporary pottery found in Puerto Rico, with a shift towards greater variation and integration as the Modified Saladoid progressed (Sutty 1990). It appeared as though a constant trade in ideas and products was occurring between South America and surrounding islands, and Sutty seemed to think that this was apparent because of the hybridization of pottery styles and from the settlement pattern on Carriacou (1990). By the Suazoid period, cotton and textiles had become an important industry for the peoples of Grand Bay (Sutty 1990). Maize and cassava were probably important subsistence crops during that time, but the people of Grand Bay had a diet rich in both terrestrial and marine resources (Sutty 1990). During this period there is the most evidence for inter-island trade, the admixture of pottery styles, and the infusion of technology, which could have been a direct result of the thriving cotton industry (Sutty 1990).

iii. TYRELL BAY ARCHAEOLOGY

No archaeological excavations ever took place at Tyrell Bay. The site is only known because of ground surveys conducted by various groups over the years, consisting of a quick visual sweep and a few glances at some surface pot shards. The only materials to be documented from Tyrell Bay to date are the skeletal remains recovered from a construction site.

iv. DENTAL ANTHROPOLOGY BACKGROUND

The anatomy of a human tooth is fairly simple. Please refer to figure 4.1 – Basic Dental Anatomy for a visual representation. The human tooth is divided into two portions; the crown and the root. The crown extends beyond the bone and gums into the oral cavity. The enamel makes up the exterior of the crown surface, and underneath it lies the primary dentin. The enamel is a very hard, crystalline compound, and the dentin is a softer, semi-vascular tissue that lends support to the brittle enamel above. The crown and the root meet at the CEJ, or cemento-enamel junction. The exterior of the root is covered by a thin layer of tissue called cementum, which helps anchor the tooth into the jawbone. Directly in the center of the tooth notice the pulp chamber which is filled with a heavily vascular tissue also abundant in nerves. This tissue is called pulp. Blood vessels and nerves enter and exit the pulp chamber through the apical foramen.

Dental caries can be defined as a disease process which leads to the systematic demineralization of enamel and dentin, the end result being the development of a cavitation (carious lesion) penetrating often the enamel and eventually the dentin, sometimes infecting the pulp chamber and causing tooth death and eventually local or

systematic bacterial infection (Hillson 1996, Larsen 1997). The development of carious lesions is a complex process, but Hillson breaks it down into five stages (1996). The first is the appearance of a microscopic brown or white spot on the tooth surface. By the second stage a darker spot has appeared on the surface of the tooth, more clearly marking the location of the developing lesion. During the third stage, a clear "body" of demineralization occurs, and the tooth surface begins to get rough and pitted. During the fourth stage the lesion progresses through the crown and begins affecting the underlying primary dentin of the tooth. This leads to the death of the primary dentin directly below the lesion, which stimulates the growth of secondary dentin directly below the dead primary dentin (Hillson 1996). The fourth stage is when cavitation occurs, as the lesion begins to entirely destroy the affected enamel. Finally, during the fifth stage, the lesion cavitates completely through the enamel crown and begins cavitating the underlying (and now dead) primary dentin. The secondary dentin continues to grow below the affected primary dentin. For a full review of the process of cariogenic decay leading to cavitation, please refer to Hillson 1996, chapter 12. For details on tooth anatomy, development, growth, and disease, please refer to Brand and Isselhard 1998, Hillson 1996, Lukacs 1998, Ten Cate 1998, and Scott and Turner 1997.

Key to the development of carious lesions in the first place is the plethora of bacteria responsible for the metabolism of simple sugars into acidic waste products in the oral cavity. The human mouth plays host for many forms of bacteria, protozoa, virus, and fungi (Hillson 1996). Most live in relative harmony with their oral environment, but a few species wreak havoc by indirectly causing caries. Among the most carious species are the *Streptococcus mutans* group, followed by those in the *S. oralis, S. milleri, S.*

salivarius, Actinomyces naeslundii, A. viscosus, and lactobacilli groups (Hillson 1996, pp. 267). Generally, these bacteria are responsible for the beginning stages of carious lesion formation. The *S. mutans* and lactobacilli groups are generally responsible for lesions that pass beyond initial cavitation because they are capable of metabolizing in lower pH environments and this gives them a competitive advantage within the cavity itself, where acidic metabolic wastes can rapidly concentrate to a pH of 5.5 or lower (Hillson 1996).

The location, magnitude, type, and amount of carious lesions can give a clue as to the diet of the population being studied (Larsen 1997). This data can also be compared to food preparation artifacts recovered to determine whether the remains being analyzed could have represented the individuals who left the food processing artifacts.

Hillson identified diet as the main factor responsible for the differing patterns and frequencies of cariogenic decay between and within ancient and modern populations (1996). Hillson named carbohydrates specifically as a key factor in cariogenic decay (1996). Experiments have shown that crown enamel begins to demineralize at a pH around 5.5 (Hillson 1996, pp.276-8). Simple sugars like sucrose, found in abundance in maize, could lower the oral pH to 5.5 in a matter of minutes after consumption (Hillson 1996; Larsen 1997). The fissures between cusps often play host to caries in populations with a "westernized diet," which has been often characterized as containing high quantities of processed, simple carbohydrates like sucrose (Hillson 1996). While tropical grasses like maize contain simple sugars, tubers like manioc contain complex starches that have not been directly linked to the formation of carious lesions (Hillson 1996; Larsen 1997). Further, both Larsen (1997) and Hillson (1996) state that premortem tooth loss is commonly the result of periodontal disease, and not cariogenic decay. Periodontal

disease, in turn, is most commonly associated with age in modern and prehistoric populations alike (Hillson 1996).

Larsen (1997) noted that several studies highlight the difference in carious lesion rates between prehistoric hunter-gatherer and farmer groups; specifically the rise in caries after the transition to agriculture. He attributed this to several factors, including a shift towards greater food processing and a greater reliance on carbohydrate-rich food crops (Larsen 1997).

An enamel hypoplasia is a defect in the enamel of a tooth caused by a disruption of crown formation during its growth early in life (Hillson 1996). The disruption can have genetic origins, but in archaeological analyses it is typically attributed to severe stress exerted upon the developing body due to malnutrition or illness (Hillson 1996). The most common types of hypoplasias are the linear and "pit" type defects (Hillson 1996).

v. SKELETAL ANATOMY

Skeletal anatomy is rather more complex than dental anatomy because of the different kinds of bones to be found throughout the human body. Bone itself is made of a complex weave of hydroxyapatite and collagen. Some bones are flat, some irregular, and some shaped like a shaft (White 2000). Within each bone there are two types of skeletal tissue. First there is the compact (or cortical) bone, so named for its solid appearance. This tissue composes the exterior of the bone. Second is the cancellous (or trabecular) bone tissue, which looks much like a piece of swiss cheese (White 2000). This tissue forms directly below the compact bone, and gives the bone support. It also hosts the red marrow, where blood cells are formed. In shaft-shaped bones the medullary cavity occupies the midshaft

of the bone and hosts the fat-rich yellow marrow (White 2000). There are subtleties to the rules which account for the incredible variability in shape and function of bones in the human body. Excellent sources on the subjects of osteology, skeletal biology, skeletal disease, and skeletal development include Aufderheide and Rodriguez-Martín 1998, Larsen 1997, Ortner 2003, Steele and Bramblett 1988, and White 2000.

CHAPTER 2 – MATERIALS AND METHODS

A. MATERIALS

The materials section refers to the skeletal and dental elements I examined for my thesis work. This material was incredibly fragmentary, and poorly preserved. The proceeding sub-sections detail the materials examined on a per-site basis.

i. GRAND BAY

The Grand Bay site is located directly on the beach, and elevated in a bank of acidic clay approximately ten feet above high tide. There are no towns directly in the vicinity, but a few farms do border the Grand Bay site. Recent beach sand mining has led to rapid erosion of the dirt bank containing the prehistoric archaeological materials.

There were four burials recovered from the Grand Bay site over a two year span. Each burial is referred to as a Feature. All four burials were extremely fragmentary, and the bone itself seemed to exhibit acid etching. The poor condition of the bones is attributable to the acidic soil in which they were interred.

Feature 97 was salvaged in 2003. This skeleton is represented by ten identifiable skeletal elements in two-hundred thirty fragments, plus seventeen teeth. For data please refer to table 2.1 in the Tables chapter.

Feature 6 was recovered in 2004, and is represented by thirty skeletal elements in three-hundred eighty-two fragments, plus thirty-seven teeth. For data please refer to table 2.2 in the Tables chapter.

Feature 1 was recovered in 2004, and is represented by forty-four skeletal elements in one-thousand one-hundred sixty nine fragments, plus sixteen teeth. For data please refer to table 2.3 in the Tables chapter.

Feature 3 was recovered in 2004, and is represented by fifty eight skeletal elements in five hundred thirty six fragments. Only two teeth were recovered from this burial. For data please refer to table 2.4 in the Tables chapter.

ii. TYRELL BAY

Tyrell Bay is located near the Harvey Vale township on the island of Carriacou, Grenada where three prehistoric skeletons were accidentally unearthed. This portion of the Tyrell Bay site remains unexcavated because it rests directly under a private residence, and the remains were recovered during construction efforts to extend a cement cistern. If grave goods were present, they were looted before authorities from the museum could arrive.

Many aspects of the remains from this site present difficulties in studying and classifying them. One important problem is that there is no defined context from which these remains were recovered. The museum staff who recovered the remains later showed me the residence and general area where the remains were discovered, but standard archaeological practices were not used to excavate the graves. Therefore, the information we gain from them will be limited.

Three individuals were present, but the uncertainty of which bones are associated with which individual further precludes detailed study. The crania and all associated teeth were still encased in soil, preserving their association from the day they were recovered.

Therefore, I decided to count each individual by their dentition and associated crania. Each dentition was given a Skeleton number. There being two dentitions, two Skeletons were identified at Tyrell Bay. All other loose elements were not associated with individual skeletons. Any information recovered from loose elements was treated generally of that burial population. In this manner it was possible to understand generalities of the prehistoric population assumed to be living at Tyrell Bay.

The Tyrell Bay remains were recovered an undisclosed number of years ago, and consist of forty four skeletal elements plus thirty four teeth. Fragmentation will be ignored at Tyrell Bay because of the recovery method.

Skeleton 01 consists of a partial mandible and six teeth. This dentition was extremely fragmentary, and the left portion of the mandible is all that remains of the tooth-bearing skeleton.

Skeleton 02 consists of the medial third of a right clavicle, the mandible, a fragmentary cranium (occipitals, parietals, frontal, vomer, nasals, sphenoid, maxillas, zygomatics, palatine, and ethmoid), plus twenty eight teeth.

B. DATA COLLECTION METHODS

Skeletal and dental remains from Grand Bay and Tyrell Bay sites on Carriacou, Grenada were examined. Each site presented unique challenges in skeletal and dental identification, classification, and pathological diagnosis. In addition to skeletal material, the artifacts found at Grand Bay were used to understand the cultural affiliation of the people living there.

i. GRAND BAY

Skeletons were recovered at Grand Bay using standard archaeological methods of documentation and recovery. A database was constructed and the Grand Bay site was given a Project Scan Number of 04CGB followed by a six number string to identify each individual item discovered at Grand Bay. In addition, each burial was given a unique Feature Number. Every skeletal and dental element from each feature at Grand Bay would thereby be associated with a unique Project Scan Number and Feature Number. Within each Feature, an arbitrary Specimen Number was assigned. For skeletal material it was a string of four numbers, xxxx. For dental material, Axxx specimen numbers were assigned to easily distinguish skeletal from dental material. Pottery received Bxxx, Animal Bone Cxxx, Shell and Coral Dxxx, and Soil Samples were assigned Exxx. Each skeletal and dental element from each feature was then identified, and data on age, sex, and the type of pathology present was collected into the database and in a lab notebook using standard methods outlined in Hillson (1996) and White (2000). Physical data sheets were used as a backup to the digital database, and severe pathology was also detailed on separate data sheets and photographed. Qualitative data collection included element condition, fragmentation, non-metric tooth traits present, and pathology. Quantitative data was collected on the tooth mesio-distal and buccal-lingual dimensions. Sexing was difficult because of the fragmentary nature of the remains from Grand Bay. However, sex was determined with some confidence using the assessment of the greater sciatic notch as described in White (2000). Age estimation was also difficult, but epiphysis fusion and dental eruption estimates offered some measure of confidence using methods described in Hillson (1996) and White (2000). After each element was identified and recorded, it was

individually bagged and labeled so that it could be cataloged for preservation in the Carriacou Historical Society Museum.

I looked at archaeological data from Grand Bay in comparison to data from other sources to determine if the people at Grand Bay might have belonged to a greater regional cultural group known as the Suazoid (Keegan 2000; Sutty 1990).

ii. TYRELL BAY

No record of individual burials existed for Tyrell Bay, but there were at least three based upon the presence of three right femurs. A database was constructed and a Project Scan Number of 03CAR000171 was given to the entire collection of remains. Skeletal elements were then given Specimen Numbers as at Grand Bay. Loose human teeth were given Axxx Specimen Numbers, while articulated teeth were given the same Specimen Number as the mandible or maxilla they were found in. Pottery was given Bxxx, and Soil Samples were given Cxxx. Each skeletal and dental element was examined and qualitative data on condition, non-metric tooth traits, and pathology present were recorded in the database and a lab notebook. Each Skeleton was also sexed using what remained of the cranium with the methods described in White (2000). The only qualitative data collected was the mesio-distal and buccal-lingual tooth dimensions using a Mitutoyo Digimatic Caliper, model MTI 500-171. The same device was used to take all measurements from both Grand Bay and Tyrell Bay.

Segments of bone were given over for AMS Radiocarbon dating. One segment from Tyrell Bay and another from Grand Bay were surrendered for laboratory testing, but not before each segment was thoroughly examined for pathology and then documented. The

segment from Grand Bay was a portion of the right fibula from Feature 6. The segment from Tyrell Bay was a portion of a right ulna.

C. ANALYTICAL METHODS

Skeletal completeness (z) was calculated by averaging the number of elements recovered (x) by the number of elements possible (206, so that x/206 = z). Fragmentation (z) was measured by averaging the total fragments per feature (x) by the number of elements recovered (y, so that x/y = z).

Caries rates (z) were estimating by creating a ratio of the number of teeth with at least one lesion (x) to the number of teeth recovered (y, so that x/y = z). No method was used to correct this rate for premortem tooth loss because that loss could not be accurately estimated. Dental completeness (z) was calculated by averaging the number of recovered teeth (x) by the number of possible teeth (32, so that x/32 = z).

Pathology was examined and described using standard osteological methods for anatomical description, classification, and differential diagnosis detailed in Aufderheide, & Rodriguez-Martín (1998), Ortner (2003), and White (2000).

CHAPTER 3 – RESULTS

My data and observations were analyzed in order to create data tables and to generate discussion. Because the recovery methods from each site were different, each site will be covered separately in this section. Each set of remains is then discussed separately within their respective sections.

A. GRAND BAY

Feature 97 was the least intact skeleton, with a mere 4.85% of the possible skeletal elements recovered. It was also highly fragmentary, with an average of 23 fragments per element recovered (Table 3.2). A single identifiable pathology was recorded for Feature 97. It involved moderate lipping of a cervical vertebral body at the margins (Table 3.3). This kind of pathology is commonly associated with activity or progressing age (Jurmain 1999; Knüsel et al. 1997; Larsen 1997). Considering the preservation of this specimen, no specific etiology was defined. Dental completeness for Feature 97 was 50%, with a caries rate of 93.75% (Table 3.5, 3.7). Fifteen total carious lesions were observed from Feature 97. Nine lesions were observed at or below the cervical margin, one on the occlusal surface, two on wear facets between teeth, and three of unknown origin because the extent of the lesion had made its origin unidentifiable. Sixty percent of lesions observed from Feature 97 were at or below the cervical margin, and 6% of carious lesions were on the occlusal surface. Also noted was the presence of a pit-type enamel hypoplasia on the labial crown surface of the left and right upper canine teeth. Both age and sex were

indeterminate for Feature 97, due mainly to the incompleteness of the skeleton. However, the marginal lipping indicates a probable adult, since arthritis of this sort is often associated with age (Jurmain 1999; Knüsel et al. 1997). Another clue comes from the cervical vertebral body itself, which is completely fused. This supports the conclusion that Feature 97 represents a fully developed adult.

Feature 6 was poorly preserved, with 14.56% of possible elements recovered. It was highly fragmentary, with an average of 12.73 fragments per element recovered (Table 3.2). No discernable pathology was observed from Feature 6. Dental completeness for Feature 6 was 50% for the deciduous dentition and 81% for the permanent dentition. None of the adult dentition had been exposed to the oral cavity long enough to develop pathology. The deciduous dentition yielded a single observed pathology – a carious lesion on the occlusal plane of the left lower second deciduous molar. The caries rate for the deciduous dentition was 10%, with 100% of caries occurring on the occlusal plane. Sex was indeterminate for Feature 6, but age was estimated at 6-9 years old based upon the presence and development of both deciduous and adult dentitions using methods from Hillson (1996) and White (2000).

Feature 1 was relatively intact, with 21.36% of elements recovered. It was also the most extremely fragmented, with an average of 26.57 fragments per element recovered (Table 3.2). Feature one exhibited the most interesting pathology. An osteochondrosis was observed on the distal articular surface of a right tibia (Photo 1.7). A possibly comminuted fracture of the right femur was also observed (Photo 1.3). Finally, the left ulna appeared to have thickened and possibly bowed, which might have been the result of repetitive activity or a fracture (Photo 1.27). Dental completeness for Feature 1 was 47%,

with a carious lesion rate of 33% (Table 3.7, 3.9). Five total lesions were observed from Feature 1. Three lesions were observed at or below the cervical margin, while two were observed on the occlusal plane. Sixty percent of carious lesions were at or below the cervical margin, while 30% were on the occlusal plane. Age was estimated at 20+ years old based upon skeletal fusion and dental eruption (Hillson 1996, White 2000). Sex was determined to be female from the sciatic notch of the pelvis (White 2000).

Feature 3 was the most complete skeleton from Grand Bay, with 28.16% of possible skeletal elements recovered. It was the least fragmented skeleton at Grand Bay, with an average of 9.24 fragments per elements recovered (Table 3.2). No skeletal pathology was observed from Feature 3. Dental completeness for Feature 3 was a meager 6%, with only two teeth recovered. No pathology was observed on either tooth. Sex was indeterminate for Feature 3, but an age of 16-20 was estimated based upon non-fusion of skeletal elements (Photo 1.8, 1.17) based upon White (2000).

B. TYRELL BAY

Skeleton 01 exhibited no skeletal pathology. Dental completeness for Skeleton 01 was a mere 19%, as only six teeth were recovered. Two of six recovered teeth exhibited carious lesions, for a rate of 33%. One of the two lesions was at the cervical margin. The other carious tooth was so affected that initial location could not be determined. Sex for Skeleton 01 could not be determined, but the presence of a carious lesion on a third molar

confirms that it had erupted by death. Therefore the individual was at least eighteen years of age.

Skeleton 02 exhibited no skeletal pathology. Dental completeness for Skeleton 02 was 88%, as 28 teeth were recovered. Thirteen of twenty-eight teeth had at least one carious lesion, for a rate of 46%. Ninety-two percent of lesions (n = 12) observed from Skeleton 02 were on the occlusal plane, and the remaining eight percent (n = 1) occurred at an indeterminate location due to the advanced state of the lesion. Skeleton 02 exhibited a relatively inordinate amount of linear hypoplasias. The first was located on the right upper second molar, and extended the entire circumference of the crown. The right upper canine had three linear defects on the labial surface. The right upper second and first and left upper second and first incisors each had two linear hypoplasias. Three linear defects were observed on the left upper canine. One linear defect was observed on the left lower canine, while the left lower second incisor exhibited two hypoplasias. The right lower first and second incisors were each observed with one linear defect. Sex for Skeleton 02 was determined using associated cranial fragments to be female. Age determination was based upon dental eruption, the estimated being greater than eighteen years of age at death.

Mixed Remains from Tyrell Bay exhibited the most interesting pathology from either site. An advanced disease process was discovered primarily affecting the endocranial surface of the frontal and parietal bones of one specimen. Many of the cranial and post-cranial lesions appeared highly destructive (see Photos 1.21-1.27, 1.29, 1.30). Postcranial lesions which are probably associated with this disease process show up on the ulnae, fibulae, tibiae, femurs, and radii. The lesions on the post-cranial remains varied greatly as

to their location – either nearer the epiphysis or diaphysis. They all seemed to be consistent in their appearance. These lesions appeared entirely destructive. Unlike the cranial lesions, these were not worm-trailed. Rather, they appeared as clearly-defined patches of uneven destruction of the first (approximately) half millimeter of cortical bone. The end result was a veritable forest of bony spicules contained within a depression on the outer surface of the bone.

