RESEARCH REPORT

Grant 8501-08

"Emergency excavation and protection of pre-Columbian sites, Pearl island archipelago, Panama"

Submitted to the National Geographic Society by

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(based on field and laboratory data provided by: Juan Martín; Máximo Jiménez; Ilean Isaza; Ana Celis; Saraí Borreiro; Diana Carvajal; Janine Pliska; Thomas Wake; Carlos Mayo; Irene Holst; Fernando Bustamante; Eugenia Mellado; Alexandra Lara; Yahaira Núñez; Maria Eugenia Sáenz)

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30th. June, 2009

ABSTRACT

In 2006 Panama's National Secretariat for Science, Technology and Innovation awarded me funds for an archaeological survey on the Pearl Islands focusing on islands scheduled for tourist development. I proposed to use new data on the antiquity, distribution and contents of pre-Columbian sites to induce developers and Panamanian agencies to assign a higher priority to archaeological resources. Some developers had already ignored Panamanian laws, adducing that shells and potsherds were not "valuable" resources. Using "purposive" survey techniques, my research team located over 100 pre-Columbian sites on ten islands, estimated their sizes, and excavated sub-surface cuts. Three decorated pottery complexes suggested occupation between 200 calibrated years BCE and Spanish conquest (1515 CE). The most widespread pottery complex is the *Cubitá* style of the *Gran Coclé* tradition (~500-750 CE). This alludes to regular contact with mainland communities around Panama Bay. A much earlier (~3900-3600 BCE) Preceramic occupation was identified alongside Don Bernardo Beach (Pedro González Island). Vertebrate archaeofaunas from this site included many bones of terrestrial taxa that are no longer present here (e.g. a dwarf deer, opossum, a monkey and a mud turtle) suggesting that seafaring colonists impacted a pristine island fauna. Abundant and taxonomically diverse fish remains point to fishing around reefs and rocky promontories probably using nets in which dolphins were occasionally enmeshed. National Geographic funds allowed the team to complete the excavation of the first human burial recorded on the archipelago, seal test pits, and continue the excavation and analysis of faunal materials from the unique Preceramic site.

Since 2006 I have been engaged in archaeological research in the Pearl Islands located 50-90 km off the Pacific coast of Panama (Figure 1, right). Their natural beauty has attracted developers since the 1970s. Several pre-Columbian sites were recently damaged on Viveros Island (Figure 2) in violation of Panamanian laws, which require construction projects to finance archaeological surveys and salvage excavations. In 2006, knowing that other development projects were imminent, I requested funds from Panama's National Secretariat for Science, Technology and Innovation (SENACYT) for a preliminary assessment of pre-Columbian sites. No serious field archaeology had been undertaken in the islands since the 1920s when Linné (1929) recorded sites on five islands. I wanted to publicize the ubiquity and importance of archaeological resources in order to foresee and mitigate future impacts. From an academic point of view, new research would not only fill in large gaps in our knowledge of the history of Panama's native peoples, but also provide information about island landscapes, flora and fauna before the Spanish arrived. Archaeologists have documented how pre-European colonists induced landscape deterioration and the loss of animal species on oceanic and land-bridge islands across the globe (e.g., Anderton, 2002; Mann *et al.,* 2008; Morgan & Woods, 1986; Steadman, 2006). It is to be expected that pre-Columbian activities caused similar impacts on the Pearl Islands.

Figure 2

The many Pearl islands vary in size from rocky stacks to Isla del Rey (~250 sq km). Spanish documents written at contact (1515-1525 CE) indicate that this island was well populated. Its chieftain would attack mainland communities with flotillas of canoes. His power was probably related to control of the pearl fisheries: pearls and mother-of-pearl were important exchange products in pre-Columbian Panama (Cooke & Sánchez, 2004a,b; Mártir, 1965; Mayo & Cooke, 2005). Spanish mistreatment of the

native islanders, however, led to immediate depopulation. African slaves were brought in to dive for pearls. Most modern islanders are of African descent.

