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Introduction

L'odeur de l'ordure dure òu l'or dort. / The stench of shit lingers where gold sleeps.

– Dominique Laporte, *Histoire de la merde* (1978)

The Lord of Guano

In 1847, on a barren windswept island off the desert coast of central Peru, a guano miner unearthed a curious stone tablet buried under five and a half meters of accumulated bird excrement (fig. 1.1). During the nineteenth-century guano export boom – an event that utterly transformed the modern world's relationship with the Pacific Ocean, agricultural soils, and marine birds – miners discovered hundreds of ancient indigenous artifacts on Peru's guano islands. These included gold and silver objects, wooden sculptures, pottery, richly woven textiles, decapitated bodies, even a mummified penguin under as much as twenty meters of the world's richest naturally occurring fertilizer. No one ever discovered another artifact like this one, however.[1]

South American explorer William Bollaert got wind of this discovery and published a short article in a popular magazine accompanied by a detailed drawing of this "curious stone" with "quaint armorial bearings." He speculated that it "may have been brought from old Spain, and may have been intended for insertion over the doorway of a building belonging to the former owner of the island."[2] Inspired by the growing interest of North American ecologists in Peru's guano birds – a fascination that powerfully influenced the beginnings of the environmental movement of the late twentieth

[1] George Kubler, "Towards Absolute Time: Guano Archaeology," in *A Reappraisal of Peruvian Archaeology*, Memoirs of the Society for American Archaeology, no. 4 (Menasha, WI, 1948).

[2] Bollaert, "Carved Stone Found on the Chincha or Guano Islands," *Illustrated Times* (London) 5 Mar. 1859: 157.

FIGURE 1.1. The coat of arms of an indigenous Peruvian guano lord, circa 1560. This object was unearthed on Isla Chincha Norte in 1847 and donated to the British Museum by Henry Hucks Gibbs in 1859. The cross still bears traces of red pigment. It is unknown what occupied the niche at the center of the carving. *Source:* Prehistory & Europe section, object 1859,0322.1; reproduced courtesy of The Trustees of the British Museum.

century – Yale art historian George Kubler tried unsuccessfully to relocate the artifact during the mid-1940s. Because it clearly dated from the era soon after the Spanish Conquest, he hoped to use it as a benchmark for producing an absolute chronology of pre-Hispanic art styles found buried at deeper levels on the guano islands. The artifact was nowhere to be found, however. In 2006, with the aid of computer cataloging, staff at the British

Museum relocated and photographed the slab, which had been hidden away like Indiana Jones's legendary lost Ark of the Covenant in its complex of warehouses.

Until this time, no one had tried very hard to read the inscription, much less suspected the insights it could provide into the deep history of humanity's relationship with the sea and bird excrement. It reads:

don pedro guanneque prinsipal del valle de [c]hincha

From the form and content of its gothic script, we can conclude that this coat of arms belonged to an indigenous noble who lived during the sixteenth century.

Who was this mysterious man? From the first part of his name, we know that Don Pedro Guaneque (or Guañeque) was a baptized Christian of high social standing. The prefix of the second part may refer to *huanu* (alternatively *yzmay* or "shit"), the Quechua word for any form of manure used as an agricultural fertilizer. This is the origin of our modern word for the excrement of wild birds and bats, which was first introduced to the English language by José de Acosta's *Natural and Moral History of the Indies* in 1604. (This word is well known to today's youth thanks to the popular 1995 film *Ace Ventura: When Nature Calls*, in which actor Jim Carrey's nemesis plots to dispossess a group of African tribes of the fortune they possess in bat guano.) *Prinsipal* was a title of nobility indicating his status as paramount lord over an ethnic group living in the lowland valleys along the south-central coast of Peru. His subordinates owed him labor and allegiance as kin. In reciprocity, it was his sacred duty to please the ancestors, to keep their living children fed, and to protect them from the hazards of flood, drought, earthquake, famine, pestilence, and invasion so that they could multiply as a people. Relationships of this sort provided a basis for social power among peoples in many parts of the world before the disruptions of the modern age.[3] By the end of this book, readers will have learned how new configurations of ethnic difference separating races, nations, and species caused some of the worst social and environmental catastrophes in history, including the demise of Peru's guano birds.