Very little bone appeared to have been laid down in response to the cranial lesions. The lesions resembled a worm-trail and snaked through the endocranial vault in no particular ordered pattern. What appeared to be pockets of destructive infection were observed between the compact plates of the cranial bones. These either fenestrated endocranially, or began there and slowly advanced ectocranially. In one instance a lesion fenestrated completely to the ectocranial surface. That particular lesion highlighted a subtlety to the lesions better than the rest in that a "wall" of bone had formed between the inner and outer plates around the edge of the fenestration. This appeared to be the result of a proliferative reaction of the bone adjacent to the lesion itself, and all other cranial lesions share this in common. The cranium was broken into several pieces, which gave an excellent side profile of the cranial bone (see Photos 1.25 and 1.26). Another important feature of the cranial lesions is that preceding any destructive lesion growth the cancellous bone between the inner and outer compact bone tables was apparently stimulated to "fill in" and become compact bone. I suspect that only after the destruction of the cancellous bone did destructive lesion growth begin, because sections of crania unaffected by destructive lesions exhibit no cancellous bone.

C. GENERAL

The radiocarbon dates for Grand Bay and Tyrell Bay indicated that the sites were probably contemporary, with a date at Grand Bay of 1050-1250 AD cal., and a date at Tyrell Bay of 1060-1280 AD cal. A product of ^{14}C dating is the ratio of ^{13}C to that of ^{12}C. This ratio, expressed as a negative product of $^{13}C/^{12}C$, was -14.21 for Grand Bay and -12.55 for Tyrell Bay. See Table 3.1 – Radiocarbon Dates for Grand Bay and Tyrell Bay in the tables section for details.

CHAPTER 4 – DISCUSSION

This chapter offers a discussion of the preceding results. Each Feature and Skeleton was discussed separately with regards to how well they answered my questions and supported my hypotheses. Feature and Skeleton discussions were organized by site. A general discussion wraps up this chapter, in consideration of how all my data fit with my hypotheses and answered my questions.

A. GRAND BAY

Feature 97 was probably the least intact of all the Grand Bay remains because the remains were recovered in 2003 as part of a last-ditch salvage effort. The grave was heavily eroded and would not have survived another year. Most of the remains were recovered on the surface. While all four recovered burials at Grand Bay were discovered due to erosion, Feature 97 was by far the most heavily eroded, which I think explains its relatively fragmentary and incomplete nature. Dental completeness from Feature 97 was impressive considering the incomplete nature of the skeleton. The dentition from Feature 97 was notable because of the almost 94% caries rate. It was also interesting because of the pit-type hypoplasias found on the upper canines from this skeleton. While the caries rate for this individual is probably artificially inflated by the lack of half the dentition, even if we assume the entire rest of the teeth had no lesions the rate would be almost 47%. A rate so high would almost definitely be caused by a focus on carbohydrates in the diet (Larsen 1997). Keegan (2000) points out that society in the Lesser Antilles around

1,000 BP was characteristically agrarian. I think that Feature 97 supports my first hypothesis based upon these observations.

Feature 6 could do little in the way of supporting my hypothesis about the cultural affinity of those interred at Grand Bay because of the age of the individual. The permanent dentition had just begun to erupt. There could therefore be no caries, let alone a pattern to analyze. The most important point to make about Feature 6 is that it did not present any evidence that would disprove my hypothesis.

Feature 1 gave the clearest picture of health at Grand Bay because it was the most skeletally complete. However, it was the most fragmentary per element of all the burials. This could be because of the very acidic soil or perhaps because more fragile bones were recovered from this burial. Ribs and finger and toe bones were recovered in abundance, which tend to be more friable than other elements. Further study into the issues of preservation and recovery is needed, but Feature 1 suggested many solid possibilities.

Feature 1 seems to support my first hypothesis with a high caries rate and a majority of the lesions at the cervical margin. This is also a similar pattern to Feature 97. The pathology present in Feature 1 helps answer my question about the everyday activities at Grand Bay. The person exhibited some interesting trauma that suggests many fascinating possibilities, one being a fall from a high ledge. It is possible that the osteochondrosis of the right tibia and comminuted fracture of the right femur are unrelated. Regardless, Carriacou is a rugged island with very limited access to fresh water and scattered terrestrial resources (Sutty 1990). It is not hard to imagine this person being injured regularly while fetching water or gathering resources. Suffice it to say, however, that the injury to this person's femur would have immobilized her and the fact that she lived for it

to significantly heal offered a possible clue as to how bountiful the resources were at Grand Bay around 1,000 BP.

Feature 3 was the most intact skeleton and also the least fragmentary, which raises questions about my supposition earlier about a general correlation between higher recovery and higher fragmentation. Perhaps fewer ribs and toe and finger bones were recovered from this feature relative to Feature 1. Regardless, the data suggest more complex issues at work with regards to completeness and fragmentation. I suspect that the time a particular skeleton was in the ground, as well as the burials distance from the beach were also important issues to consider. Future studies of fragmentation and completeness are important because Carriacou is largely unexcavated. Burials are lost to erosion and construction each year, and future studies could help better identify key sources of damage to the skeletal remains before, during, and after excavation. This in turn could lead to more effective salvage, better excavation and lab methods, and as a result could help paint a clearer picture of the inhabitants of Carriacou. Dental completeness from Feature 3 was extremely low, which precluded any analysis of carious lesion rates and patterning. Neither was any skeletal pathology observed. The important contribution Feature 3 made to my study was the fact that it did not present any result that might disprove my first hypothesis.

B. TYRELL BAY

Skeleton 01 exhibited a similar caries rate to those of the features from Grand Bay. However, Skeleton 01 had a different pattern of lesions than the features from Grand

Bay. Both of the two carious lesions observed probably originated on the occlusal plane which means that 100% of the observed lesions were located there. This is deceiving in that only six teeth were recovered and only two were carious, for a caries rate of 33%. The primary contribution of Skeleton 01 to my study is that it does not exhibit results that could disprove my second hypothesis.

Skeleton 02 exhibited no skeletal pathology. Dental completeness was extremely high, which undoubtedly helped obtain a more accurate carious lesion rate than from Skeleton 01. The caries rate was high at 46%, but this is consistent with the Grand Bay remains. The most striking difference was in the location of the lesions. A strong majority were located on the occlusal plane. Admittedly, most teeth from Skeleton 02 were still in situ. While the interstitial region was probed when possible, there may have been some interproximal lesions that could not be identified – that given different circumstances may have been visible. Perhaps this effect could account for the 92% rate of occlusal carious lesions. Regarding the possibility of carious lesions at the cervical margin avoiding detection, I do not think it is likely. The cervical margin was almost always visible, even interproximally. Another factor that might have inflated the occlusal occurrence of carious lesions was pre-mortem tooth loss. Four teeth were not recovered with the burial, but even if we assume that each had a lesion at the cervical margin the new occlusal occurrence rate would be 70%. I think this presents a strong case for an agrarian diet based around simple carbohydrates. Since manioc was a probable domesticate at Grand Bay around 1,000 BP, and since the majority of Grand Bay lesions were located at the cervical margin, I think it was possible the people of Tyrell Bay grew a different crop. The high rate of carious lesions on the occlusal plane is a pattern shared

with maize agriculturalists of Central North America (Larsen 1997). No dental data existed for the Greater Antilles during this period, but maize agriculture was practiced by Greater Antilles cultures around the same time (Keegan 2000). It is possible that two distinct cultural groups inhabited Carriacou contemporaneously (Keegan 2000). Perhaps Tyrell Bay was best suited for maize agriculture. It is also possible that the people of Tyrell Bay subsisted upon manioc but processed it much differently. Suffice it to say that differing carious lesion location patterns is not sufficient evidence to support maize agriculture at Tyrell Bay. What is very apparent is that much more research is needed at Tyrell Bay in order to adequately answer these questions. Considering the pattern of carious lesions from Skeleton 02, the possibility of maize agriculture on Carriacou should not yet be discounted, despite the fact that maizé agriculturalists have never been found that far south along the Lesser Antilles chain.

Mixed Remains from Tyrell Bay were fascinating. First and foremost it is important to recognize that differential diagnosis can be problematic in complete skeletal specimens (Aufderheide & Rodriguez-Martín 1998; Ortner 2003). The remains recovered from the construction site in Harvey Vale (Tyrell Bay) are incomplete. Forty-Four skeletal elements and thirty-four teeth represent at least three individuals at Tyrell Bay. That means only an average of seven percent of skeletal elements were recovered per person, and thirty-five percent of teeth per person. This of course means that differential diagnosis at Tyrell Bay will be nearly impossible.

As to what caused these lesions, there are only two diseases that fit the apparent pattern the best. Both acquired syphilis and tuberculosis fit the pattern, and coincidentally they are both difficult to diagnose from dry bone, and are also both often mistaken for one

another (Aufderheide & Rodriguez-Martín 1998; Ortner 2003). Both diseases have also been documented in the New World around 1,000 BP (Aufderheide & Rodriguez-Martín 1998; Ortner 2003).

The evidence pointing towards acquired syphilis are the post-cranial lesions and the possible presence of healed lesions on the exterior of the frontal bone (see Photo 1.23, areas circled). Healed lesions on the cranium, the frontal bone especially, are a hallmark of treponema infection (Aufderheide & Rodriguez-Martín 1998; Ortner 2003). Treponema is a good candidate to have caused these lesions, but Aufderheide & Rodriguez-Martín (1998) warn that syphilis is often confused with tuberculosis infection. They pointed out that one important distinction between the two diseases was the location of the cranial lesions (Aufderheide & Rodriguez-Martín 1998; Ortner 2003). According to Aufderheide & Rodriguez-Martín (1998), treponemal lesions were usually found on the outside surface of the skull, while the lesions cause by tuberculosis were usually found on the inside surface of the skull. Aufderheide & Rodriguez-Martín (1998) also explained that lesions caused by tuberculosis were oftentimes exclusively destructive. The lesions found on the Tyrell Bay remains fit this description well. Except for the stimulation of compact bone growth in the cranium, the responsible disease process was very destructive and this seems to fit with tuberculosis.

Either disease could have caused the lesions observed at Tyrell Bay. Both diseases were well-known in prehistoric North and South America by 1,000 BP (Aufderheide & Rodriguez-Martín 1998; Hutchinson et al. 1998; Ortner 2003; Rothschild et al 2000). It will be impossible to say with any degree of certainty which of the two caused the lesions at Tyrell Bay. With the sparse evidence at hand right now though, tuberculosis seems like

the more probable of the two because of the location of the cranial lesions and because of the destructive nature of those lesions, and the post-cranial lesions.

C. GENERAL

One of the most interesting results was the radiocarbon dating for Grand Bay and Tyrell Bay. Dates obtained from one specimen at each site indicated that the sites were probably occupied around the same time, and at a period in Caribbean Lesser Antilles prehistory when the Suazoid pottery style was common to the region. More radiocarbon dates will be needed to establish a clearer picture about occupation at these two sites. The $^{13}C/^{12}C$ ratios were interesting but could not clearly establish diet because of the high probability that both populations were also exploiting marine resources due to their close proximity to the ocean. Nitrogen isotope analyses should be conducted in the future to establish whether these populations were exploiting marine resources or if the less negative results for each site indicates a preference for specific cultigens.

In general all four features from Grand Bay supported my first hypothesis. Feature 6 was confirmed to be from around 1,000 BP, and the other three features either supported the hypothesis indirectly with dental caries rates and locations or did not exhibit data that could prove my first hypothesis wrong. Future research at Grand Bay will be needed in order to make my conclusions anything but tentative.

Cultural affinity was unlikely to have been attributed to the Tyrell Bay remains without archaeology to help corroborate the results. The skeletons from Tyrell Bay presented conflicting data. The most intact specimen, though, appeared to suggest a different diet

than was typical to the region at that period in prehistory; at least what is currently understood of it (Kaye et al. 2004, 2005; Keegan 2000; Sutty 1990). This suggests a tentative conclusion that the people living at Tyrell Bay did not participate in the same cultural tradition as those living at Grand Bay around the same time. Future research at Tyrell Bay may someday support the hypothesis that the prehistoric inhabitants shared a cultural affinity with Grand Bay. However, this conclusion could easily be confounded by differences in tooth wear between the sites or differences in fluoride in the natural environment between sites (Hillson 1996).

Whatever the cultural affinity of the peoples of Grand Bay and Tyrell Bay, it is apparent from pottery adornos (rim decorations) and cemis (see Kaye et al. 2004, 2005; Keegan 2000) recovered at Grand Bay that Carriacou was probably in regular contact with the Greater Antilles. Sutty (1990) defines the pottery styles at Grand Bay as showing a wide array of admixture from many traditions. Kaye et al. (2004, pp. 85) also found evidence of a possible direct link between Grand Bay and the Greater Antilles when in 2004 they discovered a rare ceramic stamp bearing a pattern commonly observed on ritual artifacts like vomit spatulas and "duhos" (similar to a throne) from the Greater Antilles (Kaye et al. 2004, pp. 85). A thriving agricultural economy would have been present in the Greater Antilles by around 1,000 BP, and the first appearance of maize agriculture showed by at least that same time (Keegan 2000, pp. 152-3). Since there is probable evidence of cultural diffusion from the cultures of the Greater Antilles to Grand Bay, maize agriculture remains a possibility that in my opinion should not be discounted on Carriacou Island during this period in prehistory (Keegan 2000). This finding is significant because it adds validity to the possibility that maize agriculture was practiced

at Tyrell Bay, in the southern tip of the Lesser Antilles around 1,000 BP. If this turns out to be the case it could change the current understanding of Caribbean trade interactions and subsistence between and within the Lesser and Greater Antilles.

CHAPTER 5 – CONCLUSION

The most significant findings of this work appear to be that caries rates support the conclusion that the prehistoric inhabitants of Grand Bay and Tyrell Bay had diets heavily dependent upon carbohydrates, which probably represents an increased dependence upon domesticates for subsistence. Every other conclusion is tentative at best, subject to the same problem; an absolute dearth of supporting archaeological, dental, and osteological evidence.

My preliminary research at Grand Bay and Tyrell Bay has generated some fascinating results. I think it is very plausible from the evidence presented – the radiocarbon dates, the dental caries, the carbon 13/12 ratios, and the archaeology – that the Grand Bay remains could very plausibly represent horticulturalists who depended upon domesticates for both subsistence and economy. Future research at Tyrell Bay may someday allow direct comparisons between these two populations – populations that were probably living on the same island at the same time, but who might have subsisted upon different domesticates. Further, the possibility of treponema or tuberculosis at Tyrell Bay was examined. Future research will help better understand this site and perhaps identify key factors that might have allowed an individual with such active, destructive, lesions to survive for so long.

New research questions include: 1) If Grand Bay and Tyrell Bay residents depended upon different domesticates, how did this affect the distribution of caries between the two sites? Were acquired syphilis and/or tuberculosis present at Grand Bay and Tyrell Bay? What were the trade relationships between Grand Bay and Tyrell Bay? Preliminary

archaeology at Tyrell Bay will have to be conducted first. Surveys to locate occupation and burials sites should also be conducted at Tyrell Bay. Larger skeletal samples will also be needed from both Tyrell Bay and Grand Bay in order for research to continue. Without more burials, quantitative and qualitative techniques comparable to other significant studies will be impossible and progress towards understanding this important corner of the Caribbean will stall.

II. APPENDICES

SECTION 1 – DATA TABLES

A. CHAPTER TWO

Table 2.1 – Feature Six Skeletal and Dental Data

Feature Six Skeletal and Dental Data		
Scan Number	Specimen Number	Element
04CGB000113	0001	Maxilla
04CGB000113	0002	Cervical Vertebra
04CGB000113	0003	Mandible
04CGB000113	0004	Skull Fragments
04CGB000113	0005	Left Tibia
04CGB000113	0006	Right Ulna
04CGB000113	0007	Right Tibia
04CGB000113	0008	Left Radius
04CGB000113	0009	Intermediate Hand Phalange
04CGB000113	0010	Intermediate Hand Phalange
04CGB000113	0011	Left Fibula
04CGB000113	0012	Right Humerus
04CGB000113	0013	Left Femur
04CGB000113	0014	Right Proximal Foot Phalange
04CGB000113	0015	Left Humerus
04CGB000113	0016	Left Ulna
04CGB000113	0017	Pelvis
04CGB000113	0018	Ribs
04CGB000113	0019	Frontal Bone
04CGB000113	0020	Skull Fragments
04CGB000113	0021	Right Femur
04CGB000113	0022	Right Ulna
04CGB000113	0023	Right Radius
04CGB000113	0024	Right Fibula
04CGB000113	0025	Parietal Fragments
04CGB000113	0026	Right Parietal
04CGB000113	0027	Left Zygomatic
04CGB000113	0028	Right Clavicle
04CGB000113	0029	First Rib

04CGB000120	0087	Human Bone Fragments
04CGB000120	0088	Maxilla
04CGB000113	A001	R upper 2 dm
04CGB000113	A002	L lower 3 P
04CGB000113	A003	L upper 2 M
04CGB000113	A004	R upper 3 P
04CGB000113	A005	L upper 1 M
04CGB000113	A006	R upper 4 P
04CGB000113	A007	L upper 2 dm
04CGB000113	A008	L lower 1 I
04CGB000113	A009	R upper 1 dm
04CGB000113	A010	R lower 2 I
04CGB000113	A011	L lower 1 dc
04CGB000113	A012	R lower 1 I
04CGB000113	A013	R upper 2 M
04CGB000113	A014	R upper 1 M
04CGB000113	A015	L lower 1 C
04CGB000113	A016	R lower 4 P
04CGB000113	A017	L upper 1 C
04CGB000113	A018	R lower 2 dm
04CGB000113	A019	L upper 4 P
04CGB000113	A020	L upper 3 P
04CGB000113	A021	R lower 3 P
04CGB000113	A022	L lower 4 P
04CGB000113	A023	R lower 2 M
04CGB000113	A024	L lower 2 M
04CGB000113	A025	R lower 1 dc
04CGB000113	A026	L upper 1 dm
04CGB000113	A027	R lower 1 dm
04CGB000113	A028	L lower 1 dm
04CGB000113	A029	R upper 1 C
04CGB000113	A030	R lower 1 M
04CGB000113	A031	L lower 1 M
04CGB000113	A032	R upper 1 I
04CGB000113	A033	L lower 2 dm
04CGB000113	A034	L upper 1 I
04CGB000113	A035	R upper 2 I
04CGB000113	A036	L lower 2 I
04CGB000113	A037	Teeth Fragments

Table 2.2 – Feature Three Skeletal and Dental Data

Feature Three Skeletal and Dental Data		
Scan Number	Specimen Number	Element
04CGB000022	0030	Inferior Articular Facet
04CGB000022	0031	Scapula
04CGB000022	0032	Vertebra
04CGB000022	0033	Ribs
04CGB000022	0034	Left Tibia
04CGB000022	0035	Left Int. Cuneiform
04CGB000022	0036	Left Calcaneus
04CGB000022	0037	Left Medial Cuneiform
04CGB000022	0038	Left Talus
04CGB000022	0039	Left 1st Proximal Foot Phalange
04CGB000022	0040	Left 5th Proximal Foot Phalange
04CGB000022	0041	Left 1st Metatarsal
04CGB000022	0042	Left 2nd Metatarsal
04CGB000022	0043	Left 3rd Metatarsal
04CGB000022	0044	Left 4th Metatarsal
04CGB000022	0045	Left 5th Metatarsal
04CGB000022	0046	Left 2nd Proximal Hand Phalange
04CGB000022	0047	Left 3rd Proximal Hand Phalange
04CGB000022	0048	Left 4th Proximal Hand Phalange
04CGB000022	0049	Prox. Hand Phalange Prox. Art. Surface
04CGB000022	0050	Left Femur
04CGB000022	0051	Right Femur
04CGB000022	0052	Right Ischium
04CGB000022	0053	Left Ischium
04CGB000022	0054	Pelvic Fragments
04CGB000022	0055	Right Ilium
04CGB000022	0056	Right 3rd Proximal Hand Phalange
04CGB000022	0057	Phalanges
04CGB000022	0058	Hand Phalange
04CGB000022	0059	Right Humerus
04CGB000022	0060	Metatarsals
04CGB000022	0061	Right 5th Metatarsal
04CGB000022	0062	Right 1st Metatarsal
04CGB000022	0063	Left fibula
04CGB000022	0064	Right Radius
04CGB000022	0065	Ribs
04CGB000022	0066	Sacrum
04CGB000022	0067	Lumbar Vertebra
04CGB000022	0068	1st Cervical Vertebra
04CGB000022	0069	2nd Cervical Vertebra
04CGB000022	0070	Cervical Vertebrae
04CGB000022	0071	Sternum