My research team focused on islands that either had modern settlements or were scheduled for tourist development. We located nearly 100 sites on ten islands (underlined in Figure 2). On Pedro González Island we discovered a Preceramic site dated to ~3900-3600 calendar years BCE – the first of its kind to be identified on Central American islands. All other Pearl Island sites contained pottery belonging to the last 2000 years of the pre-Columbian era. Vertebrate faunal samples found in shell-bearing middens included some terrestrial species that are no longer present on the archipelago or on individual islands, including a very small deer. This drew attention to the utility of archaeofaunas for reconstructing past biodiversity and relating it to past human activities.

By April, 2008 (the onset of the annual rains) SENACYT funds were exhausted, but small test excavations remained open at the Preceramic site on Pedro González and three ceramic sites on Casaya Island, one of which had produced the first human burial from the archipelago. Therefore we requested emergency funds from the National Geographic Society for completing these excavations and sealing the test pits.

Our surveys on the archipelago were rapid and "purposive". They focused on the largest and/or most visible sites. Many of these were shown to us by islanders who had spotted shell heaps with pottery or grinding stones when working in their fields. Several inter-tidal traps were recorded (Figure 3). These ubiquitous stone artifacts are presumed to pre-Columbian. Island residents do not retain a tradition of using them. A rehabilitated "corral" on Saboga Island is used today to trap fish.

Figure 3: Stone intertidal trap, Pedro González Island. (Photo: G. Saint-Malo)

All localities with evidence for past human activities were located with a hand-held and/or precision GPS. Topographic information was recorded in a GIS format under the supervision of Carlos Mayo. Continuing analysis suggests that many "sites" were probably single dwellings or clusters of dwellings.

Three pottery complexes have been identified. On Casaya Island we are finding evidence for a group of painted and incised sherds akin to the *La Mula* complex from Coclé and the Azuero Peninsula (200 BCE - 250 CE (Cooke *et al.,* 2000) (Figure 4). Materials from the Taboguilla-1 site (Stirling & Stirling, 1964) probably fall into the same temporal and stylistic category.

Figure 4: Painted and incised sherds from the earliest pottery horizon (ICA-3)

Figure 5: Rim sherds of the "Ciruelo Black-on-Red" type found at sites on various islands

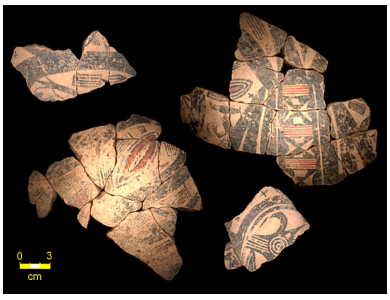

Figure 6: Late *Cubitá* sherds from a shell-bearing midden on Pedro González Island, 1470-1220 BP (cal 640-780 CE)

The second complex includes painted wares assigned by Luís Sánchez to the *Cubitá* style of the *Gran Coclé* tradition (550-700 CE). The most ubiquitous *Cubitá* pottery type is a red-slipped bowl decorated with black concentric lines (occasionally with additional geometric and zoomorphic motifs) ("Ciruelo Black-on-Red") (Figure 5). At some sites this type co-occurs with sherds from fine polychrome vessels (Figure 6). Painted pottery types reported from Playa Venado, west of the Pacific entrance of the Panama Canal, show a particularly close resemblance to island wares suggesting regular communication by canoe across Panama Bay (Cooke & Sánchez, 2004a,b; Cooke *et al.* 2000; Sánchez & Cooke, 2000).

The latest pottery complex is characterized by modeled and incised wares. Decoration emphasizes red-painted and modeled motifs as well as designs that use incisions arranged in triangular zones (Figure 7). It is clearly stratified above the *Cubitá* complex at sites on Bayoneta Island. Insufficient

Figure 7: Collared jar sherds with triangular zones of punctations

information is available to determine whether the *Cubitá* complex evolved *in situ* into this late complex or whether there is a temporal hiatus between the two that could, in theory, represent abandonment and re-colonization – perhaps by a second "people". Come what may, by ~1000 C.E. Pearl Island communities' social interactions had shifted eastwards towards coastal and inland areas of Panama province, the Darién, and north-western Colombia (Cooke 1998, Cooke & Sánchez, 2004a) (i.e., the "Gran Darién" culture area over which the "Cueva" language was spoken at Spanish contact).