According to court records from the late 1560s, an indigenous lord with this exact name rented a coastal lagoon at the mouth of the Mala River to a local Spaniard to pay part of the annual tribute his kin group owed to the new colonial regime. ("Mala" can also be read in the curious lettering at the base of Don Pedro Guaneque's coat of arms.) Lagoon environments were far more extensive back then, before they were drained by modern

[3] *Oxford English Dictionary*, s.v. "guano"; Domingo de Santo Tomás, *Lexicon, o vocabulario de la lengua general del Perú* (1560; Lima, 1951), 58, 121, 134; Susan Ramírez, *To Feed and Be Fed: The Cosmological Bases of Authority and Identity in the Andes* (Stanford, CA, 2005), 96–97, 114, 142, 214.

irrigation technocrats. When properly cared for, these brackish pools can be used to corral large numbers of *lisa* or mullet (*Mugil cephalus*), one of the world's most common estuary fish. These lagoons also produce totora reeds (*Schoenoplectus californicus*), a valuable source of fiber and building material. According to the creation myth related in the prologue, the female deity Urpi Huachac was the inventor of this rudimentary form of aquaculture, which, thanks to a violent flood brought by the trickster Cuniraya Viracocha, gave birth to all the fish of the sea. Don Pedro's arrangement ended up in litigation because the lagoon failed to bear fish in abundance after his death and his kin were forced to repay in gold all rent they had received.[4]

This was a harsh, demeaning blow to Don Pedro's kin that threatened them with extinction as a people. Archaeologists and historians are beginning to recognize that coastal indigenous peoples not only viciously opposed their conquest by the Inca during the late fifteenth century but also aided the Spanish so that they could throw off the yoke of highland imperialism.[5] A number of indigenous nobles in the Americas adopted coats of arms with heraldic symbols of their own design during the sixteenth century to take credit for allying with the Spanish in their victory and to express a long-standing obsession with genealogical descent.[6] To a Spaniard, the bell tower and red cross in this coat of arms would appear to assert Don Pedro's loyalty to Christianity and the new colonial order. The image in the lower left quadrant displays Don Pedro's wooden *vara* or staff of authority. It appears to be crowned with feathers, a common feature of indigenous regalia symbolizing creative power – and altogether appropriate for a guano lord.[7]

Other elements in this design possessed deeper, hidden meanings. The image in the upper right quadrant is probably a guanay cormorant (*Phalacrocorax bougainvillei*), the most abundant and important of Peru's guano-producing birds. Guanays adopt this reclined neck posture and flash their wings when preparing to mate. It can also be interpreted as the literal image of Don Pedro's foremother Urpi Huachac, who was viewed as the mythic founder of a number of indigenous lineages along Peru's central coast. The most important religious site in the lower Mala valley before the Spanish Conquest was a sacred stone hill known as Sulcavilca. This *huaca* (any sacred being or object with power over death and procreation) was understood to

[4] "Expediente de la causa seguida por Juan Sánchez de Aguirre en nombre de Diego Díaz contra los indios de Mala," 1566–69, Biblioteca Nacional del Perú, doc. A199, fol. 120^{r-v}, 180^{r}–181^{r}, 194^{r}–195^{v}, 208^{v}–209^{r}; Rostworowski, *Recursos naturales renovables*, ch. 1.

[5] Noble David Cook, *Demographic Collapse, Indian Peru, 1520–1620* (Cambridge and New York, 1981), 157–58; "The Great Inca Rebellion," *Nova*, PBS, 26 June 2007.

[6] Jaime Cuadriello, *Las glorias de la República de Tlaxcala* (Mexico City, 2004), 325–84; Carolyn Dean, *Inka Bodies and the Body of Christ: Corpus Christi in Colonial Cuzco* (Durham, NC, 1999), 142–54.