04CGB000022	0072	3rd Metacarpal
04CGB000022	0073	Hand Phalanges
04CGB000022	0074	Left Ulna
04CGB000022	0075	Left Radius
04CGB000022	0076	Right Ulna
04CGB000022	0077	Unidentified Long Bone Fragments
04CGB000022	0078	Left Lunate
04CGB000022	0079	Left Capitate
04CGB000022	0080	Left Hamate
04CGB000022	0081	Left Trapezoid
04CGB000022	0082	Left Triquetral
04CGB000022	0083	Right Talus
04CGB000022	0084	Right Tibia
04CGB000022	0085	Right Calcaneus
04CGB000022	0086	Right Foot Fragments
04CGB000022	A038	L lower 3 M
04CGB000022	A039	R upper 1 I

Table 2.3 – Feature One Skeletal and Dental Data

Feature One Skeletal and Dental Data		
Scan Number	Specimen Number	Element
04CGB000025	0089	Right Capitate
04CGB000025	0090	Left 2nd Metacarpal
04CGB000025	0091	Prox. Hand Phalange
04CGB000025	0092	Distal Hand Phalanges
04CGB000025	0093	Right Triquetral
04CGB000025	0094	Right Finger
04CGB000025	0095	Left Capitate
04CGB000025	0096	Left Scaphoid
04CGB000025	0097	Left Lunate
04CGB000025	0098	Left Hand Bones
04CGB000025	0099	Left Hamate
04CGB000025	0100	Left Proximal Phalanges
04CGB000025	0101	Left Metacarpals
04CGB000025	0102	Intermediate Hand Phalanges
04CGB000025	0103	Right Tibia
04CGB000025	0104	Right Humerus
04CGB000025	0105	Right Fibula
04CGB000025	0106	Left Femur
04CGB000025	0107	Left Parietal
04CGB000025	0108	Left Temporal
04CGB000025	0109	Mandible
04CGB000025	0110	Right Temporal
04CGB000025	0111	Cranial Fragments
04CGB000025	0112	Right Ulna

04CGB000025	0113	Right Femur
04CGB000025	0114	Right Clavicle
04CGB000025	0115	Left Radius
04CGB000025	0116	Left Ulna
04CGB000025	0117	Right Radius
04CGB000025	0118	Left Fibula
04CGB000025	0119	Right Patella
04CGB000025	0120	Left Humerus
04CGB000025	0121	Metacarpals
04CGB000025	0122	Right Capitate
04CGB000025	0123	Unidentified Long Bone Fragments
04CGB000025	0124	Humerus
04CGB000025	0125	Sternum
04CGB000025	0126	Unidentified Human Bone
04CGB000025	0127	Left Os Coxa
04CGB000025	0128	Right Os Coxa
04CGB000025	0129	Vertebrae
04CGB000025	0130	Ribs
04CGB000025	0131	Right Ribs
04CGB000025	0132	Left Ribs
04CGB000022	0143	Right Ulna
04CGB000025	A040	L upper 2 I
04CGB000025	A041	L lower 1 M
04CGB000025	A042	L lower 3 M
04CGB000025	A043	L upper 3 M
04CGB000025	A044	R upper 3 P
04CGB000025	A045	R upper 1 C
04CGB000025	A046	R upper 4 P
04CGB000025	A047	R upper 2 M
04CGB000025	A048	R upper 3 M
04CGB000025	A049	R lower 1 I
04CGB000025	A050	R lower 1 C
04CGB000025	A051	R lower 3 P
04CGB000025	A052	R lower 4 P
04CGB000025	A053	R lower 1 M
04CGB000025	A054	R lower 2 M
04CGB000025	A055	Tooth Roots

Table 2.4 – Feature Ninety-Seven Skeletal and Dental Data

Feature Ninety-Seven Skeletal and Dental Data		
Scan Number	Specimen Number	Element
03CAR000097	0133	Mandible
03CAR000097	0134	Right Clavicle
03CAR000097	0135	Humerus
03CAR000097	0136	Right Scapula

03CAR000097	0137	Cervical Vertebra
03CAR000097	0138	Vertebrae
03CAR000097	0139	Ribs
03CAR000097	0140	Left Scapula
03CAR000097	0141	Unidentified Human Bone
03CAR000097	0142	Unidentified Long Bone Fragments
03CAR000097	A056	L upper 1 M
03CAR000097	A057	L upper 4 P
03CAR000097	A058	L upper 1 C
03CAR000097	A059	L upper 2 I
03CAR000097	A060	R upper 1 I
03CAR000097	A061	R upper 1 C
03CAR000097	A062	R upper 3 P
03CAR000097	A063	R upper 1 M
03CAR000097	A064	L lower 1 I
03CAR000097	A065	R lower 1 I
03CAR000097	A066	R lower 2 I
03CAR000097	A067	R lower 3 P
03CAR000097	A068	R lower 4 P
03CAR000097	A069	R lower 2 M
03CAR000097	A070	R lower 3 M
03CAR000097	A071	L lower 3 M
03CAR000097	A072	Tooth Roots

Table 2.5 – Tyrell Bay Skeletal and Dental Data

Tyrell Bay Skeletal and Dental Data		
Project Scan	Specimen #	Bag Contents
03CAR000171	0001	Mandible
03CAR000171	0002	Right Femur
03CAR000171	0003	Right Femur
03CAR000171	0004	Right Tibia
03CAR000171	0005	Left Tibia
03CAR000171	0006	Left Talus
03CAR000171	0007	Right Talus
03CAR000171	0008	Right Fibula
03CAR000171	0009	Left Fibula
03CAR000171	0010	Right Ulna
03CAR000171	0011	Left Ulna
03CAR000171	0012	Right Calcaneus
03CAR000171	0013	Left Calcaneus
03CAR000171	0014	Right Humerus
03CAR000171	0015	Right Ulna
03CAR000171	0016	Right Radius
03CAR000171	0017	Left Ulna
03CAR000171	0018	Left Radius

03CAR000171	0019	Left Cuboid
03CAR000171	0020	Right Os Coxae
03CAR000171	0021	UnID Long Bone Fragments
03CAR000171	0022	Femur
03CAR000171	0023	Metatarsals
03CAR000171	0024	Left MT-2
03CAR000171	0025	Foot Phalange
03CAR000171	0026	Left MC-1
03CAR000171	0027	Right MC-4
03CAR000171	0028	Right Parietal
03CAR000171	0029	Left Parietal
03CAR000171	0030	Left Zygomatic
03CAR000171	0031	Right Temporal
03CAR000171	0032	Cranial Fragments
03CAR000171	0033	Cranium
03CAR000171	0034	UNID Human Bone Fragments
03CAR000171	0035	Right Femur
03CAR000171	0036	Left Femur
03CAR000171	0037	Left Tibia
03CAR000171	0038	Right Clavicle
03CAR000171	0039	Sacrum
03CAR000171	0040	Atlas (C1)
03CAR000171	0041	Axis (C2)
03CAR000171	0042	Right Os Coxae
03CAR000171	0043	Cranium
03CAR000171	0044	Hyoid
03CAR000171	A001	L upper 1 C
03CAR000171	A002	R upper 3 P
03CAR000171	A003	R upper 4 P
03CAR000171	A004	L lower 4 P
03CAR000171	A005	L lower 1 M
03CAR000171	A006	L lower 3 M
03CAR000171	Bag# 0043	R upper 3 M
03CAR000171	Bag# 0043	R upper 2 M
03CAR000171	Bag# 0043	R upper 4 P
03CAR000171	Bag# 0043	R upper 3 P
03CAR000171	Bag# 0043	R upper 1 C
03CAR000171	Bag# 0043	R upper 2 I
03CAR000171	Bag# 0043	R upper 1 I
03CAR000171	Bag# 0043	L upper 1 I
03CAR000171	Bag# 0043	L upper 2 I
03CAR000171	Bag# 0043	L upper 1 C
03CAR000171	Bag# 0043	L upper 3 P
03CAR000171	Bag# 0043	L upper 4 P
03CAR000171	Bag# 0043	L upper 1 M
03CAR000171	Bag# 0043	L upper 2 M

03CAR000171	Bag# 0043	L upper 3 M
03CAR000171	Bag# 0043	L lower 3 M
03CAR000171	Bag# 0043	L lower 4 P
03CAR000171	Bag# 0043	L lower 3 P
03CAR000171	Bag# 0043	L lower 1 C
03CAR000171	Bag# 0043	L lower 2 I
03CAR000171	Bag# 0043	L lower 1 I
03CAR000171	Bag# 0043	R lower 1 I
03CAR000171	Bag# 0043	R lower 2 I
03CAR000171	Bag# 0043	R lower 3 P
03CAR000171	Bag# 0043	R lower 4 P
03CAR000171	Bag# 0043	R lower 1 M
03CAR000171	Bag# 0043	R lower 2 M
03CAR000171	Bag# 0043	R lower 3 M

B. CHAPTER 3

Table 3.1 – Radiocarbon Dates for Grand Bay and Tyrell Bay

Radiocarbon Dates for Grand Bay and Tyrell Bay

Survey No.	Site	Lab No.	Type	$^{13}C/^{12}C$ ratio	^{14}C age	Cal. BP (2 sigma)
04CGB000409	Grand Bay	AA62278	shell	2.53	1,917+-37	AD 390-590
04CGB000396	Grand Bay	AA62279	charcoal	-25.13	1,243+-36	AD 680-880
04CGB000403	Grand Bay	AA62280	shell	3.39	1,789+-38	AD 530-690
04CGB000403	Grand Bay	AA62280	shell	3.36	1,822+-41	AD 470-670
04CGB000403	Grand Bay	AA62281	charcoal	-23.96	1,339+-36	AD 640-770
04CGB000559	Grand Bay	AA62282	charcoal	-25.97	1,227+-36	AD 690-890
04CGB000552	Grand Bay	AA62283	bone	-14.21	1,062+-44	AD 1050-1250
03CAR000295	Tyrell Bay	AA62284	bone	-12.55	1,027+-46	AD 1060-1280

Table 3.2 – Skeletal Fragmentation and Completeness at Grand Bay

Skeletal Fragmentation and Completeness at Grand Bay					
Feature	# Fragments	% Tot. Frags	# Elements Rec.	% Elements Rec.	Frags/Element
6	382	16.49%	30	14.56%	12.73
3	536	23.13%	58	28.16%	9.24
1	1169	50.45%	44	21.36%	26.57
97	230	9.93%	10	4.85%	23.00

Table 3.3 – Skeletal Pathology at the Grand Bay Site

Skeletal Pathology at the Grand Bay Site				
Project Scan	Feature	Specimen #	Bag Contents	Pathology
04CGB000025	1	0103	Right Tibia	Osteochondrosis of the distal tibial ephiphysis – joint surface
04CGB000025	1	0113	Right Femur	Healing Fracture
04CGB000025	1	0116	Left Ulna	Unknown
03CAR000097	97	0137	Cervical Vertebra	marginal lipping

Table 3.4 – Skeletal Pathology at the Tyrell Bay Site

Skeletal Pathology at the Tyrell Bay Site			
Project Scan	Specimen #	Bag Contents	Pathology
03CAR000171	0001	Mandible	Periapical abscesses at LL3M and from LL1I to LL2M; aveolar reabsorption
03CAR000171	0003	Right Femur	healed secondary gummatous lesion
03CAR000171	0004	Right Tibia	active primary gummatous lesion
03CAR000171	0005	Left Tibia	active primary and secondary gummatous lesion
03CAR000171	0007	Right Talus	possible osteochondritis on trochlear surface
03CAR000171	0008	Right Fibula	possible secondary gummatous lesions
03CAR000171	0009	Left Fibula	possible secondary gummatous lesions
03CAR000171	0010	Right Ulna	possible secondary gummatous lesions
03CAR000171	0016	Right Radius	possible gummatous lesions
03CAR000171	0017	Left Ulna	probable gummatous lesions
03CAR000171	0018	Left Radius	possible gummatous lesions
03CAR000171	0021	Long Bone Fragments	probable active gummatous lesions
03CAR000171	0028	Right Parietal	Active remodeling of endocranium

03CAR000171	0029	Left Parietal	active remodeling of endocranium
03CAR000171	0031	Right Temporal	possible syphilitic remodeling of endocranium
03CAR000171	0032	Cranial Fragments	endocranium actively modified
03CAR000171	0033	Cranium	active gummatous lesion fenestrated through the skull table - endocranial modification
03CAR000171	0040	Atlas (C1)	eburnation of superior articular surface
03CAR000171	0041	Axis (C2)	schmorl's node on the inferior articular surface of the body
03CAR000171	0043	Cranium	active remodeling of endocranium

Table 3.5 – Dental Pathology at the Grand Bay Site

Dental Pathology at the Grand Bay Site				
Project Scan	Feature	Specimen #	Identification	Pathology
04CGB000113	6	A033	L lower 2 dm	wear on cusps to dentine - caries on distal fossa
04CGB000025	1	A040	L upper 2 I	possible caries on lab. root surface - calculus labially
04CGB000025	1	A042	L lower 3 M	caries on occlusal surface
04CGB000025	1	A046	R upper 4 P	one caries on the buccal aspect of cervical margin
04CGB000025	1	A053	R lower 1 M	one possible caries on occlusal surface
04CGB000025	1	A054	R lower 2 M	one caries on distal cervical margin
03CAR000097	97	A056	L upper 1 M	one caries on mesial cervical margin
03CAR000097	97	A057	L upper 4 P	caries on mesial cervical margin
03CAR000097	97	A058	L upper 1 C	possible caries at the lingual cervical margin - pit-type hypoplasia on labial crown surface
03CAR000097	97	A060	R upper 1 I	possible caries at labial cervical margin
03CAR000097	97	A061	R upper 1 C	pit-type hypoplasia on labial crown surface
03CAR000097	97	A062	R upper 3 P	possible caries at mesial interproximal wear facet - one caries at buccal cervical margin
03CAR000097	97	A063	R upper 1 M	one caries at mesial cervical margin

03CAR000097	97	A064	L lower 1 I	probable caries on mesial surface under the cervical margin - slight linear defects on labial crown surface
03CAR000097	97	A066	R lower 2 I	probable caries on mesial interproximal wear facet
03CAR000097	97	A067	R lower 3 P	one caries directly under the cervical margin approximately buccal-distal
03CAR000097	97	A068	R lower 4 P	one caries on mesial root just below the cervical margin
03CAR000097	97	A069	R lower 2 M	one caries in lingual groove of occlusal surface
03CAR000097	97	A070	R lower 3 M	entire buccal portion of crown eaten away by caries - no occlusal surface left
03CAR000097	97	A071	L lower 3 M	entire crown and half of root structure eaten away by caries
03CAR000097	97	A072	Tooth Roots	remnants of teeth eaten away by caries

Table 3.6 – Dental Pathology at the Tyrell Bay Site

Dental Pathology at the Tyrell Bay Site				
Project Scan	Specimen #	Skeleton #	Identification	Pathology
03CAR000171	A003	01	R upper 4 P	mesial crown surface destroyed by caries which penetrates pulp chamber and fenestrates distally at the cervical margin
03CAR000171	A006	01	L lower 3 M	one caries on the buccal margin below the crown
03CAR000171	Bag# 0043	02	R upper 3 M	two caries, each in the occlusal margin
03CAR000171	Bag# 0043	02	R upper 2 M	one caries on the occlusal margin - one circum-crown linear hypoplasia
03CAR000171	Bag# 0043	02	R upper 3 P	one caries on the developmental groove
03CAR000171	Bag# 0043	02	R upper 1 C	three linear hypolasias on the labial surface
03CAR000171	Bag# 0043	02	R upper 2 I	two linear hypoplasias
03CAR000171	Bag# 0043	02	R upper 1 I	two linear hypoplasias
03CAR000171	Bag# 0043	02	L upper 1 I	two linear hypoplasias
03CAR000171	Bag# 0043	02	L upper 2 I	two linear

				hypoplasias
03CAR000171	Bag# 0043	02	L upper 1 C	one distinct hypoplasia, with two more barely distinquishable hypoplasias
03CAR000171	Bag# 0043	02	L upper 3 P	one caries in distal developmental groove
03CAR000171	Bag# 0043	02	L upper 1 M	two caries in the distal fossa and one in the mesial fossa - a third in the lingual groove
03CAR000171	Bag# 0043	02	L upper 2 M	one caries in mesial fossa of occlusal surface
03CAR000171	Bag# 0043	02	L lower 3 M	one caries each in the mesial and distal fossas
03CAR000171	Bag# 0043	02	L lower 4 P	one caries between the mesial marginal ridge and the mesial fossa
03CAR000171	Bag# 0043	02	L lower 3 P	one caries between distal fossa and distal marginal ridge
03CAR000171	Bag# 0043	02	L lower 1 C	one linear hypoplasia
03CAR000171	Bag# 0043	02	L lower 2 I	two linear hypoplasias
03CAR000171	Bag# 0043	02	R lower 1 I	one linear hypoplasia
03CAR000171	Bag# 0043	02	R lower 2 I	one linear hypoplasia
03CAR000171	Bag# 0043	02	R lower 3 P	one caries on distal interproximal facet
03CAR000171	Bag# 0043	02	R lower 1 M	one caries on buccal groove
nnnnn	Bag# 0043	02	R lower 2 M	distolingual and distobuccal cusps destroyed by one caries - one caries on mesial fossa - one caries on buccal groove
03CAR000171	Bag# 0043	02	R lower 3 M	mesiobuccal and mesiolingual cusps destroyed by one caries

Table 3.7 – Grand Bay and Tyrell Bay Dental Completeness

Grand Bay and Tyrell Bay Dental Completeness					
Site	Project Scan	Feature	Description	# Present	% Present
Grand Bay	04CGB000113	6	Permanent	26	81%
Grand Bay	04CGB000113	6	Deciduous	10	50%
Grand Bay	04CGB000022	3	Permanent	2	6%
Grand Bay	04CGB000025	1	Permanent	15	47%
Grand Bay	03CAR000097	97	Permanent	16	50%
Tyrell Bay	03CAR000171	SK 01	Permanent	6	19%
Tyrell Bay	03CAR000171	SK 02	Permanent	28	88%
Grand Bay	TOTAL	N/A	N/A	69	47%
Tyrell Bay	TOTAL	N/A	N/A	34	53%

Table 3.8 – Age and Sex at Grand Bay and Tyrell Bay

Age and Sex at Grand Bay and Tyrell Bay			
Site	Feature	Approximate Age in Years	Sex
Grand Bay	6	6-9	indeterminate
Grand Bay	3	16-20	indeterminate
Grand Bay	1	20+	female
Grand Bay	97	indeterminate	indeterminate
Tyrell Bay	Skeleton 01	18+	indeterminate
Tyrell Bay	Skeleton 02	18+	female

Table 3.9 – Caries Rates and Locations for the Permanent Dentition

Caries Rates and Locations for the Permanent Dentition				
Site Name	Caries Rate (obs.)	% Pulp Exposure	% Occlusal	% Elsewhere
Grand Bay	50%	22%	6%	94%
Tyrell Bay	44%	13%	87%	13%