Figure 8: Location of Don Bernardo Beach (red dot)

These ceramic-using peoples, however, were not, the earliest colonists of the archipelago. In March, 2008, Juan Martín discovered a Preceramic shell-bearing midden on Pedro González Island, lying about half a meter under the surface of a ceramic occupation. This site is located alongside a beautiful beach (Playa Don Bernardo) on the eastern side of the island (PG 19-20; Figure 8, red dot). This area will soon be developed for a hotel complex. Martín opened two 1 x 1 meter test pits here in 2008. Two marine shell (*Argopecten*) samples taken from the top and the bottom of the Preceramic midden in one pit (PG-19) produced dates of: 5260 ± 40 BP (cal 3770-3600 BCE) (Beta-245132) and 5390 ± 40 BP (cal 3920-3700 BCE) (Beta-243898). A fragment of carbonized palm nut provided a third date: 4880 ± 40 BP (cal 3710-3630 BCE) (Beta-256751) (Figure 12). The chipped stone industry consists of small agate flakes and blades detached from pebbles probably obtained in basalt outcrops on the beach (Figures 9, 10).

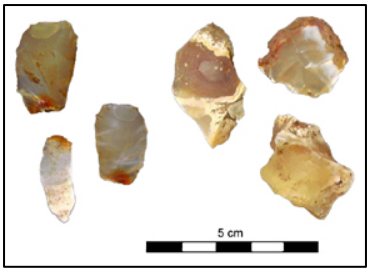

Figure 9: Agate tools from Playa Don Bernardo

When we requested financial assistance from the National Geographic Society in April, 2008, Ilean Isaza and Ana Katalina Celis were struggling to finish test pits in three shell-bearing middens on Casaya Island. The two subsurface probes dug by Juan Martín at the Pedro González Preceramic site also

Figure 10: Basalt outcrops with agate nodules, Playa Don Bernardo

remained incomplete and open. One of the tests at Los Peñones (ICA-3) on Casaya was revealing a human burial – the first reported from the archipelago. This individual was buried face-up in a shallow grave underneath a shell-bearing midden. The right forearm crossed the abdominal area. The lower part of the body had been removed by modern looter activity (Figures 11, 12, below). The only artifacts found in association were two tiny but worked agate flakes – perhaps points for small projectiles. Tooth dentin produced a date of 950 ± 40 BP (calibrated to 1010-1170 CE) (Beta-246905). Physical anthropologist Janine Pliska (Pennsylvania State University) determined that this individual had all observable epiphyses completely fused suggesting an age in excess of the early 20s. The diagnostic pre-auricular regions and pubis bones of the pelvis were not recovered. The greater sciatic notch was only partially preserved; but Pliska noted that - if the angle of the notch continued at the angle of the observable elements - it would be a "mild female expression". In accordance with the Lovejoy *et al.* (1985) system, the auricular surface equates with phase 4 (marked by uniform coarse granularity), i.e., an age of 35-39. The incisors exhibit shoveling on their lingual surfaces (a common genetic trait in Amerindian groups). Two teeth and some bone fragments were sent to Ugo Perego (Sorenson Molecular Genealogy Foundation) and Alessandro Achilli (University of Pavia, Italy) for ancient DNA extraction. Pliska only observed pathologies in the teeth. Ante-mortem tooth loss of the second right mandibular molar (and possibly the third as well) was followed by complete resorption of the alveolar sockets. Multiple lines of enamel hypoplasia on most of the teeth, including the earliest and latest forming adult teeth, suggest chronic or frequent episodes of malnutrition throughout childhood.