[7] Ramírez, *To Feed and Be Fed*, 191–211; José Luis Martínez Cereceda, *Autoridades en los Andes: Los atributos del señor* (Lima, 1995), 79–84, 189–90.

be the embodiment of one of the four sons of the creator deity Pachacamac and his wife Urpi Huachac.[8] It is no coincidence that the highland area where the story in the prologue was recorded, Huarochirí, is located at the headwaters of the Mala River. Similar myths were widespread along Peru's central coast during the colonial era and are replete with symbols associated with guano, birds, fertility, and kinship.[9] In the prologue to this volume, Cuniraya Viracocha turned into a bird and plopped his white semen next to Cauillaca to impregnate her. The name Viracocha means "sea of fatness" or "sea of abundance," further indicating his links to fertility and the sea. Cauillaca and her child eventually turned into guano islands, known today as the islands of Pachacamac. One of Urpi Huachac's daughters turned into a bird to escape being raped and flew out to sea to find her mother, who was off visiting these islands. Urpi Huachac convinced Cuniraya to come within her reach so she could preen him – a common bond-forming practice among cormorant mate pairs. In the story's climax, he escaped death in the sea by running off "to take a shit" in a field. Unfortunately, the translator of this text ruined its punch line by prudishly favoring the phrase "I've got to go off for a moment to relieve myself" because "the plain translation 'to shit' sounds jarringly obscene."[10] This decision obscured the basic moral of this folktale: that which is repulsive can possess profound creative power. This mistranslation is symbolic of our larger failure to recognize the importance of shit to history.

The image in the lower right quadrant appears to portray the place in which this tablet was discovered: the three Chincha Islands (fig. 1.2). Indigenes from the coastal valleys of Chincha and Pisco directly associated these islands with the *huaca* Urpi Huachac and her two daughters. The people of Pisco – a word that itself means "bird" – also associated these islands with the term *quillairaca*, which means "silver vagina" or "the moon's vagina." To anyone who has ever set foot on one of Peru's guano islands, the semicircle on the central island in this image obviously portrays the raised, circular nest of a guanay. Until recently, millions of guanays flocked to these islands each spring to mate. Their nests are made from pure excrement and shine white in the sun; but in the light of the full moon, they glow silver. Conscious of this point, the makers of this coat of arms appear to have intentionally placed the north-coast word for the fisherman's most important celestial guide, the goddess of the moon "Si," apart from the rest of the text above the three islands. These vaginas of the moon serve as the birthplace for

[8] Cristóbal de Albornoz, "La instrucción para descubrir todas las guacas del Pirú" (ca. 1568–71) *Journal de la Société des Américanistes* 56 (1967): 34; Henry Tantaleón and Omar Pinedo, "Entre los Andes y el mar: El valle bajo del Mala antes y durante la ocupación Inca," *Revista de arqueología* (Madrid) 283 (2004): 54–63.

[9] Peter Eeckhout, "Relatos míticos y prácticas rituales en Pachacamac," *Bulletin de l'Institut français d'études andines* 33 (2004): 1–54.

[10] *Huarochirí Manuscript*, ch. 2, §28; Santo Tomás, *Lexicon*, 144; Ramírez, *To Feed and Be Fed*, 66.