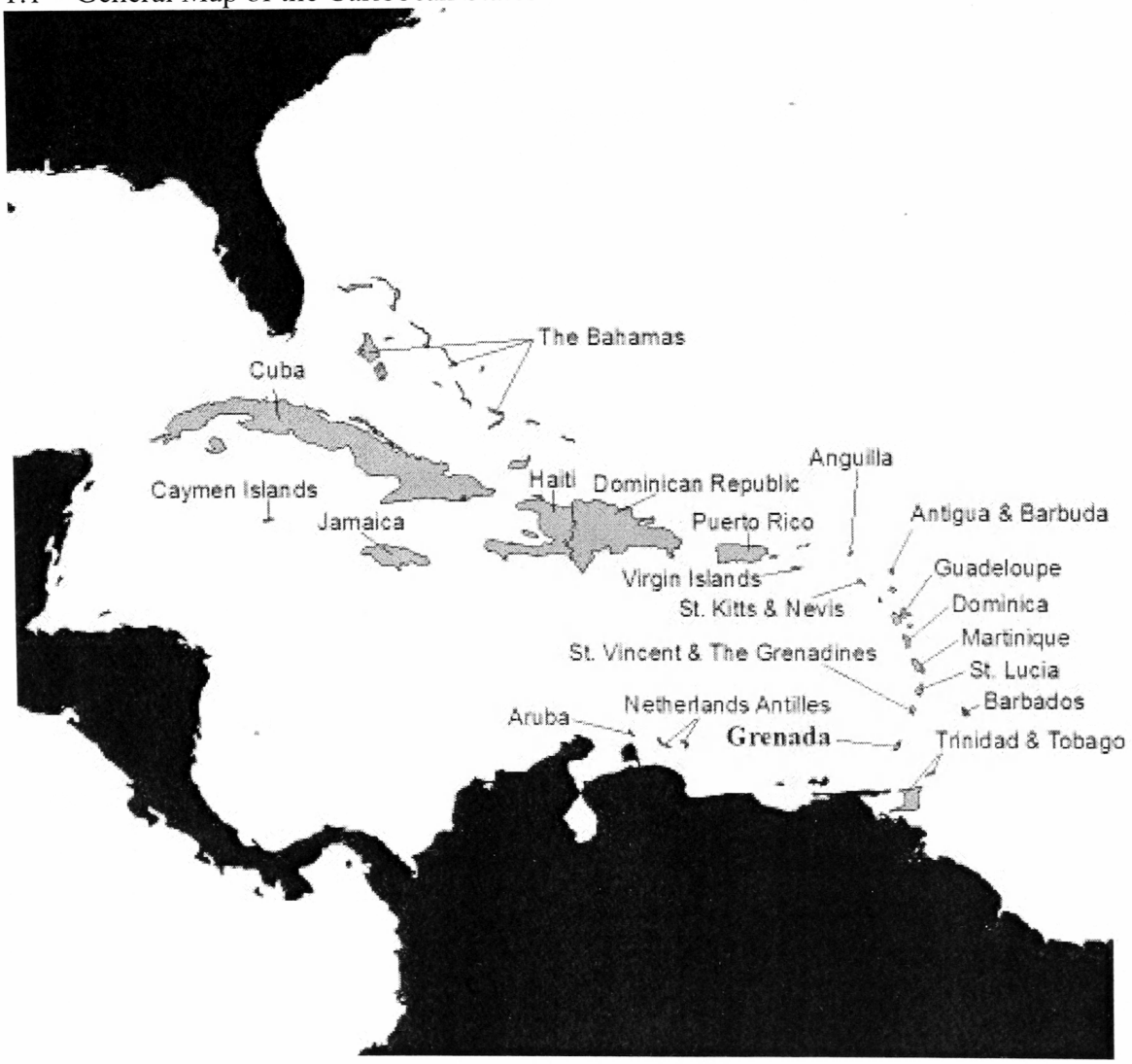
Table 3.10 – Carious Lesions per Tooth

Carious Lesions per Tooth		
	Number	Percent
Grand Bay		
Molars	8	50%
Premolars	5	31%
Canines	0	0%
Incisors	3	19%
Tyrell Bay		
Molars	9	60%
Premolars	6	40%
Canines	0	0%
Incisors	0	0%

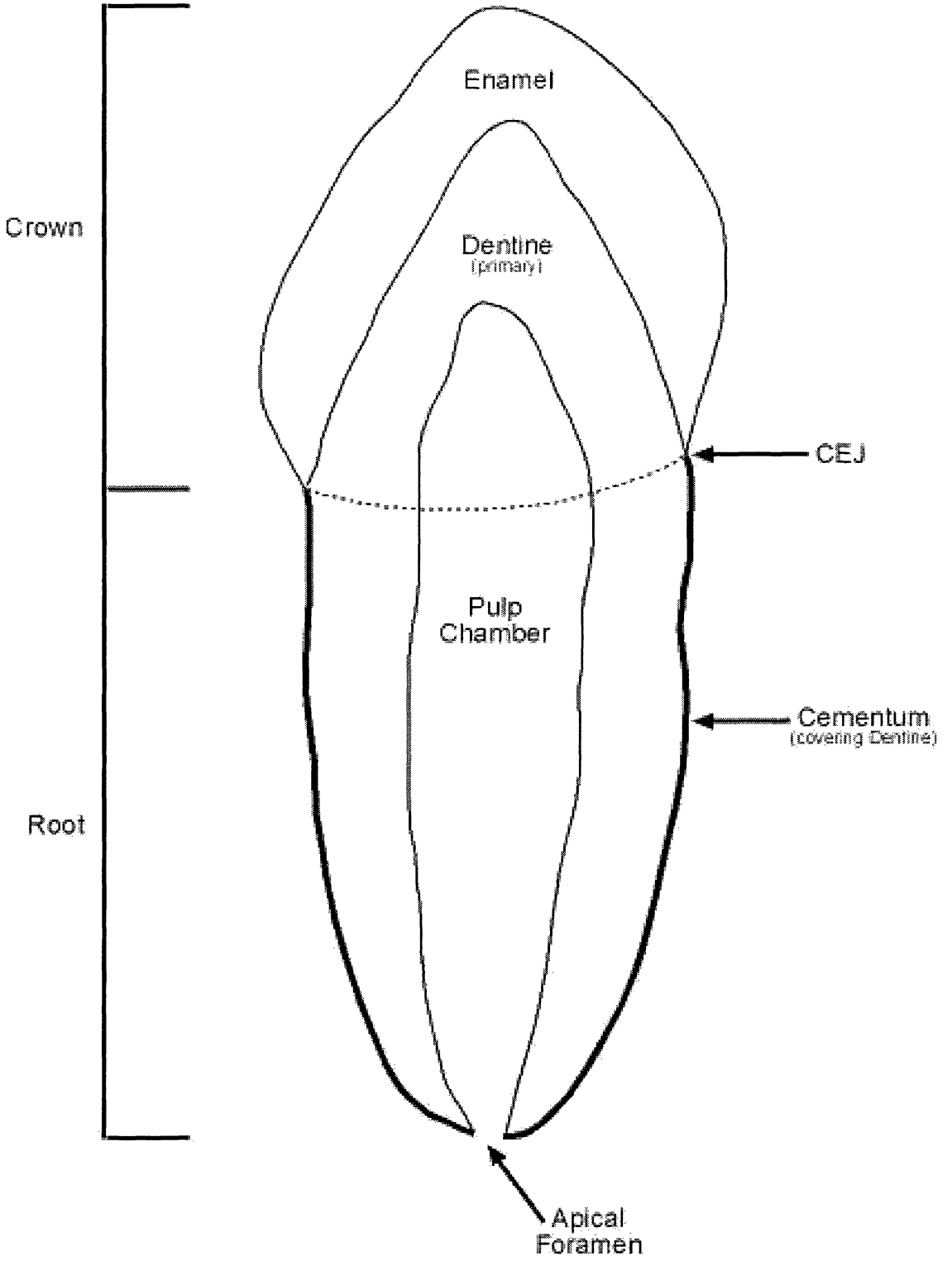
SECTION 2 – FIGURES AND PHOTOGRAPHS

A. FIGURES

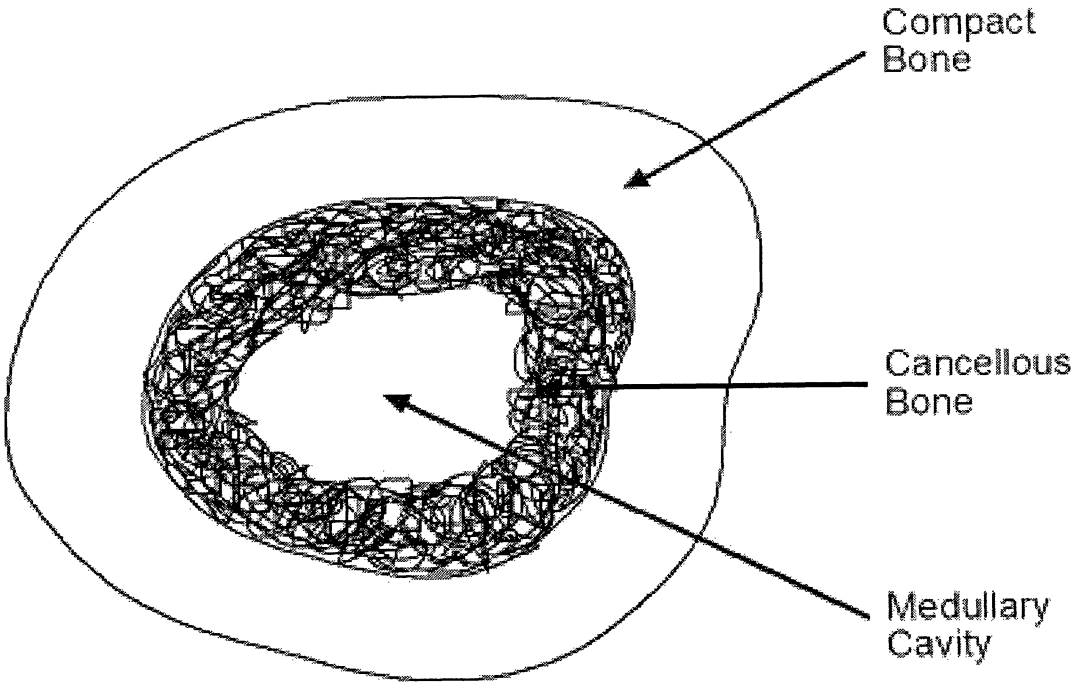
1.1 – General Map of the Caribbean States



1.2 – Basic Tooth Anatomy



1.3 – Cross-Section of a Long Bone Shaft

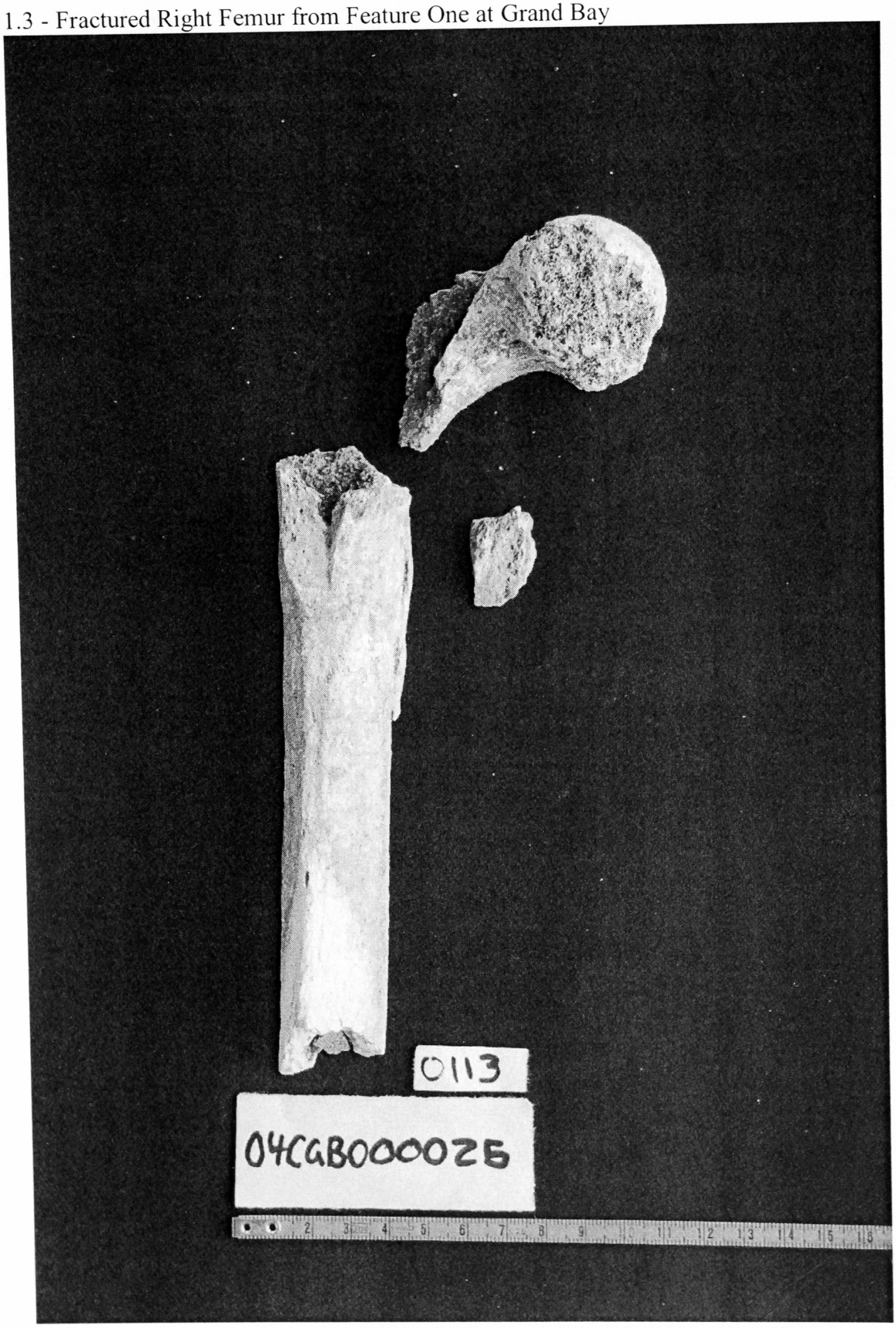


B. PHOTOGRAPHS

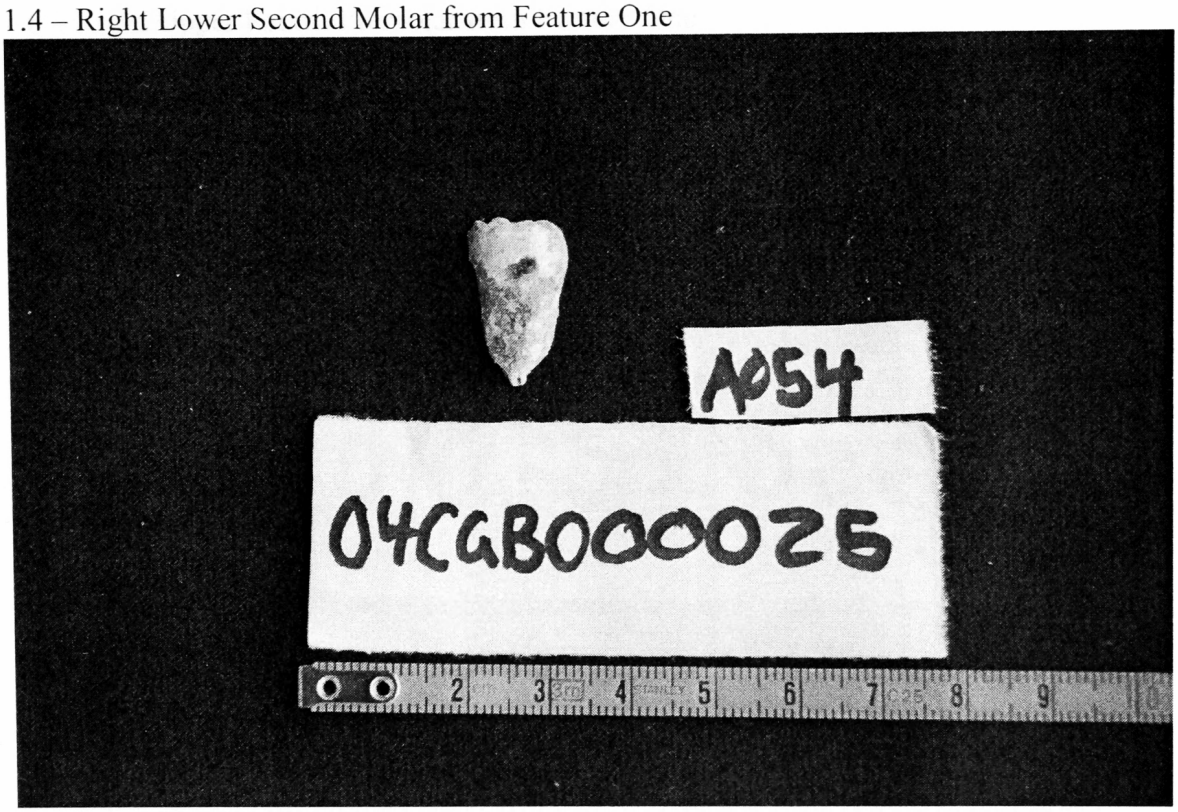
1.1 – Feature One at Grand Bay Unexcavated (© 2004 Claudia Kraan, w/permission)

1.2 – Feature One at Grand Bay Excavated (© 2004 Claudia Kraan, w/permission)

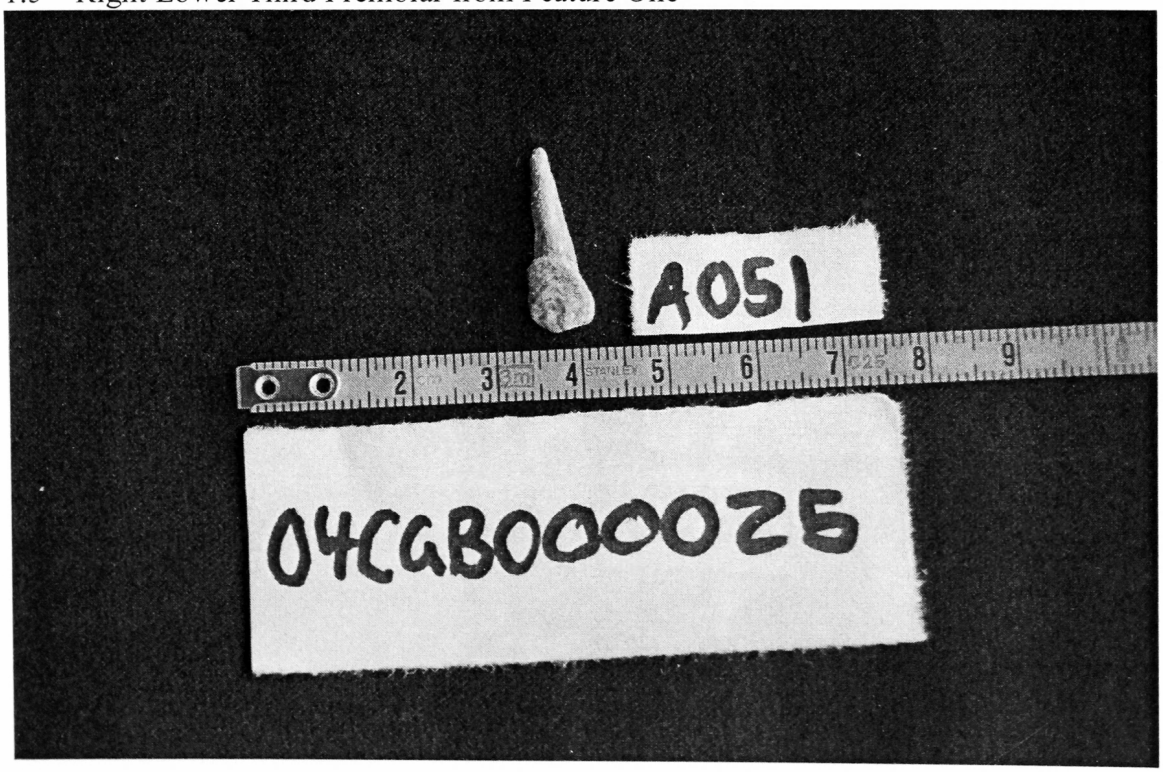
1.3 - Fractured Right Femur from Feature One at Grand Bay



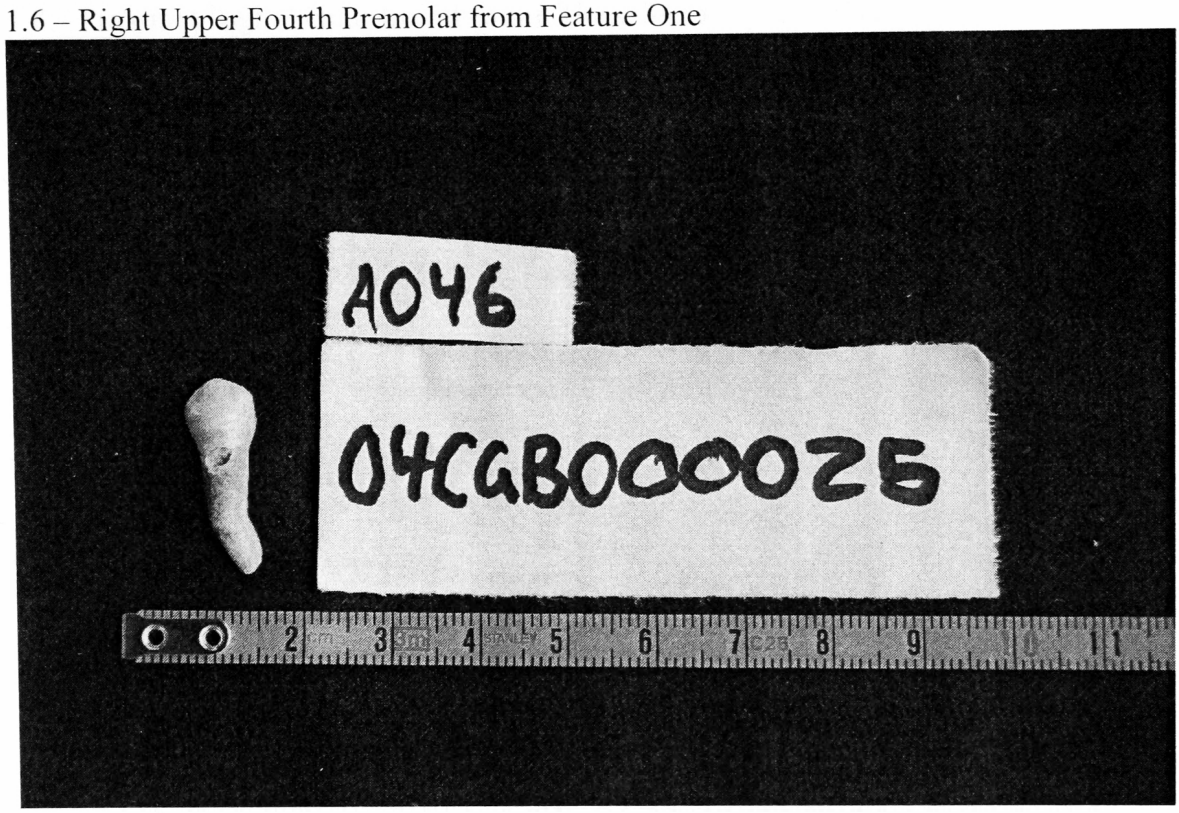
1.4 – Right Lower Second Molar from Feature One