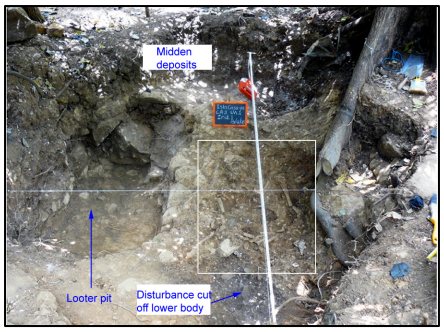

Figure 11: Disturbed human burial on Casaya Island (ICA-3)

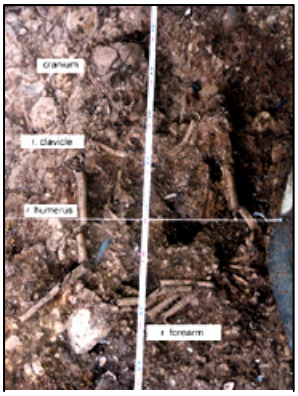

Figure 12. Detail of human burial on Casaya Island (ICA-3)

Fragments of another adult individual and an infant were found within this mortuary feature. Cranial and postcranial material is very fragmentary, no intact bones were measureable; and significant elements for epiphyseal fusion were not found. Even so Pliska proposes that the infant was younger than 18 months at death (she suggests 6-12 months) on the basis of a femoral fragment. Only two of the infant's deciduous teeth were recovered. The first, left maxillary incisor, which begins formation at 5 ± 2 months *in utero* and ends formation at birth, shows vertical furrowing in the enamel (a type of hypoplasia). Since enamel hypoplasias in human deciduous teeth are much less common than in adult teeth (because the infant is usually well nourished in the womb) this pathology suggests either an unusually unhealthy mother or a premature birth.

Figure 13: Ana Celis and Ilean Isaza make surface-collections around a circular shell-bearing midden on Casaya Island (ICA-10)

Most sites on Casaya Island are circular shell-bearing middens with a dark soil matrix (Figure 13). All were cleared, surface-collected, and tested with at least one sub-surface cut. Column samples were taken from one wall of each cut for faunal and botanical analyses. Some of the middens are quite deep, i.e., at ICA-4, where the basal strata produced samples of the earliest polychrome complex mentioned above (Figure 4). National Geographic funds allowed Ilean Isaza and Ana Celis to complete sub-surface sampling and back-fill all cuts. In these and other archaeological tasks they were helped by local residents and schoolchildren with whom they established an excellent relationship (Figure 14). The disturbance of the ICA-3 burial feature by looters indicates that this activity still occurs from time to time on the archipelago. The project's current research team is making every effort to continue the positive didactic approach developed by Isaza and Celis on the premise that the more islanders learn about their pre-Columbian past and the techniques used to study it, the easier it will be to palliate future looting and alert authorities to wanton site destruction by developers. We decided not to

Figure 14: Schoolchildren learn about pre-Columbian farming on Casaya Island

seal the two test pits excavated by Juan Martín on Pedro González Island in 2008 because we learnt that the development company (Grupo Eleta) would be moving in immediately. Juan Martín and Tomás Mendizábal were contracted by an environmental monitoring company to undertake a rapid survey of the area around and north of Don Bernardo Beach in May and June, 2008. The permanent presence of company personnel obviated backfilling. Besides, the exposed walls were useful for explaining the significance of the Preceramic site to developers to whom bones, shells and stone flakes seem less exciting than painted pottery and spindle whorls. Consequently I diverted remaining National Geographic funds towards expanding one of the test cuts and advancing the analysis of the vertebrate faunal remains.

Figure 15: North wall of test pit PG-19 at Playa Don Bernardo, showing the radiocarbon ages of the Preceramic deposit (additional details about the dates are given on p. 4)

In 2008, Juan Martín reached culturally sterile layers in one of the test pits (PG-19) (Figure 15). He took the other pit (PG-20) to about 1.2 m below ground surface - but did not reach natural soil. Therefore Alexandra Lara was asked to continue this pit in May, 2009, expanding it westwards by one meter (thus making it a 2 x 1 m cut). Although she reached a depth of 2.6 below modern surface, a sudden rise in the water table in June prevented her from reaching the base of the cultural deposits, whose excavation has been postponed until next dry season (Figure 16). At about two meters depth marine shell declines rapidly giving way to a sandy soil with abundant charcoal. In 2008, the bottommost shell sample for radiocarbon was obtained in cut PG-19 at 0.9 m below ground surface. Therefore the deposits we have reached at PG-20 at >2.6 m should be considerably older. Intuitively, the fact that charcoal increases with depth suggests we are seeing the effects of initial colonization with forest removal and burning. But no changes in the flaked stone tool inventory are