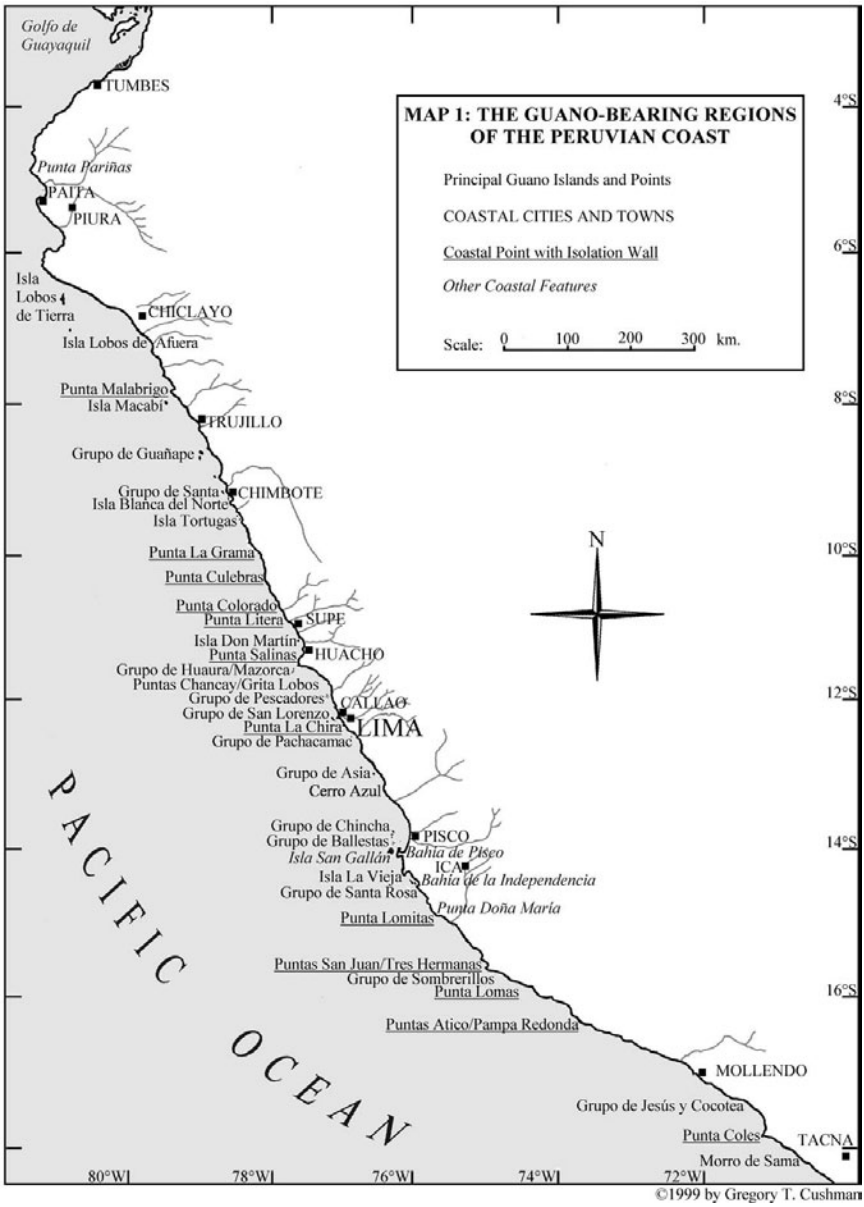

FIGURE 1.2. Map of the guano-producing regions and irrigated valleys of the Peruvian coast. Map by author, used by permission.

every guanay ever born. They also provide an exceptionally rich source of agricultural fertilizer that enables the prosperity and reproduction of the humans who collect them, grind them up, and add them to fields of crops. Every image in this carefully composed coat of arms appears to assert Don Pedro's genealogical ties to age-old sources of reproductive power along the Peruvian coast, beliefs that were probably shared by a widespread descent group from this region who called themselves the *Lunaguaná* or *Runaguanay*, "guano birds of the people." Here we have a real-life *Da Vinci Code* asserting the shared feminine and masculine basis of human reproduction and prosperity.[11]

We know from a host of written records, oral traditions, and physical remnants that ancient Andean peoples were greatly concerned with maintaining the fertility of the land and sea. According to the best-known chronicler of the colonial era, indigenous Peruvians

> fertilized the soil by manuring it, and in the valley of Cuzco and almost all the highland area they treated their maize fields with human manure [*runap huanu*], which they regarded as the best. They go to great trouble to obtain it, and dry it and pulverize it in time for the sowing season. In the [higher Sierra], . . . the climate is too cold for growing maize, and they sow potatoes and other vegetables: for this they use the manure of the Peruvian sheep [llamas and alpacas, *huanacup huanu*], which they regard as more beneficial than any other.
>
> On the seacoast, from below Arequipa to Tarapacá, . . . they use no other manure but the dung of sea birds [*piscup huanu*], of which large and small varieties occur on the coast of Peru in such enormous flocks that they seem incredible to anyone who has not seen them. They breed on some uninhabited islands off the coast, where they deposit such an amount of dung that is no less incredible. From a distance the heaps of it look like the snowy crests of a range of mountains. . . . The dung of the sea birds produces great fertility. In other parts of the same coast, such as the basins of . . . Malla, and Chillca, and other valleys, they manure with the heads of sardines [*challuap huanu*].[12]

Fertilization represented only one of a host of techniques used by Andean land managers to maximize production from the soil while guarding against total crop failure caused by environmental extremes.[13]

[11] Santo Tomás, *Lexicon*, 161, 164–65, 169; Alonso Osorio, "Testimonio y extirpación de idolatrías," (1620), in Rostworowski, "Pescadores Artesanos y Mercaderes en el Perú prehispánico," *Revista del Museo Nacional* (Lima) 41 (1975): 344–45; Rostworowski, "Islas del litoral," 94–95; Rostworowski, "Guarco y Lunaguaná: Dos señoríos prehispánicos de la costa sur central," *Revista del Museo Nacional* 44 (1978–80): 166–67, 181–82; Ramírez, *To Feed and Be Fed*, 96–97, 114, 142, 214.