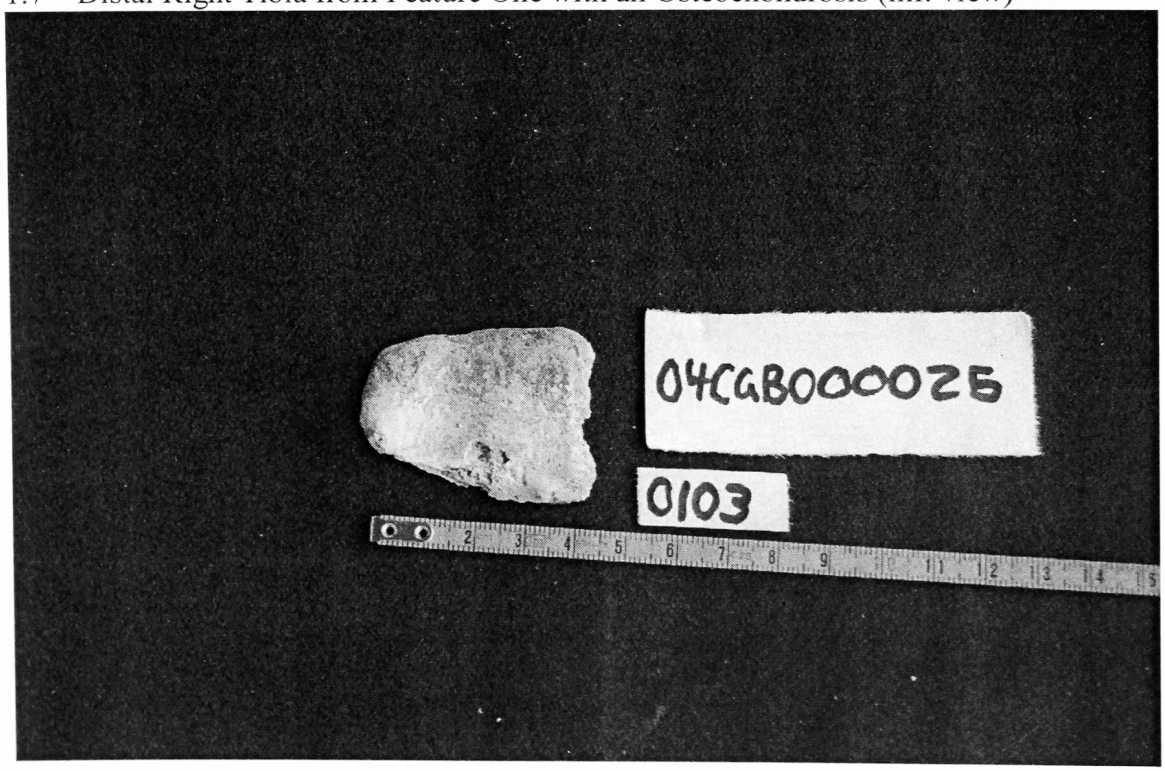
1.5 – Right Lower Third Premolar from Feature One



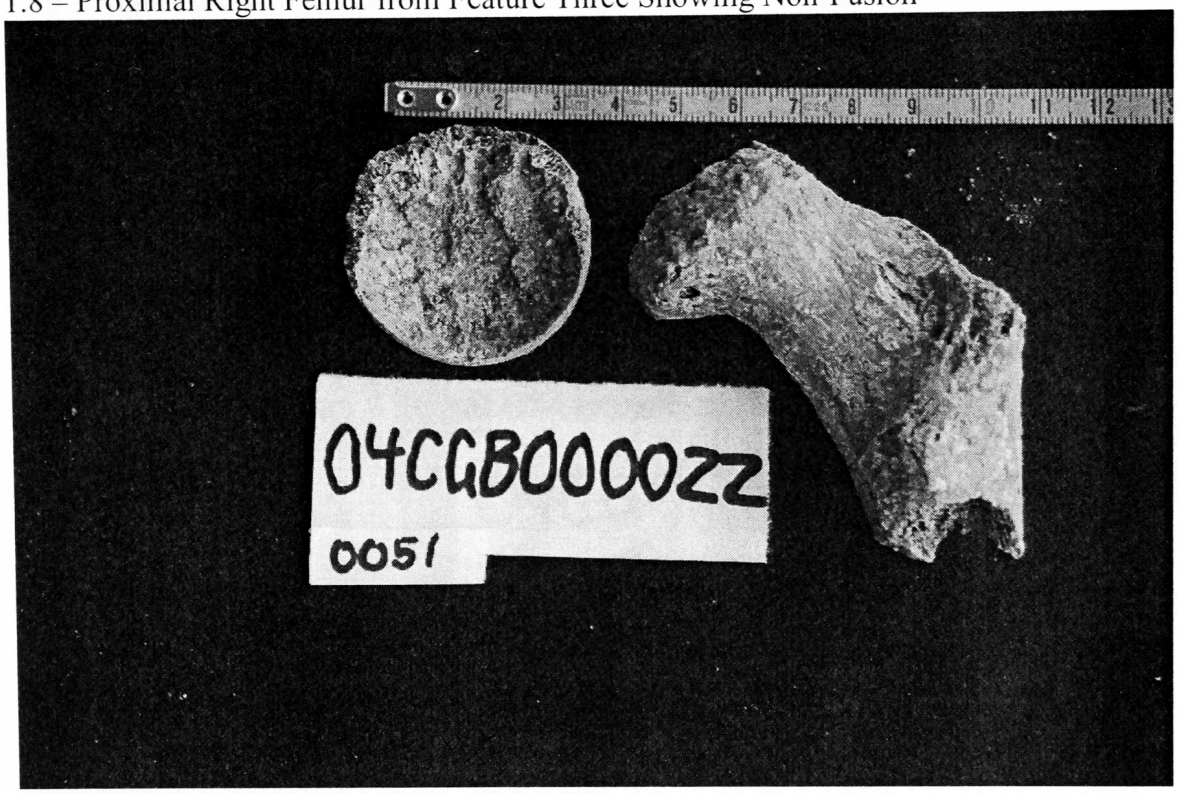
1.6 – Right Upper Fourth Premolar from Feature One



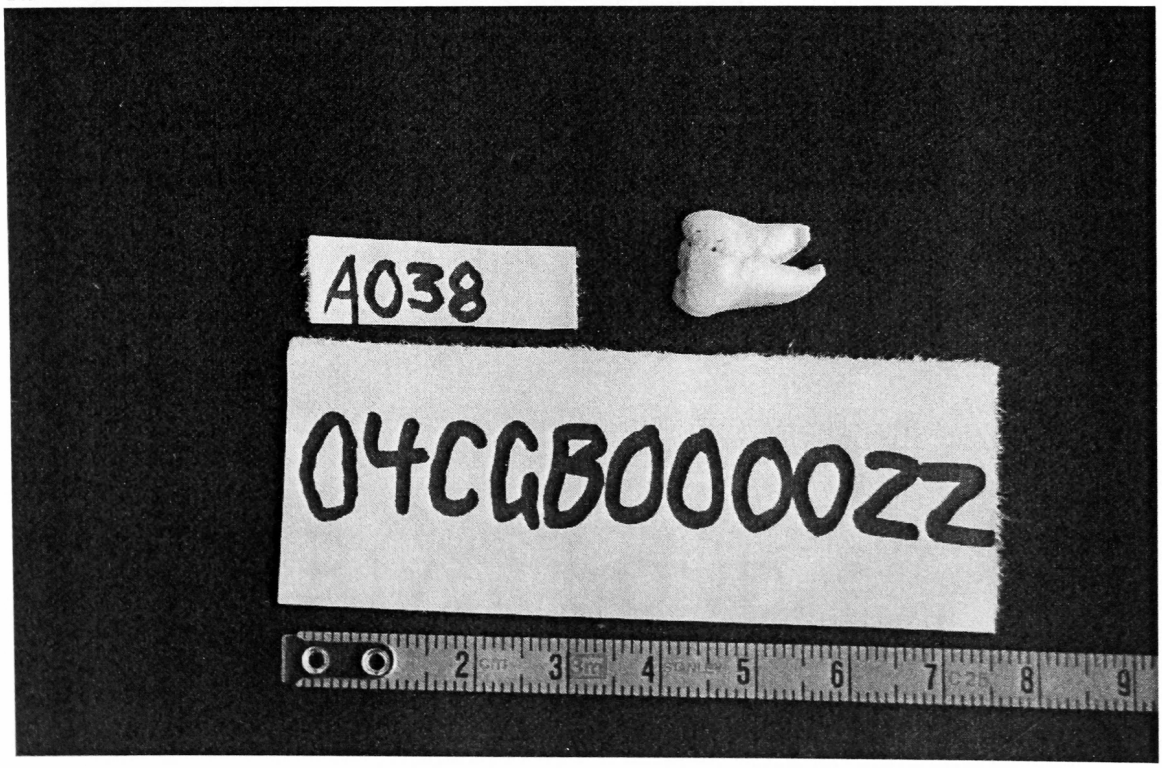
1.7 – Distal Right Tibia from Feature One with an Osteochondrosis (inf. view)



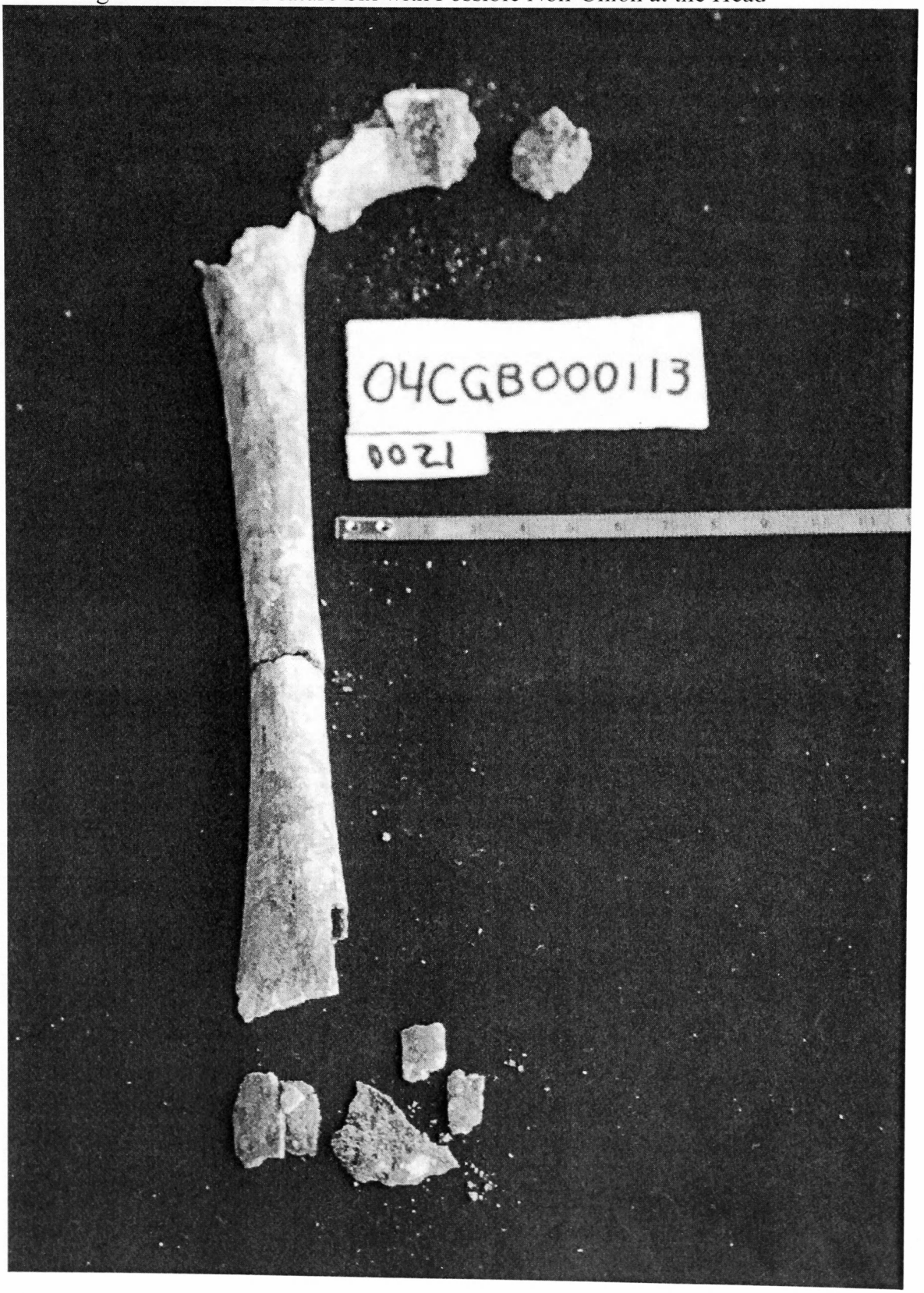
1.8 – Proximal Right Femur from Feature Three Showing Non-Fusion



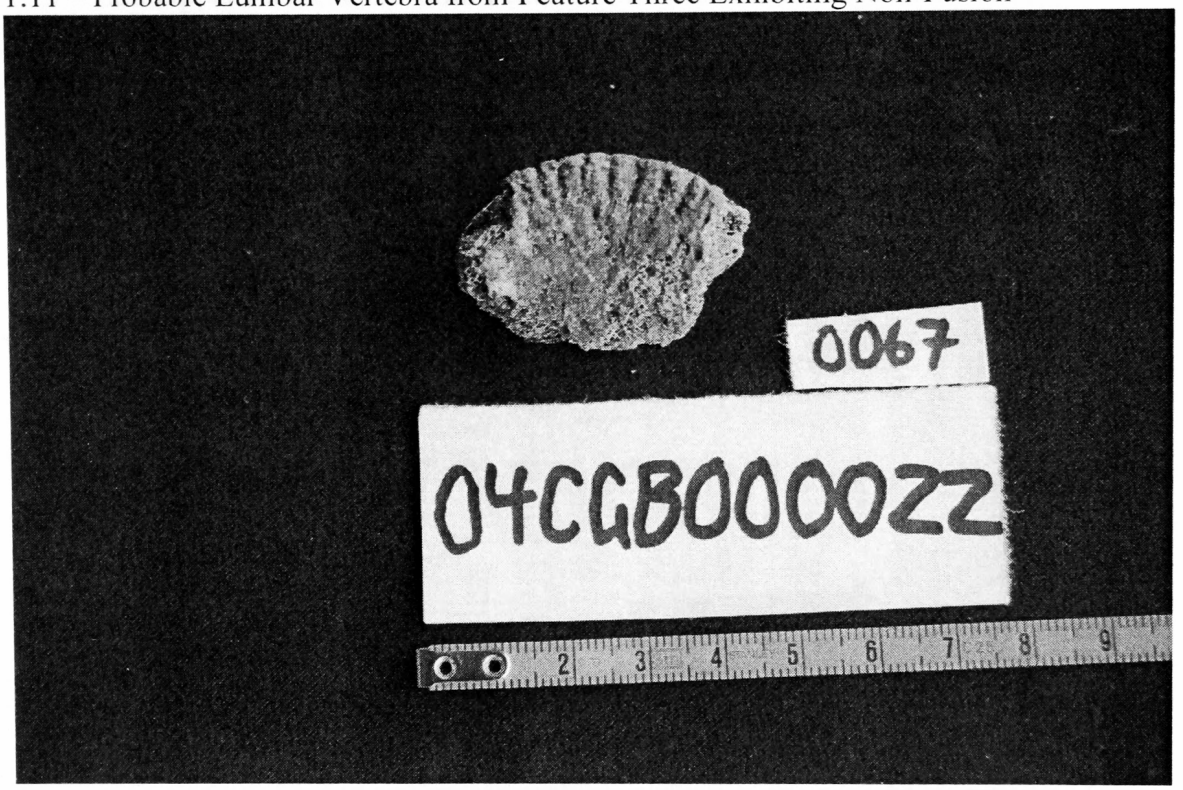
1.9 – Left Lower Third Molar from Feature Three



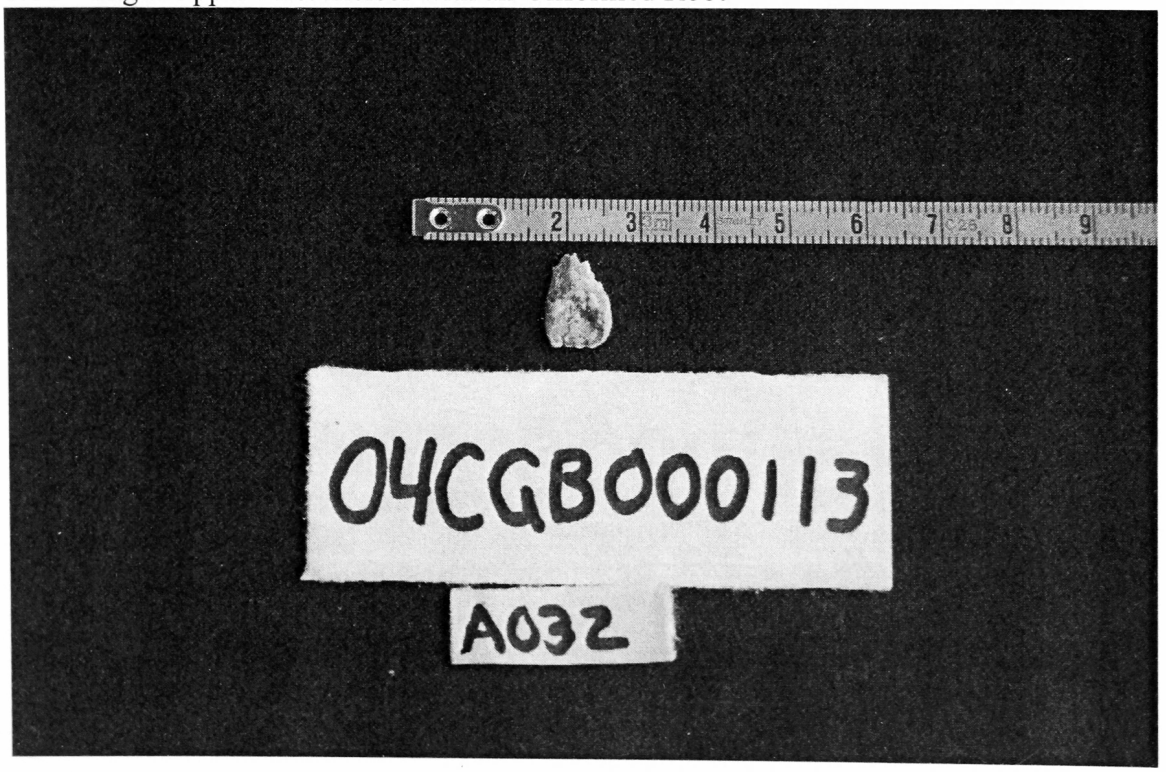
1.10 – Right Femur from Feature Six with Possible Non-Union at the Head