Figure 16: Cut PG-20-1 at Playa Bernardo, Pedro González, May, 2009. In clockwise order around the excavation: Juan Martín, Carlos López (INAC inspector) & Fernando Bustamante. The top yellow line signals the beginning of the Preceramic deposit with abundant marine shell; the second line, a decline in marine shell

yet apparent throughout the Preceramic depositt. Irene Holst identified six starch grains that are compatible with maize (*Zea mays*) on the grinding surface of a small "one-hand" cobblestone *mano* found 1.30 m below ground surface. Three charcoal samples were sent (June 2008) to Beta Analytic from 102-130 cm, 180-190 cm and 250-260 cm below ground surface. On the basis of 100 soundings with a soil auger, Fernando Bustamante and Eugenia Mellado estimated the area covered by the uppermost shell-bearing midden to be ~1300 m^2.

Figure 17: Two common dolphin (*Delphinus delphis*) periotics found in cut PG-19 at the Preceramic site on Plava Don Bernardo

In cuts PG-19 and PG-20 (2008) all materials were sieved in the field over a 1/8" (3.4 mm) mesh. All sediments that fell under this mesh were collected over window screen and taken back to the laboratories for further analysis. Marine shells have not yet been quantified. Their occurrence in dense strata sandwiched between layers with less shell suggests that their exploitation may have been seasonal or irregular. So far, all non-fish vertebrates from both cuts have been identified to family and below. In cut PG-19 (2008), 41 cetacean bones were recovered. Thomas Wake identified bottle-nosed dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*) (Figure 17) and, possibly, a species of oceanic dolphin (*Stenella*). Eleven snake vertebrae (including *Boa constrictor*), 12 sea turtle bones (including hawksbill [*Eretmochelys imbricata*]), five deer and two agouti bones were also recovered in this cut Another dolphin (*D. delphis*) periotic has just been recovered in the basal strata of cut PG-20. Cetacean bones ("small whale") have formerly been reported in isthmian middens only at the

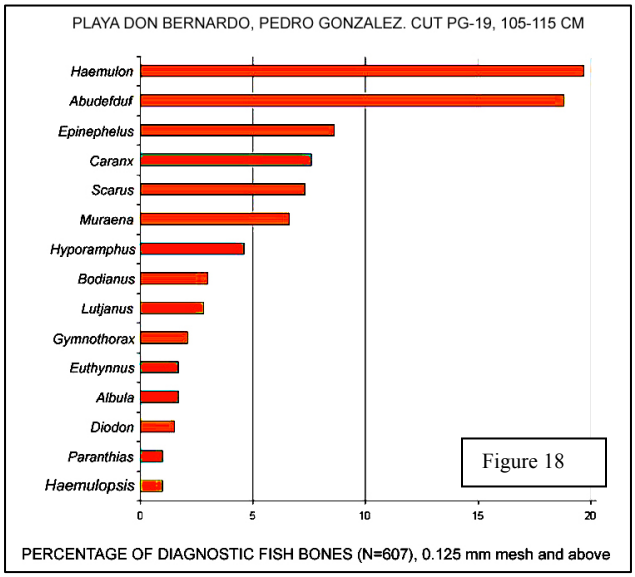

Figure 18

Early Ceramic Monagrillo type site on the eastern shore of the Azuero Peninsula (Willey & McGimsey, 1954).

