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Another One Bites the Dust

By *Chad R. Maxwell*

He bit the dust. Most individuals are familiar with this colloquial phrase, or maybe just Queen's song "Another One Bites the Dust." Although commonly connected with death, this phrase gains an entirely new meaning when one thinks about literally "biting the dust." The practice of biting dust or eating dirt has existed since the days of *homo halibus.* Scientifically speaking, the practice of eating dirt is called geophagy. Eating dirt is practiced in almost every country throughout the entire world and has been proven to have some health benefits. In addition, geophagy has significant meaning and symbolism within each culture. Considering these generalizations, it seems odd that the medical community terms geophagy as a form of pica. Pica stems from Latin and refers to "a bird that eats everything, a magpie." Today, however, pica is a medical term that means "an abnormal appetite for substances that are not fit to eat" ("Pica" *Webster's*). This classification of geophagy is not only odd, but also incorrect. Through a chemical and biological study of geophagy it will be shown that dirt is not only edible, but can have health benefits. An examination of the practice's historical and cultural context will reveal that geophagy is not at all perverse. Thus, in proving geophagy normal and establishing the edibility of dirt, the medical term "pica" will be proven inaccurate and false.

Geophagy: History

The discovery of a non-indigenous white clay next to the prehistoric remains of *homo halibus* at Kalambo Falls, Zambia supports the idea that the practice of eating dirt can first be recorded as far back as 2.5 million years ago: "Tens of thousands of years before the birth of clay crafts, this ancient hominid clearly had a relationship with clay" *(Whole Earth)*. In addition to the fact that clay craftsmanship had yet to exist, two other reasons point toward *homo halibus* as a geophagist. First, because the clay is

not indigenous to the area of Kalambo Falls, it must have been carried there by an ancient *homo halibus.* Secondly, it is this very clay which is consumed by modern earth-eaters.

However, historical documentation of the term geophagy did not occur until much later. Aristotle first used the term geophagy in 300 B.C. (Danford). As early as 40 B.C., the eating of dirt was introduced among the Greeks to fight sickness and disease. The ancient Greeks and Romans, especially Diocorides, believed that the clay had special medicinal powers. Ancient priests would obtain the clay from caves on the island of Lemnos. After acquiring the clay, it was mixed with goat's blood, pressed into pellets or lozenges, and then sealed with the figure of a goat. This product was called *tierra siglata* or "sealed earth." The tablets later became very popular in Rome after Galen, a Greek philosopher and physician, visited Lemnos and returned to Rome with 20,000 of the goat lozenges. After Galen's return, the healing and anti-poison effects of the *terra siglata* were sought after for many years to come (Frate).

Geophagy is not limited solely to the Greeks and Romans, though. Around 1000 A.D., earth-eating in Europe was identified as a common habit among children and was thought abominable. Avicenna, the Arab physician and philosopher, detested geophagists and attempted to whip the habit out of those who practiced dirt eating. He stated: "they should be abandoned to the grave" (Frate 1). In the sixth century A.D., Aeituse observed and documented the practice of geophagy among pregnant women in Greece. In the early 1800's, David Livingston noted that geophagy, also called *safura* in African communities, was common among the pregnant women in African tribes. During the mid-1800's when the slave trade increased, the practice of eating dirt was carried across the sea to Jamaica, the West Indies, and the Americas. Slaves infected with hookworm—a parasite that "hooks" onto the intestinal lining of its host, feeding off digested foods as they pass—ate the clay to alleviate gastric pain (Abrahams 66). Most research on geophagy indicates that the practice has no racial, temporal, or geographical boundaries, suggesting that geophagy is widespread. In modern human society, this practice is most common among the world's poorer or more tribally oriented people, the greatest portion of whom are pregnant black women (Frate 2).

Geophagy: Chemical Analysis

In order to recognize the possible health benefits of consuming clay, it is important to understand its chemical properties and composition.

Through understanding geophagy chemically, one will realize that it is "fit to eat." Clays are formed by the gradual degradation of rock; this process is most commonly connected with sedimentary shales, mudstones, and marine sediments in addition to various soils. Clays have no geographic boundaries. Where there is soil, there usually exists clay. The properties of clay are dependent upon the environment in which they are found. Depending on the weather conditions, such as temperature, location, pressure, etc. and the composition, made from elements found within the clay from the surrounding environment, clays will be produced which have differing structural compositions and properties.