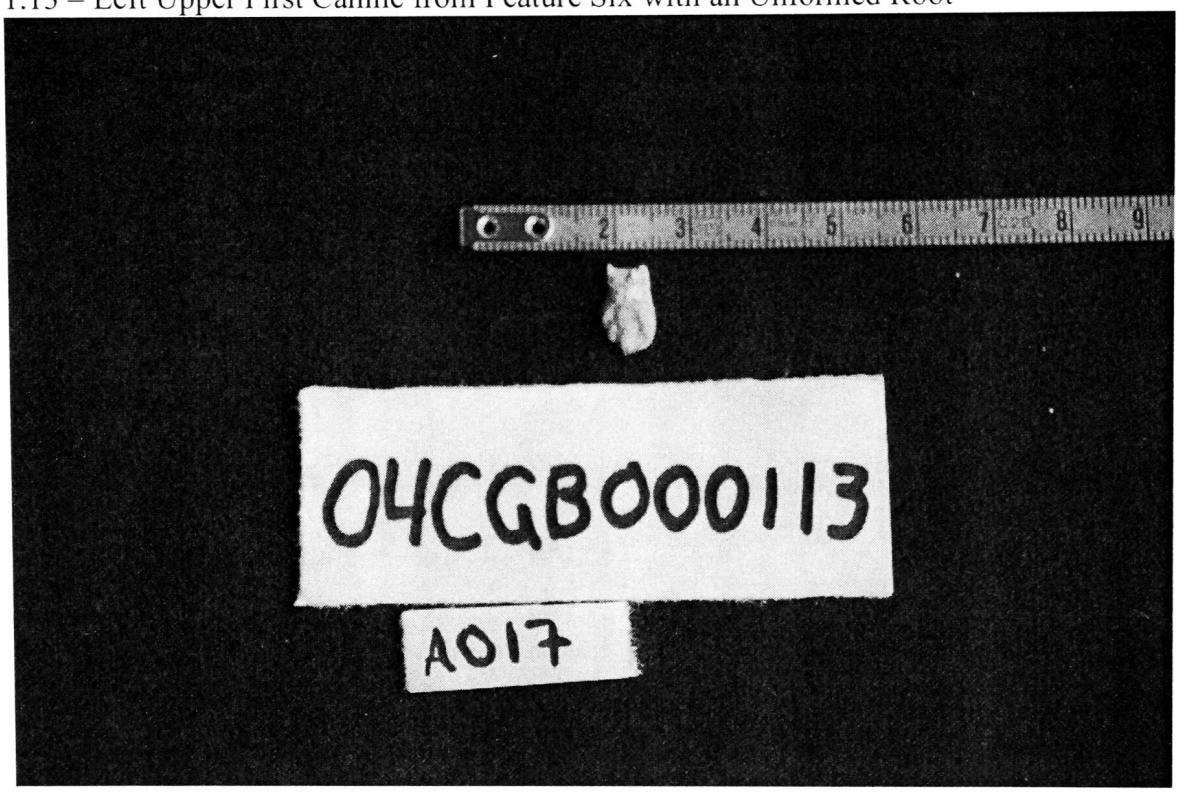
1.11 – Probable Lumbar Vertebra from Feature Three Exhibiting Non-Fusion



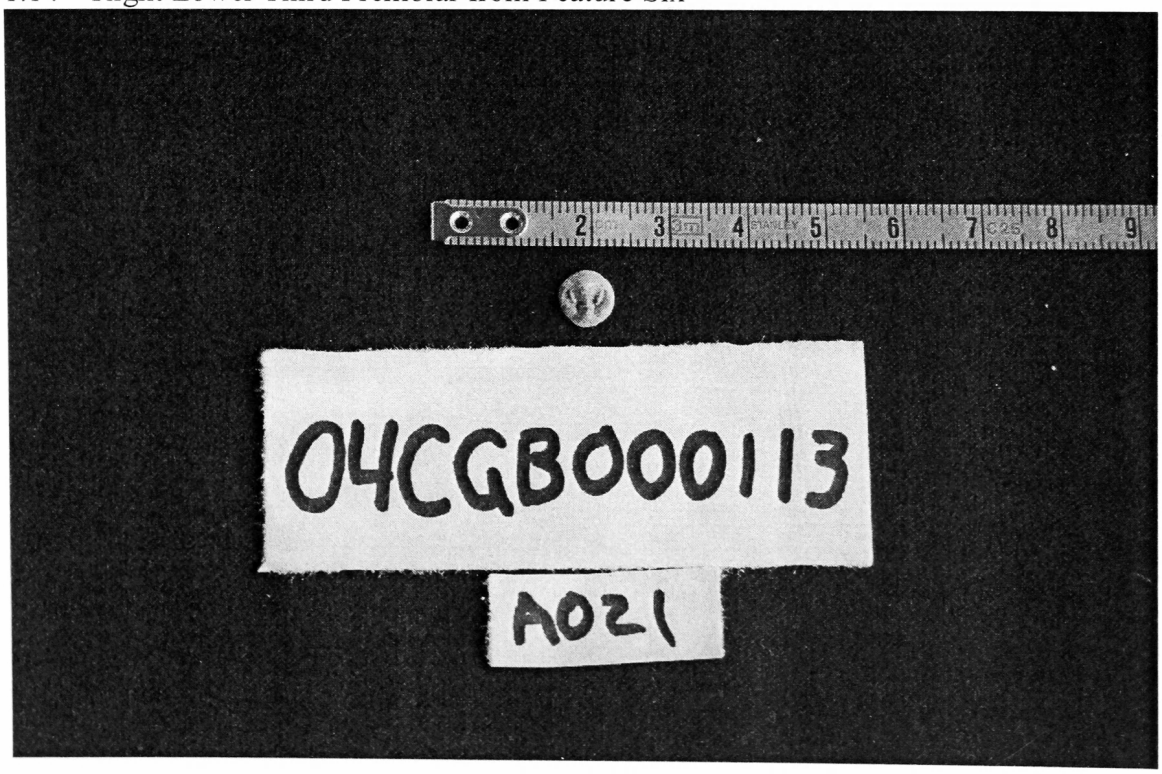
1.12 – Right Upper First Incisor with an Unformed Root



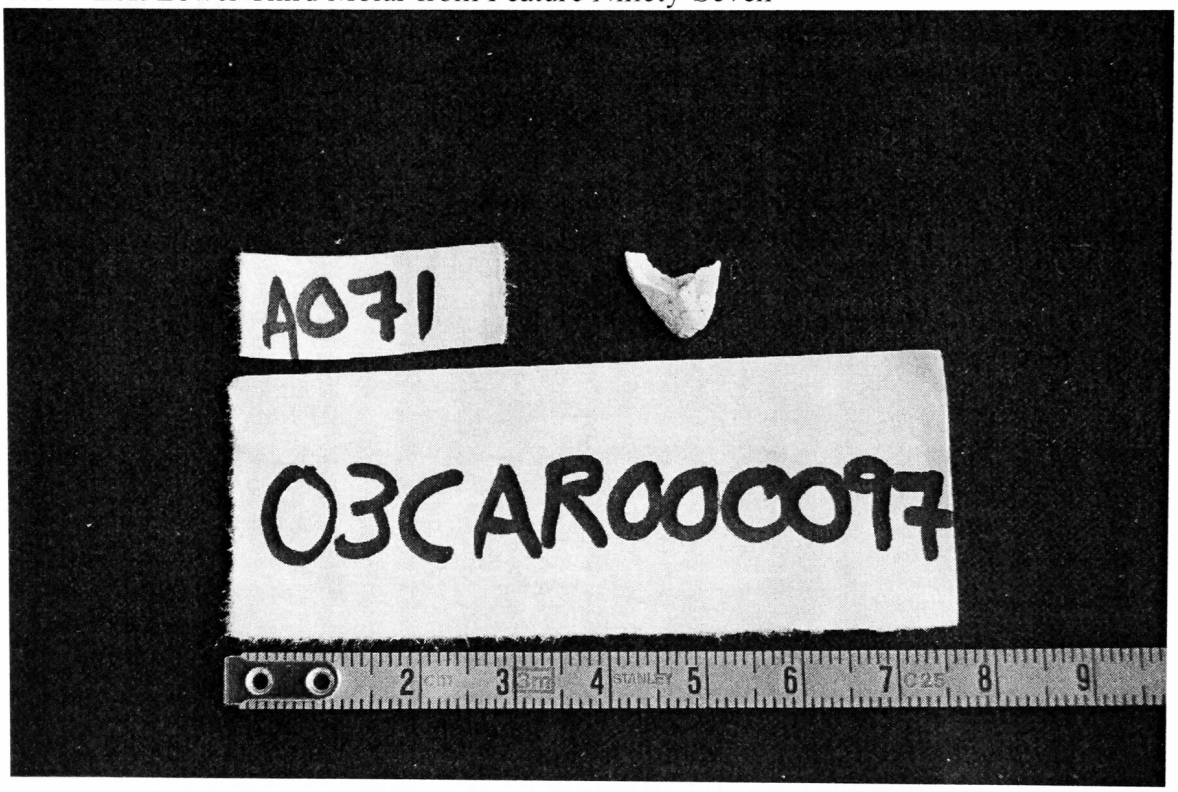
1.13 – Left Upper First Canine from Feature Six with an Unformed Root



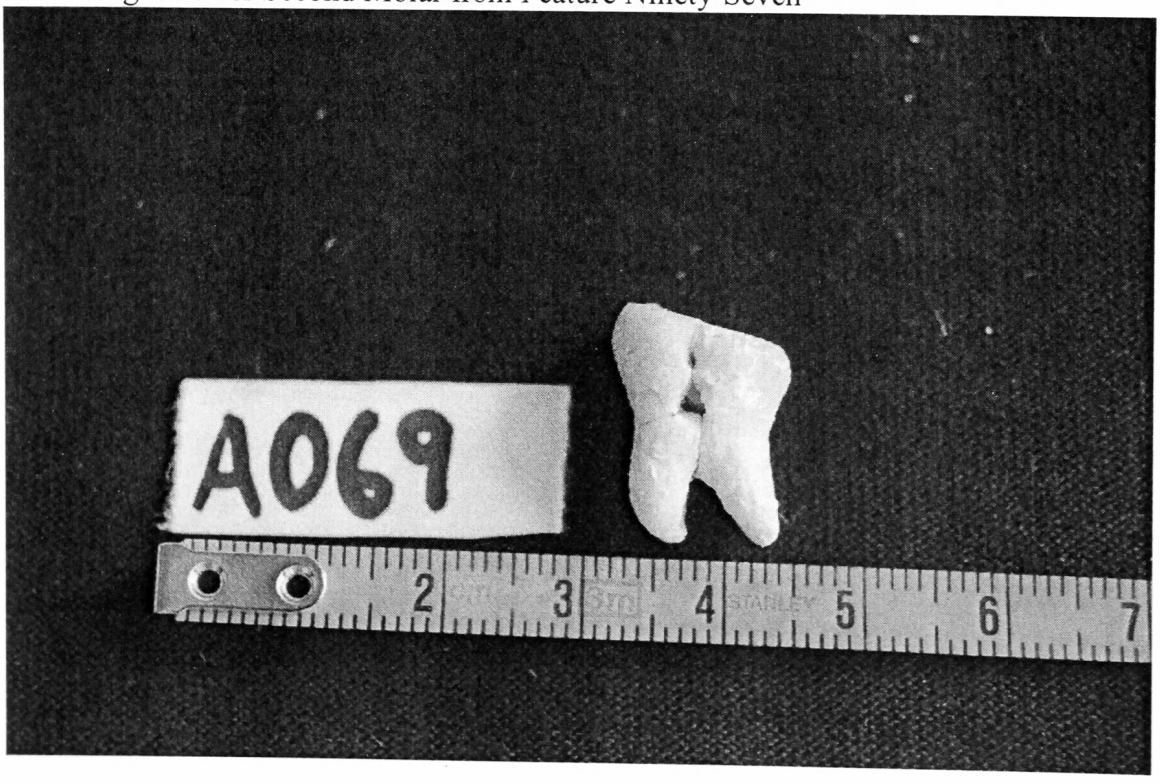
1.14 – Right Lower Third Premolar from Feature Six



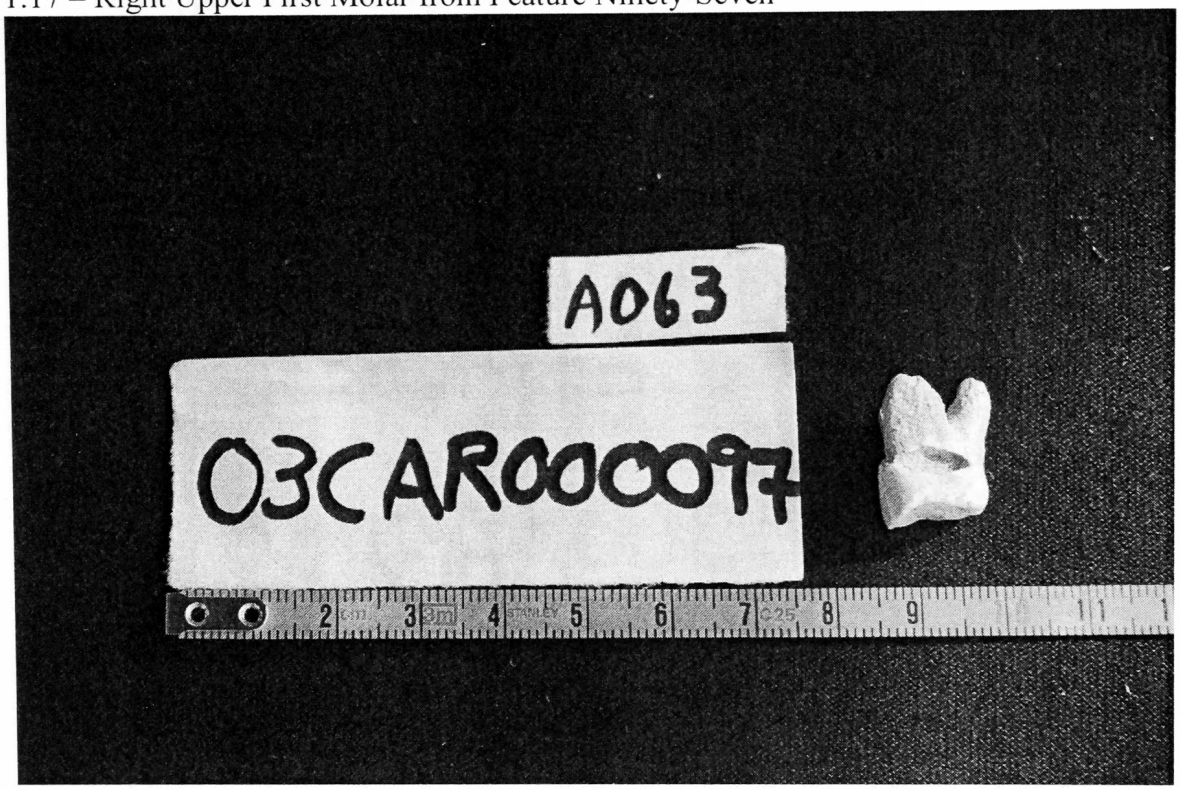
1.15 – Left Lower Third Molar from Feature Ninety-Seven



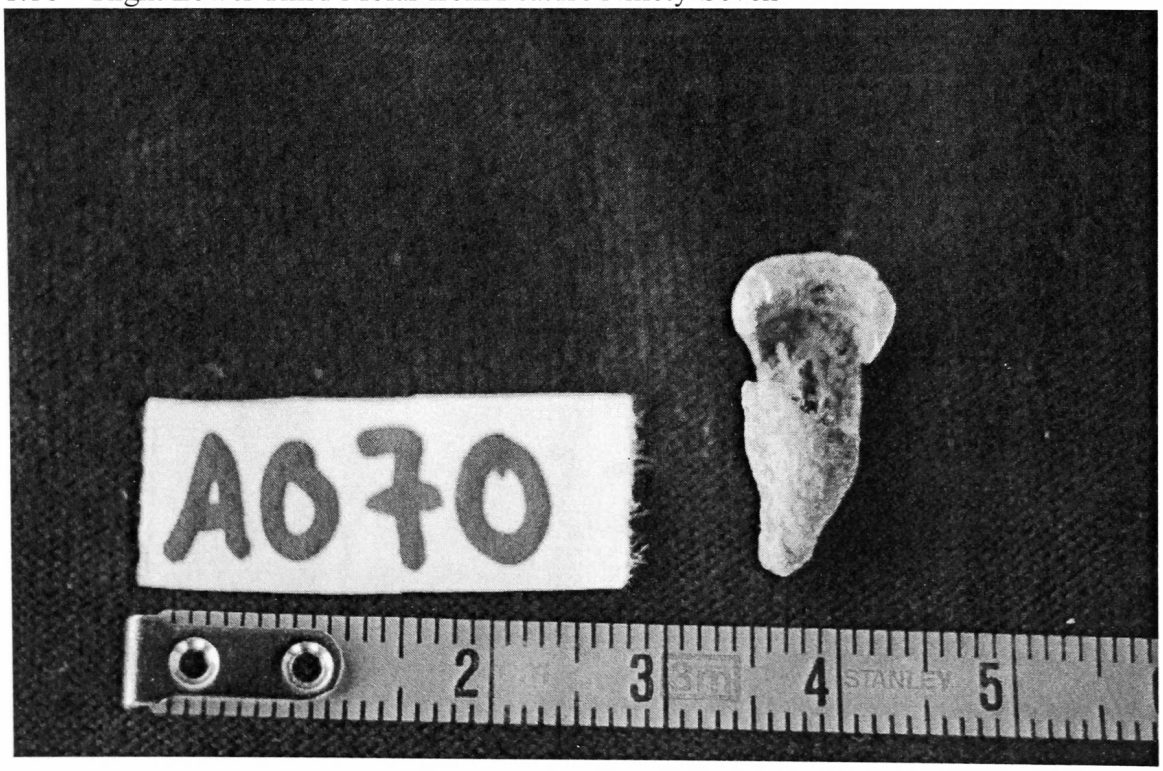
1.16 – Right Lower Second Molar from Feature Ninety-Seven



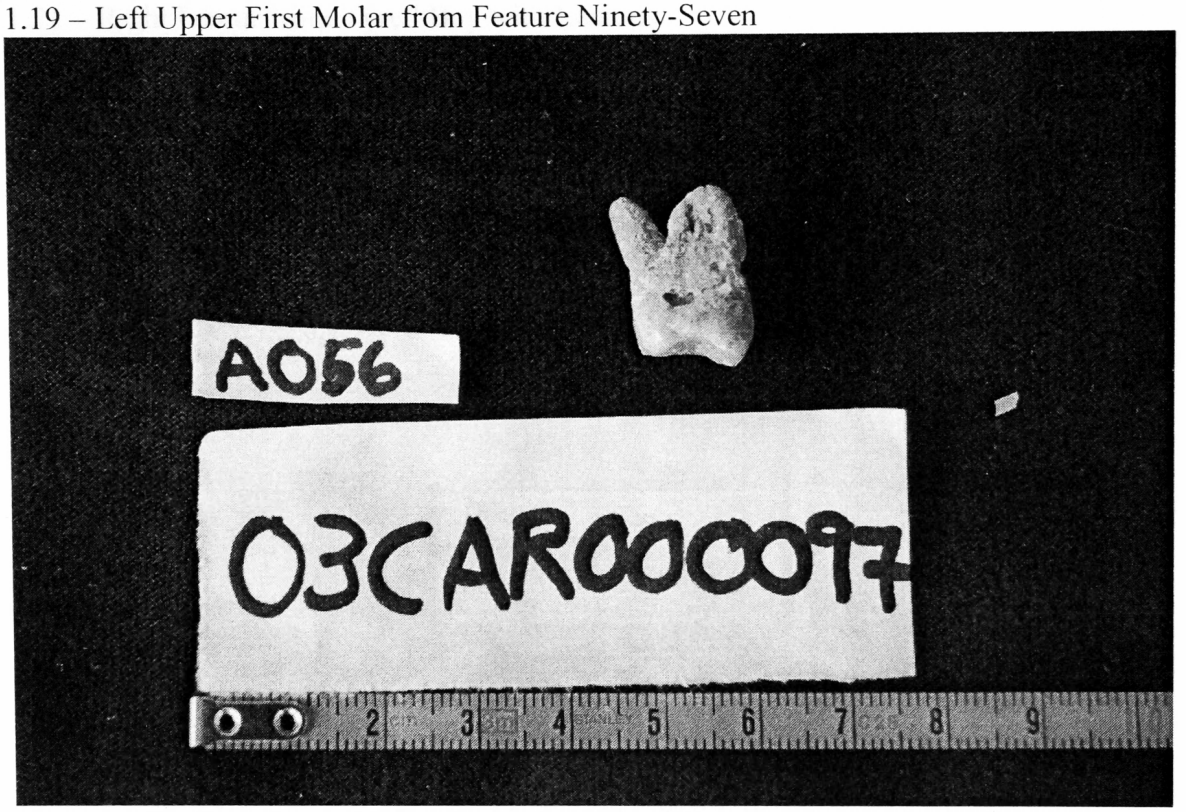
1.17 – Right Upper First Molar from Feature Ninety-Seven