Figure 18 (above) summarizes the percentage frequency of fish bones identified to genus from a single level at the base of the cultural deposits in PG-19 (105-115 cm below modern surface) (excluding the dermal spines of porcupine fish [Diodontidae]). The analysis combined bones collected in the field over 1/8" (3.4 mm) and in the laboratory over nested geological sieves (to 0.125 mm). Most of the genera represented are widespread on reefs. Small grunts (*Haemulon*) and sergeant-majors (*Abudefduf*) comprise ~40% of the sample. Reef fish that attain much larger sizes, i.e., parrot fish (*Scarus*) and wrasse (*Bodianus diplotaenia*), were also taken. The fourth most frequent genus (*Caranx*) consists mostly of bones of the green jack (*C. caballus*) - a widespread species whose shoals make forays close inshore if water is deep and clear. The bonito (*Euthynnus lineatus*) behaves in the same way, as do shad mackerel (*Decapterus*) and amberjack (*Seriola*), which were recorded in other levels of this test. These kinds of fish can be caught with shiny lures. However, laying out nets between boats or from rocky promontories to boats would be an effective way of exploiting their movements in and out of bays. Dolphins pursuing the shoals could have been caught (or become involuntarily enmeshed) in this way. Wake noticed that a dolphin basioccipital fragment appears to have been punctured by a weapon.

Common name	Taxon	NISP
Deer	Cervidae	217
Opossum	Didelphidae	106
Sea turtle	Chelonia	64
Snake	Serpentes	58
Agouti	*Dasyprocta*	50
Green iguana	*Iguana*	33
Bird	Aves	9
Dolphin	Delphinidae	8
Spiny Rat	*Proechimys*	4
Mud turtle	*Kinosternon*	7
Black iguana	*Ctenosaura*	1
Monkey	Cebidae	1

Figure 19

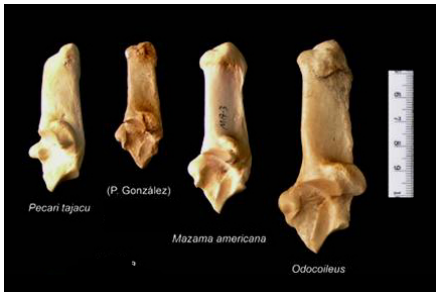

Figure 20: Deer right calcaneum from the Preceramic site on Pedro González (second from left), compared with calcanea of modern adult collared peccary, brown brocket and white-tailed deer

All vertebrate bones recovered in cut PG-20 (1 x 2 m) – to a depth of 260 cm - have been identified to Class. Fish bones represent 96.3% of the 24,251 specimens recovered over 1/8" (3.4 mm) mesh. Five hundred and fifty-eight of the 886 non-fish bones allowed identifications below Class (Figure 19). Two hundred and seventeen

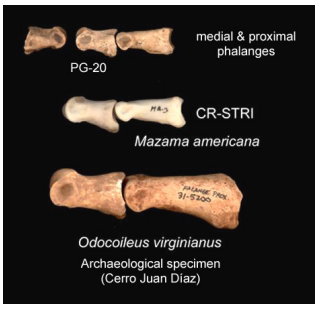

Figure 21: Adult deer medial & proximal phalanges from cut PG-20 (*top*) are compared with the same elements from a modern adult brown brocket (*Mazama americana*) (*center*) and a pre-Columbian adult white-tailed deer from Cerro Juan Díaz (*bottom*)

deer bones have now been identified. Several bones from adults represent very small individuals. An adult calcaneum found in 2008 in cut PG-20 is smaller than adult calcanea of mainland brown brocket (*Mazama americana*) and collared peccary (*Pecari tajacu*) (Figure 20). Other adult specimens found in cut PG-20 confirm this trend (Figures 21 & 22). We do not yet possess sufficiently tight osteological criteria, however, to assign these specimens incontrovertibly to brocket (*Mazama*) or white-tailed deer (*Odocoileus virginianus*). This will surely be possible when a larger sample with complete cranial bones and antlers has been acquired. In fact, certain morphological details make us believe that *two* deer taxa may be present. No deer species is present on Pedro González today. The only extant deer species in the archipelago is the grey brocket (*Mazama gouazoubira*). It is present *only* on San José Island, and is not known from the Central American mainland (Handley, 1966). No deer bones were recovered in vertebrate samples at any of the ceramic sites whose archaeofaunas have been analyzed so far. We hypothesize therefore that deer (including a dwarf species) were extirpated from Pedro González by Preceramic hunters. Dwarfism in island animal species has been reported in many parts of the world including Isla Escudo off the Caribbean coast of Panama where a very small sloth ("*Bradypus pygmeus*") exists today (Anderson & Handley, 2002; Van Valen, 1973).