[12] Garcilaso de la Vega, *Royal Commentaries of the Incas* (1609; Austin, TX, 1966), 1:246–47; for Quechua terms, see *Markham in Peru: The Travels of Clements R. Markham, 1852–1853* (Austin, TX, 1991), 41, 143.

[13] William Denevan, *Cultivated Landscapes of Native Amazonia and the Andes* (New York, 2001), 34–48.

Never one to miss an opportunity to promote the accomplishments of the Inca emperors from whom he descended, Garcilaso de la Vega recalled that

> in the times of the Inca kings these birds were so carefully watched that no one was allowed to land on the islands during the breeding season under pain of death, so that they should not be disturbed or driven from their nests. It was also illegal to kill them at any season either on the islands or elsewhere, under pain of the same penalty.
>
> Each island was assigned, on the Inca's instructions, to a certain province, or if it was a large island, to two or three provinces . . . in which each village had its piece and each householder in the village his part, according to the quantity of manure he was reckoned to need.[14]

As we see later in this book, twentieth-century conservationists loved citing this law to legitimate government regulation of Peru's marine environment, oblivious to their original imperialist intent to dispossess the coast's existing guano lords.

These episodes only begin to recount the importance of guano and the sea to the indigenous peoples of Peru. These relationships may extend back to the emergence of settled life along the Pacific coast of South America more than 5,000 years ago.[15] The history of guano deserves our attention, at the very least, for its significance to ancient Andean societies. However, the main purpose of this book is to demonstrate that guano, guano islands, and guano birds have been profoundly important to other peoples as well. This includes the ecological, cultural, and geopolitical history of the modern world – *our world*. This realization first requires us to abandon our intense prejudice toward excrement and recognize its basic importance to all living things.

Nitrogen, Phosphorus, and Shit in History

Excrement is not considered a topic of polite conversation, yet it is a fundamental and unavoidable feature of biological existence. City folk tend to view this foul substance with disdain, as a source of comedy or even fear. Such attitudes have ancient roots in taboos governing religious purity. The Mosaic law commanded:

> Designate a place outside the camp where you can go to relieve yourself. As part of your equipment have something to dig with, and when you relieve yourself, dig

[14] De la Vega, *Royal Commentaries*, 1:246–47.

[15] Michael Moseley, *Maritime Foundations of Andean Civilization* (Menlo Park, CA, 1975); Charles Mann, "Oldest Civilization in the Americas Revealed," *Science* 7 (Jan. 2005): 34–35; Daniel Sandweiss et al., "Environmental Change and Economic Development in Coastal Peru between 5,800 and 3,600 Years Ago," *Proceedings of the National Academy of Sciences* 106 (2009): 1359–63.

a hole and cover up your excrement. For the LORD your God moves about in your camp to protect you and to deliver your enemies to you. Your camp must be holy, so that he will not see among you anything indecent and turn away from you.[16]

In our secular age, however, these attitudes are more a reflection of how divorced urban, industrial existence has become from natural cycles and civilization's agrarian roots. Thus, the ecologically enlightened in our disposable society now have to read special books to learn "how to shit in the woods" to protect the wilderness from harm and to teach our children that "everyone poops."[17]

An important source of this separation stems from the success that the modern state and experts in its employ have attained at manipulating natural processes for the rest of us. One major task they have been asked to perform is to hide, wash away, and otherwise protect us from our own excreta. In *Civilization and Its Discontents* (1930), Sigmund Freud postulated that our differentiation from the beasts of the field began when our species began to walk upright and we began to lose the olfactory sense. In Freud's view, gaining control over the anal constituent of life was indispensable to attaining the three essential characteristics of civilization: cleanliness, order, and beauty. Thus, the open sewer, manure heap, and public fart have become our most potent (and pungent) symbols of barbarity and backwardness. Thus, in colonizing efforts around the globe, "marines and latrines" had an inseparable affinity. Vanished excrement is as much a part of our mythology of modern existence as the moon's vagina was for Don Pedro's Peru. Yet our often unspoken obsession with excretory functions in everyday discourse reveals that our pretension of living in a civilization unconstrained by ecological limitations is "eternally, hopelessly soiled." The role that failed septic tanks played in the U.S. environmental movement testifies to this.[18]