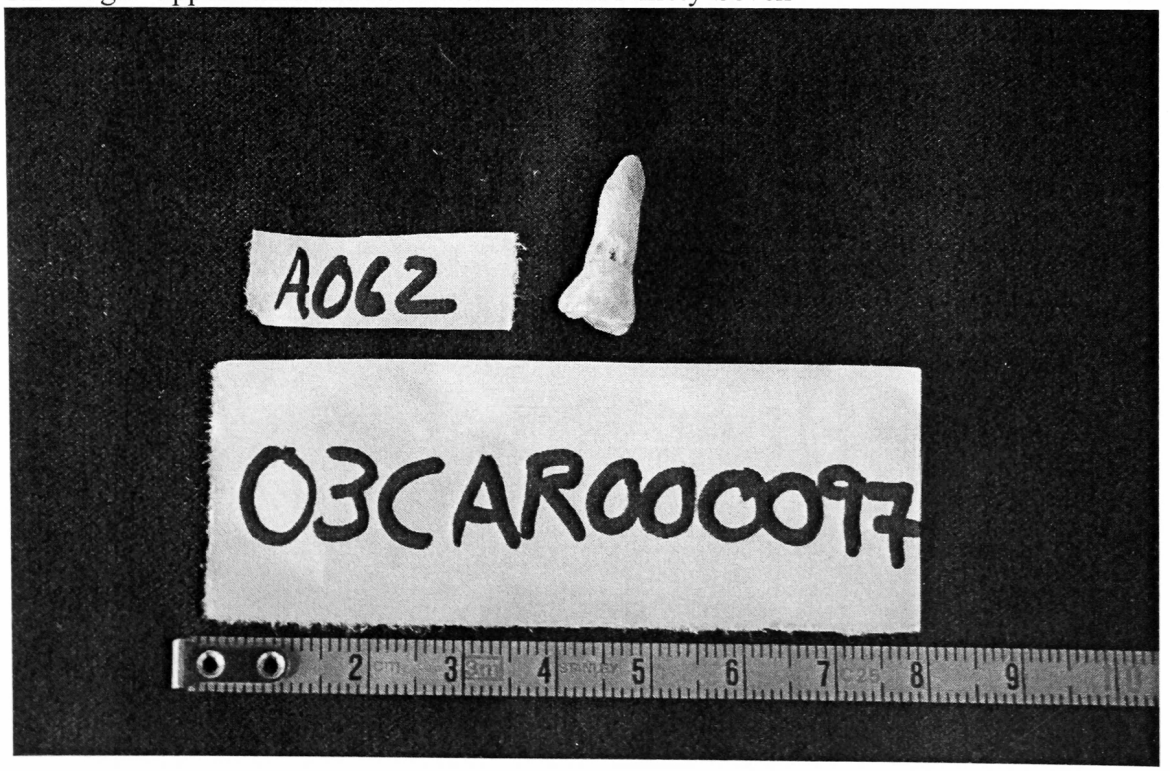
1.18 – Right Lower Third Molar from Feature Ninety-Seven



1.19 – Left Upper First Molar from Feature Ninety-Seven

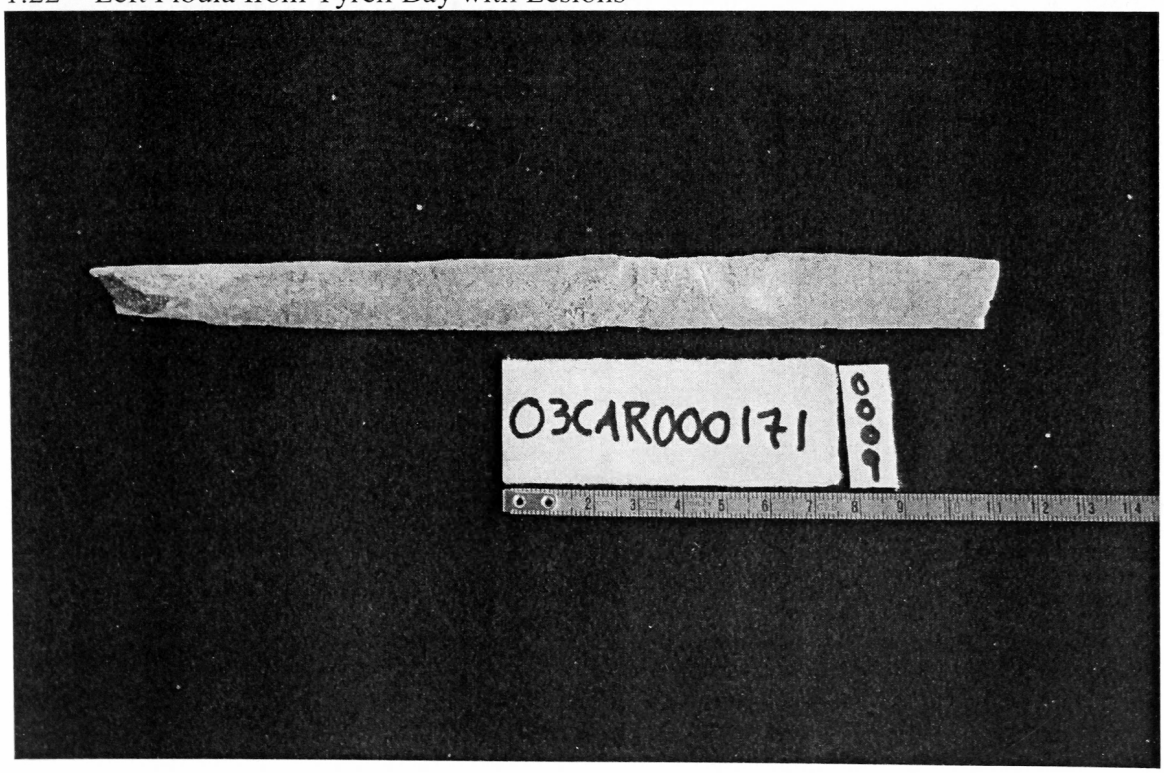


1.20 Right Upper Third Premolar from Feature Ninety-Seven

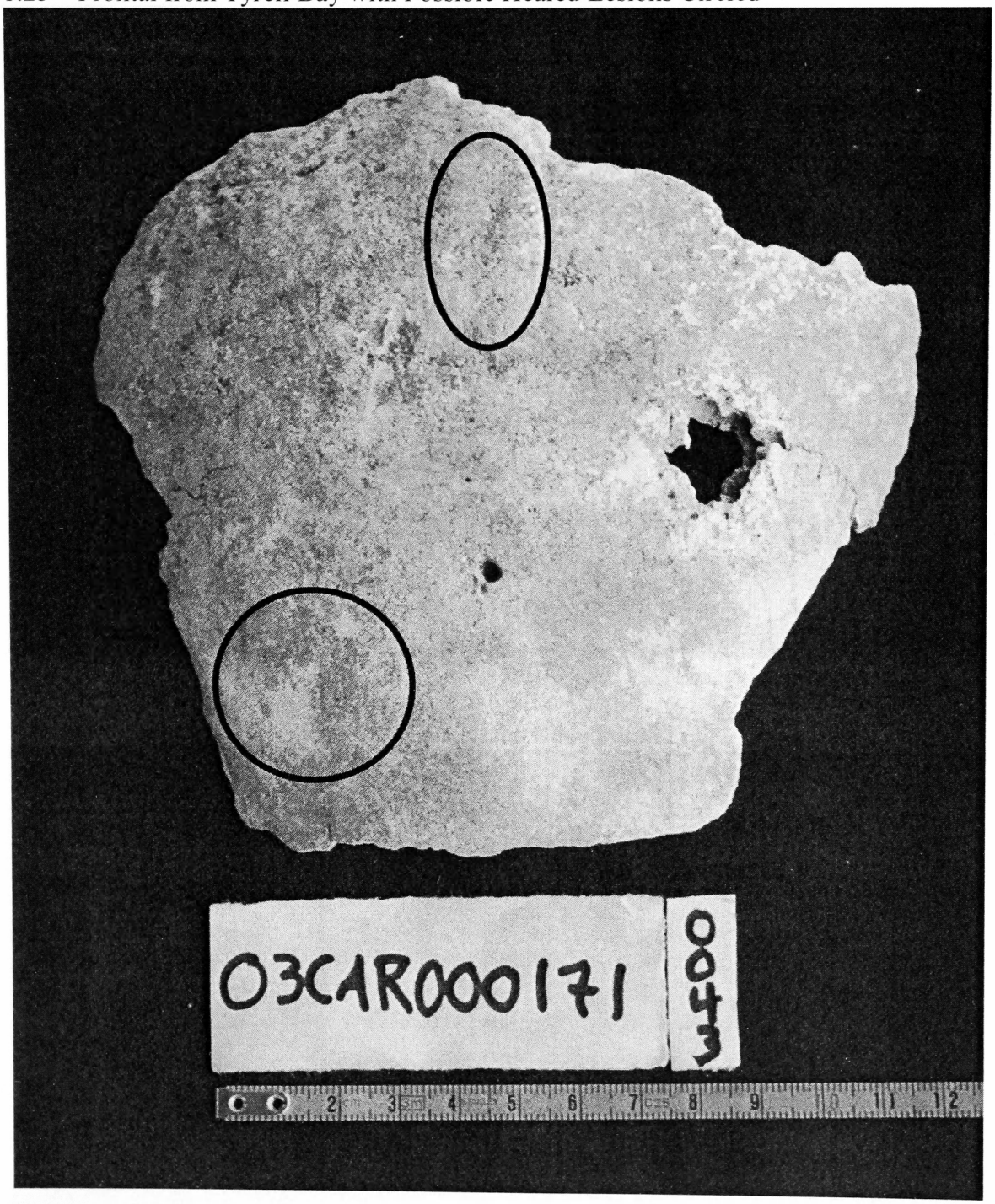


1.21 – Right Femur from Tyrell Bay with Lesions

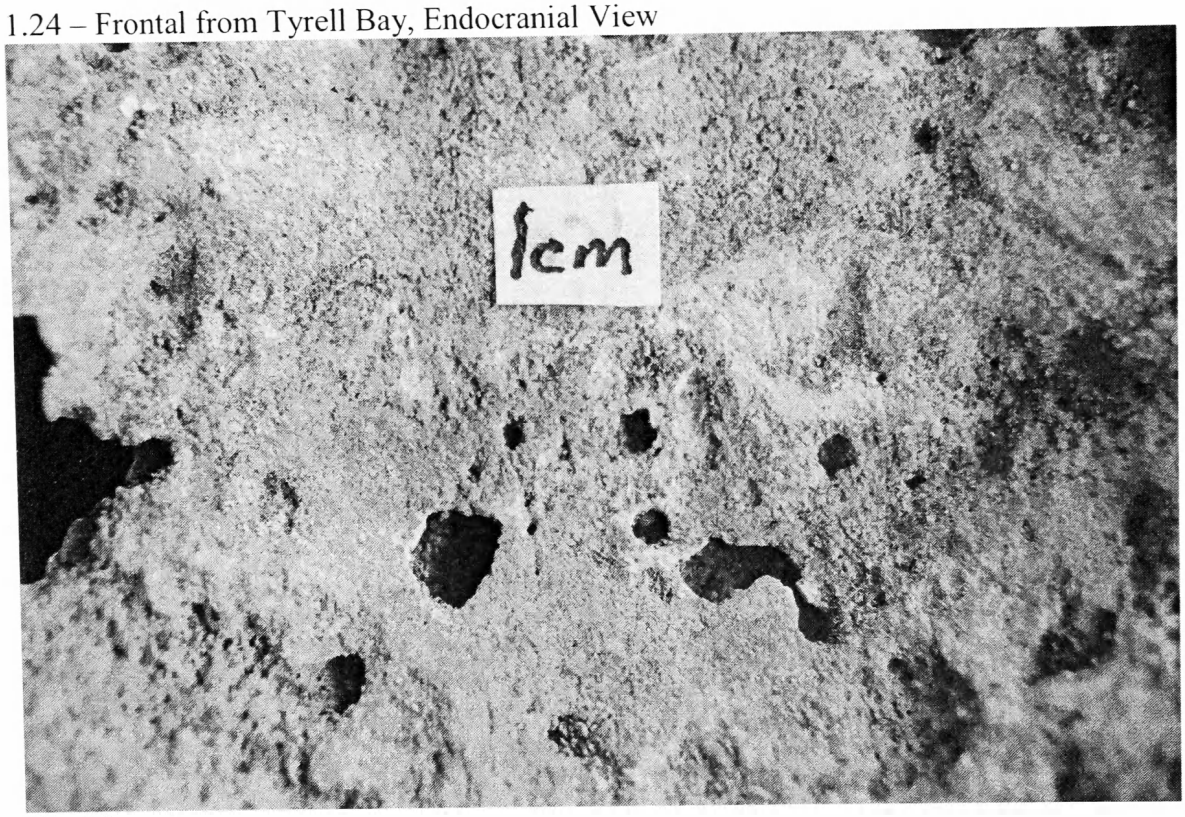
1.22 – Left Fibula from Tyrell Bay with Lesions



1.23 – Frontal from Tyrell Bay with Possible Healed Lesions Circled

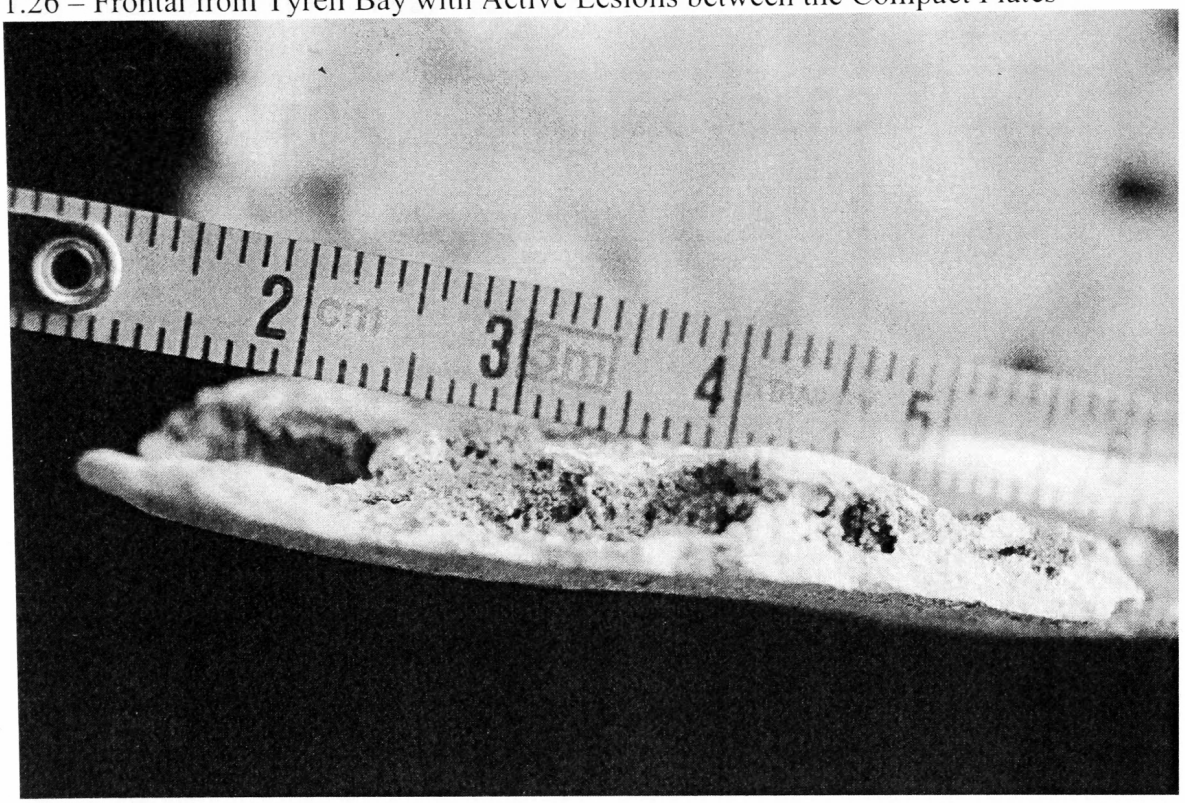


1.24 – Frontal from Tyrell Bay, Endocranial View

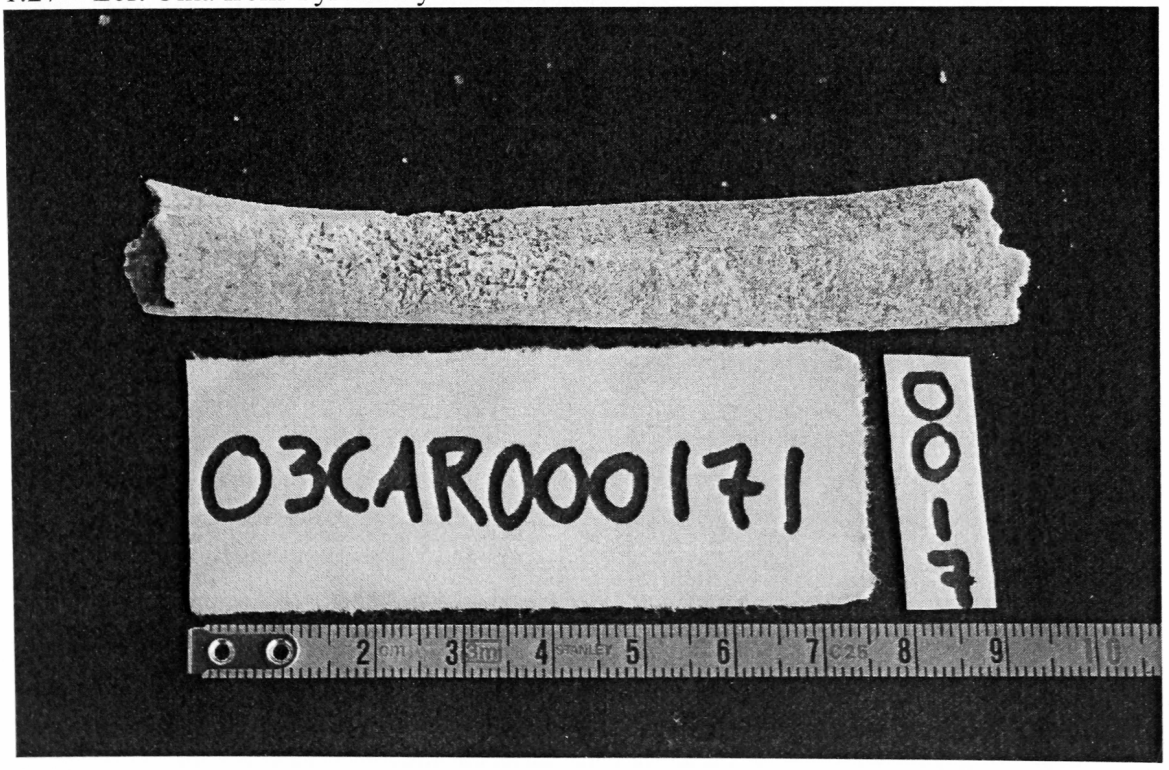


1.25 – Frontal from Tyrell Bay with Cancellous Bone Filled In

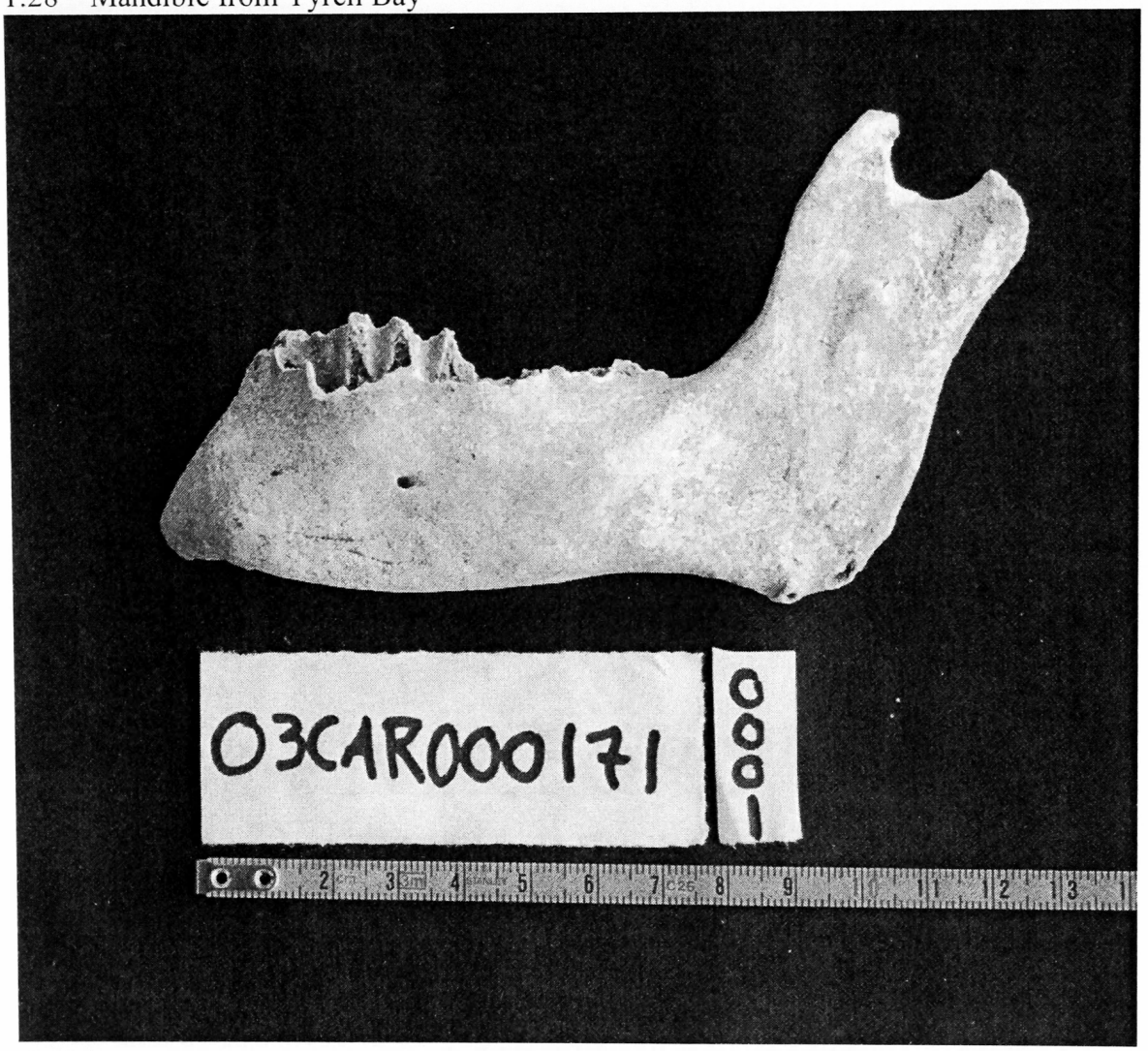
1.26 – Frontal from Tyrell Bay with Active Lesions between the Compact Plates