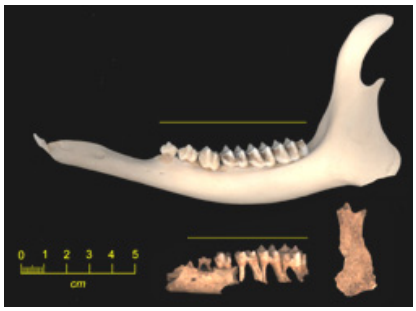

Figure 22: *Above*: right mandible of an adult modern brown brocket (*Mazama americana*) from the central Panama mainland. *Below:* fragment of an adult deer right mandible with worn teeth, found in cut PG-20 at Playa Don Bermardo

Opossums (Didelphidae) are the second most frequent non-fish taxon in cut PG-20 (106 specimens). They may have suffered a similar fate to deer. No opossums are present on Pedro González today. No didelphid bones have been observed in ceramic-age middens here or on other islands. Some of the adult bones represent the common opossum (*Didelphis marsupialis*), which survives on Isla del Rey (Handley, 1966). But many archaeological specimens seem too small for this species. A very small sub-

adult lumbar vertebra is referable to woolly opossum (*Caluromys derbianus*). Mud turtles (*Kinosternon*) have not been reported from the Pearl Islands (Roberto Ibáñez, personal communication). Nor have primates: a distal femur found in level 130-140 cm in cut PG-20 is closest to a white-faced capuchin (*Cebus capucinus*) in size but may not be this species. Spiny rats (*Proechimys semispinosus*) survive on several Pearl islands. They are common on Bayoneta and Rey, and are still an important food source. But local hunters interviewed say they are not found on Pedro González. On the other hand, boas, agoutis and green iguanas are still regularly consumed by this island's residents.

If the Preceramic people on Pedro González Island were the first colonists, they must have arrived by sea. We do not know which fibers they would have used for fishing nets. (Spindle whorls for spinning cotton have been found at ceramic period sites). Maize starch grains on the single grinding stone that has been recovered so far indicate that they were farmers. The number of non-fish vertebrate bones identifiable below Class is still small (under 600). If we assume that two deer and two opossum genera are present (as seems likely), seven genera of terrestrial mammals have been identified in samples from two small test cuts, in addition to one sea turtle genus (*Eretmochelys*), one freshwater turtle genus (*Kinosternon*), two iguana species (*Iguana iguana* and *Ctenosaura* sp.), three families of snakes (Boidae, Colubridae and cf Viperidae), and three bird genera (heron [Ardeidae, cf. *Egretta alba*], cormorant [*Phalacrocorax*] and dove [*Leptotila*]). Deer, opossums, monkeys and mud turtles (*Kinosternon*) are no longer present on Pedro González. Since the Preceramic site on Don Bernardo Beach will be heavily impacted by impending construction for a hotel complex, it behooves us to advocate the preservation of part of the cultural deposit, and to salvage of as much of the remainder as we can. It would also be informative to strip-excavate the area to the north of the buried shell-bearing midden, searching for dwellings. No Preceramic houses have ever been found in Panama. Larger animal bone samples will undoubtedly continue to improve our knowledge, not only of the biodiversity of this island at the moment of first human contact since the formation of the archipelago, but also of the repercussions of pre-Columbian fishing, hunting and land clearance on the fauna and landscape.

To conclude, timely National Geographic Society support enabled my research team to complete the testing project on an island (Casaya), which was densely populated before Spanish contact. The local community developed a keen interest in the fieldwork. We expect them to communicate to other villages on the archipelago that archaeology is a serious and informative endeavor rather than a weekend activity or commercial enterprise. It is hoped that molecular analysis will provide some information about the genetic relationships of the adult individual recovered in the burial feature found here – the first identified on the archipelago. On learning after the grant award that the development of beautiful Don Bernardo Beach on Pedro González Island was imminent, I decided to channel available National Geographic funds towards the amplification of test pits and the enlargement of the vertebrate archaeofaunal samples. These are providing exciting new data about the antiquity of human colonization, past island biodiversity, and pre-European impacts.

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