Excretion is as basic to existence as eating, and in nonindustrial ecosystems it is fundamental to the cycling of nutrients and renewal of life, but industrial civilization has a very different set of values. Instead of deifying semen, soil, and excrement, we place emphasis on the dead building blocks of life. Thanks to the findings of molecular biology, we now know that all organisms need a variety of basic substances to function and grow.

[16] Deuteronomy 23:12–14, New International Version.

[17] Kathleen Meyer, *How to Shit in the Woods: An Environmentally Sound Approach to a Lost Art* (Berkeley, CA, 1989); Taro Gomi, *Everyone Poops* (Brooklyn, NY, 1993).

[18] Freud, *Civilization and Its Discontents* (New York, 2005), 79, 83–84, 87–88, 96–97; Laporte, *History of Shit*, x, 35; Corbin, *The Foul and the Fragrant*; Melosi, *The Sanitary City*; Chalhoub, *Cidade febril*; Merle Curti and Kendall Birr, *Prelude to Point Four: American Technical Missions Overseas, 1838–1938* (Madison, WI, 1954), ch. 6; Anderson, "Excremental Colonialism"; Adam Rome, *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* (Cambridge and New York, 2001), ch. 3.

This book focuses on two of the most important of these, nitrogen (N) and phosphorus (P), and their role in transforming the metabolism of the modern world.[19]

Nitrogen is vital to a host of biochemical processes. It forms the chemical bonds between amino acids used to construct enzymes and other proteins, it constitutes part of the nucleic acid chains that code for reproduction and protein synthesis, and it is an important building block of chlorophyll, which creates nearly all of the biological energy that drives life on earth. Dietary experts recommend that for good health, adult men and women consume 0.75 grams of protein for every kilogram of body weight each day, but fast-growing infants need more than twice as much. As a consequence, protein deficiency (kwashiorkor) is one of the most significant nutritional problems facing the world's poorest children, with the conspicuous exception of those with access to marine sources of protein.

Nitrogen is one of the most abundant elements on earth – 78 percent of the atmosphere at sea level is nitrogen. Yet practically all of it is locked up in an unreactive form (N_2) that must first be converted to nitrogen oxides (NO_x) or ammonia (NH_3) to be used in biological systems. There are only two basic ways for this to occur: through the tremendous expenditure of energy or by the intervention of nitrogen-fixing organisms. Reactive nitrogen is also tremendously mobile and can be quickly removed from an environment by leaching, physical erosion, volatilization, combustion, or bacterial denitrification. For these reasons, reactive nitrogen is often in such limited supply compared with other nutrients that it places basic restrictions on the rate at which an organism can grow. (This is known as the "Law of the Minimum.") Its availability can even limit the productivity of an ecosystem as a whole.

Compared with nitrogen, phosphorus makes up a tiny proportion of the world's biomass and has received almost no attention from historians, but it is no less dispensable to life. Phosphorus, usually in the form of phosphate (PO_4^{3-}), is a critical constituent of the structural tissue of plants and the bones and teeth of animals. At a far more basic level, phosphate bonds in adenosine triphosphate (ATP) provide the main source of energy for cell metabolism. Phosphorus cycling in the environment is much slower and simpler than nitrogen cycling. It begins with the erosion of upland rocks by wind and water and ends with the deposition of phosphate-rich sediments in the ocean. Leaching is the principal way that phosphorus is removed from an environment. Humans have to consume substantial quantities because we wastefully excrete 98 percent of our intake each day. Thus, for

[19] The following is based in part on Vaclav Smil, "Nitrogen and Phosphorus," in *The Earth as Transformed by Human Action* (Cambridge and New York, 1990); Smil, *Enriching the Earth*; G. J. Leigh, *The World's Greatest Fix: A History of Nitrogen and Agriculture* (New York, 2004).