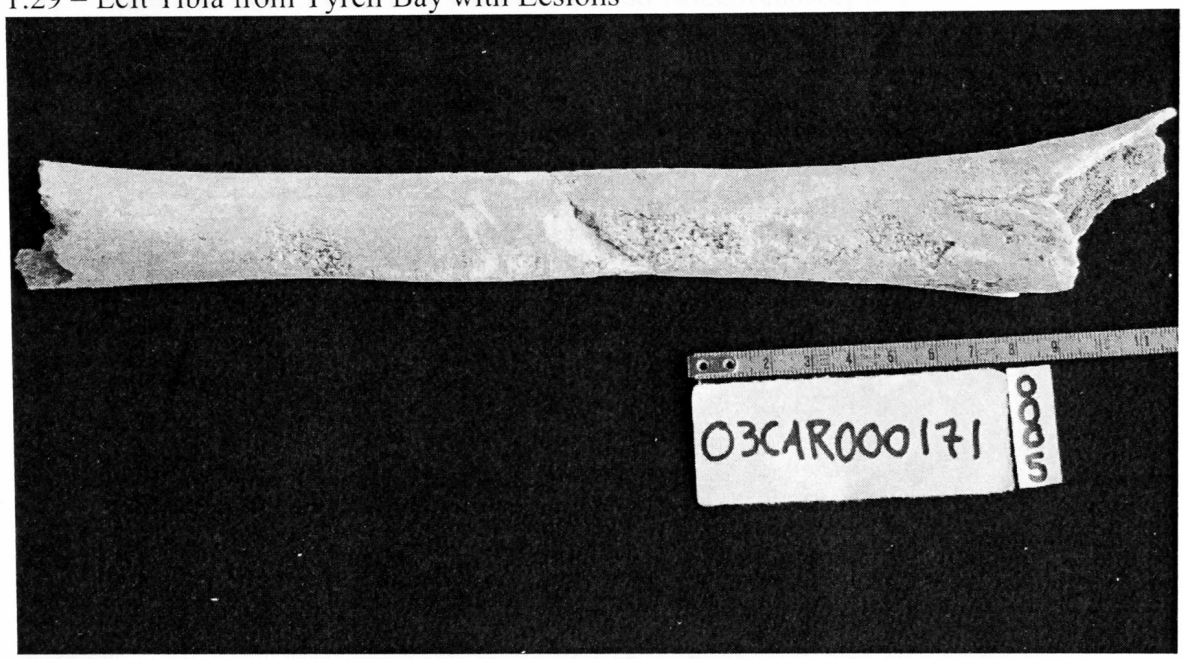
1.27 – Left Ulna from Tyrell Bay with Lesions



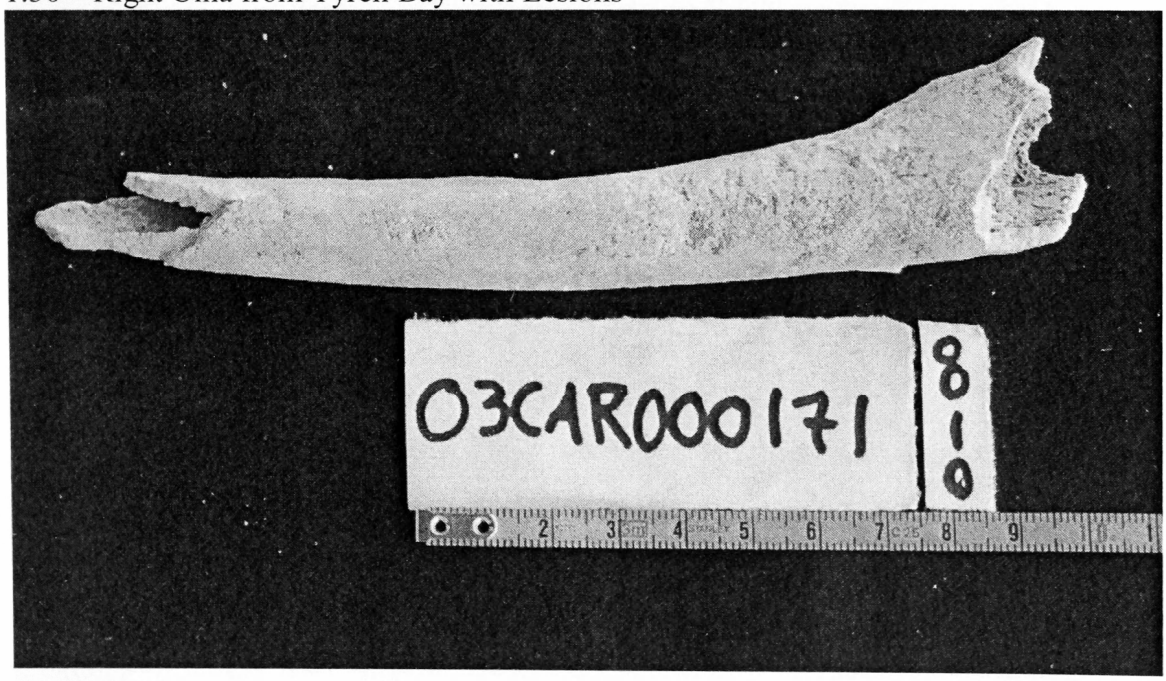
1.28 – Mandible from Tyrell Bay



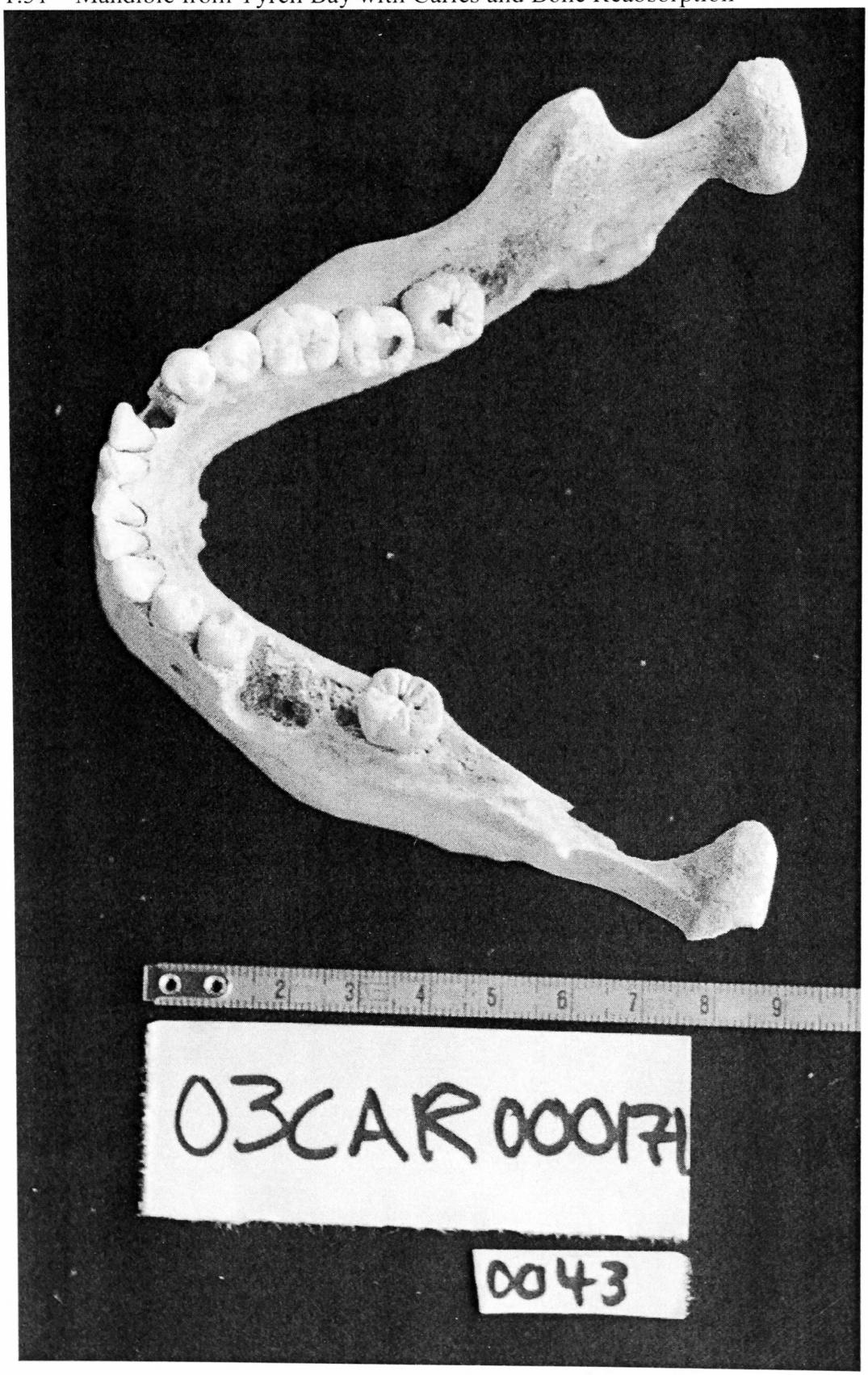
1.29 – Left Tibia from Tyrell Bay with Lesions



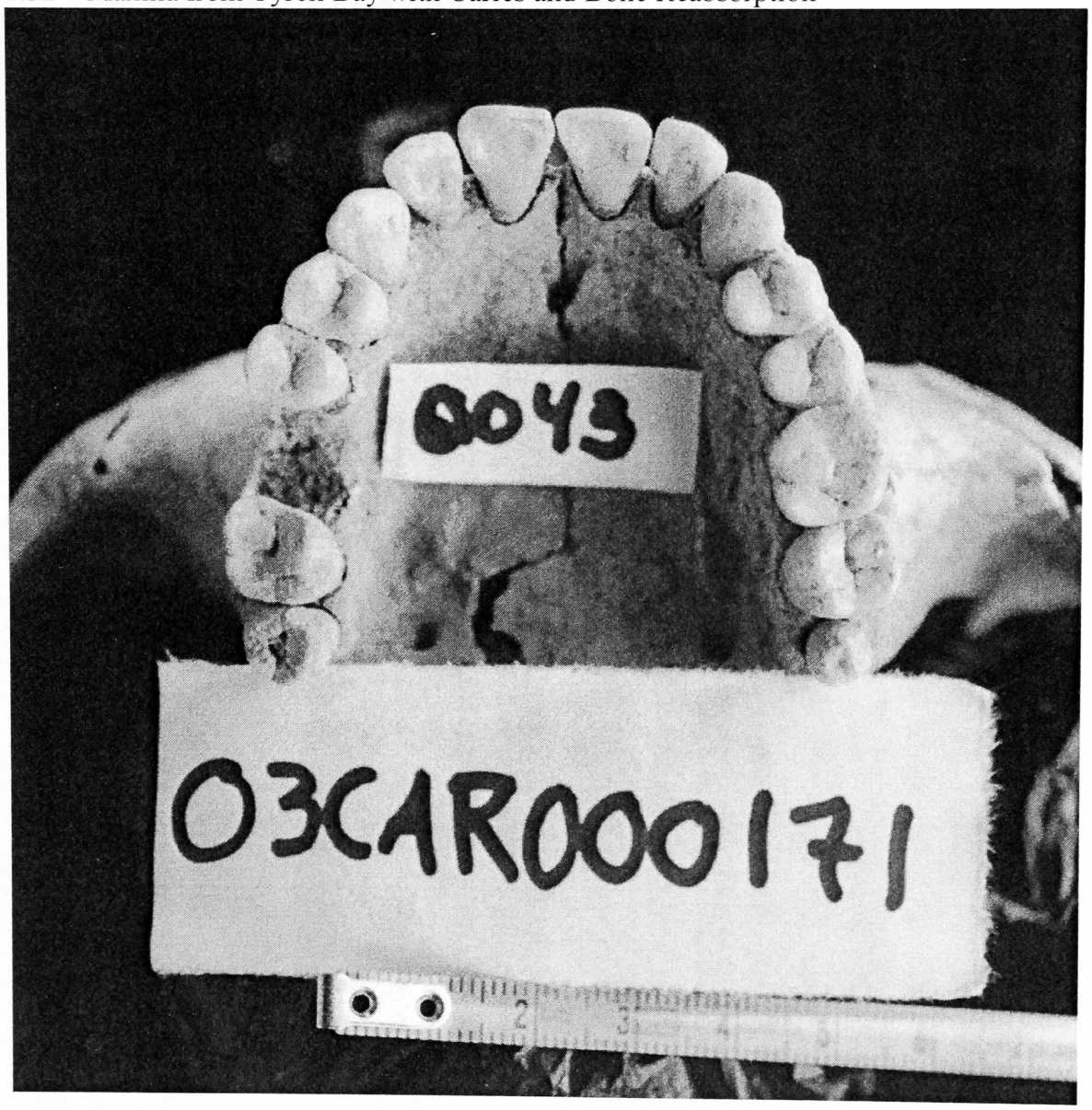
1.30 – Right Ulna from Tyrell Bay with Lesions



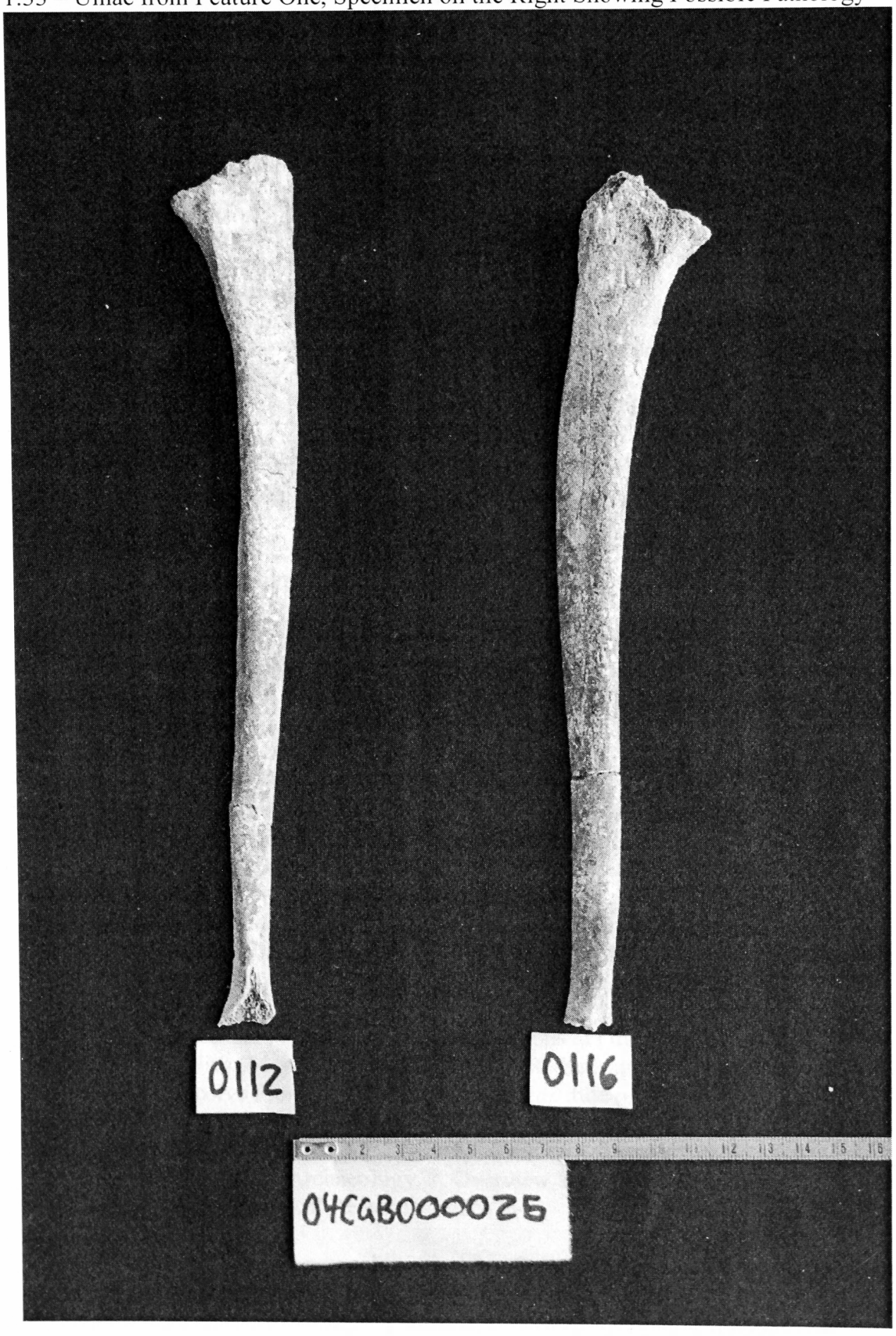
1.31 – Mandible from Tyrell Bay with Caries and Bone Reabsorption



1.32 – Maxilla from Tyrell Bay with Caries and Bone Reabsorption



1.33 – Ulnae from Feature One, Specimen on the Right Showing Possible Pathology



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IV. AFTERWARD

MY JOURNEY: SEARCHING FOR MEANING

I was lifting some free weights after my cardio workout and began to think about the motivations behind my actions recently. I'm about one day away from finishing my thesis and I seem to have come down with a horrible case of writers block. I began searching under the surface of this block, looking for the root. It brought back memories of my recent past. I remembered the infinite sadness I felt during my extended depression. I saw the helplessness behind my wife's eyes as she struggled desperately to care for me. I heard the echo of my pain again - the echo that had drowned me in sorrow and blocked out the noise of the world with its monotonous squeal. Like banshees howling a shrieking chorus in the night - a strident wail that stabs at my heart to this day. Looking past the echo was the silence that births all things within us. Silence, the mother of who we are; the root. What mother gave birth to this newest struggle within me? I looked in her eyes and saw my identity as a failure. She had come back to me, but I would not suffer the burden of her presence long. Once, she beckoned me as the Reaper and I obediently followed. But I have cast off that yoke. I bear her burden no longer...or so I hope.

It is a silent and oblivious thing, the fall. Far more terrifying is to open your eyes and realize it. But my eyes were open, and I gazed into those of my mother. I denied her industry with quiet acknowledgement and began to understand these past few days as a reassessment of my worth as a human being. For so long I was that boy who never quite

cut it. I was the student who had intelligence, but was never considered good enough to go on. I was the white male who would never get a job, even if he *did* get that degree. I spent a majority of my life deriving a strong identity through my failures. I let them dictate who I became until one day I realized that I was actually going to succeed. And then like a falling glass meeting the tile floor, my identity shattered. The silence was broken, and for me there was no existence. I had died in every sense but of the body; for what is a person with no ego at all? Utterly broken, destroyed, obliterated, I sulked through life like an apparition searching for impossible justice. A hoodwinked fool, I tried desperately to put the pieces of my glass back together. To no avail I merely cut my hands and bled. Every day I bled. Every day I cursed and rued and hated the glass for cutting me. Every day, that is, until I realized that I could never be that person again. I couldn't hold the glass of a failure because I had succeeded. Blaming the glass for cutting me was like blaming the wind for blowing. Then I removed my blindfold and wandered. I searched many days until to my surprise I found my glass right in front of me. And as I saw it - at that precise moment - I came to understand that the glass was just a glass. I would always have one, and whatever I was trying to make it into, it could only ever be a glass. So I tired of the glass and dropped it onto the tile floor. I myself did not shatter this time. Only the glass had broken. And then I was whole again; and then I was saved.

Maybe I'll always need a glass. Maybe always having one is part of being human. Through my struggle I came to understand that the glass itself is not important. When it breaks I'll always have a new one. And so today I took my mother and smote her ruin upon the tile floor. She may return someday, but I'll never be bound to her fate again.