Major clay groupings include kaolin, montmorillonite, halloysite, and allophane. The structure of clay is based on two fundamentals: their crystalline shape—resulting from the organization of silicon-oxygen tetrahedrons in hexagonal networks, giving clay a large surface area—and the ability to bind and exchange metals because of the dense localization of hydroxyl ions and oxygen in the tetrahedron structures (Sposito 43). In 1964, Frate discovered ten elements that were consistently present in three separate samples: silicon, aluminum, iron, calcium, titanium, potassium, manganese, copper, cobalt, and chromium. Sposito's research also found magnesium, iron, and silicon to be essential elements in clays. Iron is an important element needed by the body. Thus, if iron is in chemical form, then clay could be an important source of famine food. Other nutrient elements found in clay include vanadium and trace amounts of strontium. In testing soils, however, concentrations of all elements except iron, aluminum, silicon and calcium were relatively low (Aufreiter). The most important property of clays is created by two of its common elements, aluminum and silicon. Due to the silica-aluminum ration, which also takes part in determining the structure of clays, clays may absorb water and organic compounds. This is called the colloidal property of clay (Sposito 43).

"Kaolinitic and montmorillonitic clays are those most frequently consumed by humans" (Wiley 532). The former clay is made up of mostly aluminum and silicon, and it can only absorb organic compounds to their external surface. Conversely, montmorillonitic clays may absorb cations, water, and organic molecules into the inner layers of the clay. The absorption and structural properties of clay are the catalysts for the biological benefits of geophagy.

Geophagy: Biological Analysis

As proven through the aforementioned structural and chemical analysis,

the most important properties of clay are its colloidal properties—the absorption of water, organic materials, and the exchange of cations. Several health benefits are based on these properties. First, clay may be used as an anti-diarrhea medication. Diarrhea occurs when food substances and liquids travel too quickly through the intestine. This quick progression does not allow the body adequate time to absorb the water from the digested foods. When kaolin clay is eaten, its colloidal properties enable it to absorb the excess water found in the body, food, and intestines, thus curing the diarrhea. In fact, kaolin clay is a primary ingredient in many modern anti-diarrhea medicines, such as Tums, Maalox, and Rolaids—hence the name *Kaopectate* (Ashenbach 87). Furthermore, clays can cure diarrhea by slowing the digestion progress, which gives the body more time to absorb water from the digested substances. This process again relieves diarrhea.

A second health benefit of geophagy is that clays can supply minerals and ions that the body requires to sustain its electrochemical balance. Just as clay reduces transit time in the intestines allowing more water to be absorbed, the clay also allows for more minerals and vitamins to be absorbed by the body as well. This may be why many resort to eating clay during periods of starvation. Proteins and liver glycogen reserves are used up during starvation, and most bodies become chemically out of balance. Geophagy can preserve this delicate electrolyte balance (Aufreiter). Furthermore, the cation-exchange properties of clay will allow for the unnecessary minerals in the body to be absorbed by the clay, while the clay can also potentially give up the minerals and ions the body needs. For example, clay can supply the body with calcium while absorbing zinc or iron. Similarly, it can absorb iron while giving the body aluminum, a non-nutritive element; the converse is also true. Thus, the net effect of clay ingestion on mineral status depends on what other foods or nutrients are present in the gut. Clearly, clays do have the ability and potential to aid the body's nutritional status.

Other biological benefits exist from eating clay as well. As the Greeks and Romans knew, clays have the ability to trap organic and non-organic toxins in their structure. For example, mercury atoms can be trapped in clay through an ion exchange with potassium, magnesium, or calcium. While the clay traps poisonous and possibly deadly substances, it gives the body elements it can use, such as potassium—a requirement for every muscle contraction. Clays have also been proven to absorb and thus prevent the absorption of aflatoxins, mold toxins, lethal plant toxins, such as digoxin (a cardiac glycoside), drugs such as chloroquine, and some bacteria (Wiley 536). After

these toxins are absorbed into the body, they are simply excreted from the body, rendering them harmless. Thus, eating dirt can significantly affect one's mineral nutrition depending on the current quantities of minerals in the body and stomach; be used as an effective diarrhea medication; and reduce or eliminate secondary compounds or other toxins that may be absorbed by the mucosal cells lining the intestines.

One of the most interesting biological aspects of geophagy affects the pregnant female. Katz and Wiley proposed, "Clay consumption throughout the course of pregnancy confers multiple benefits throughout the course of pregnancy" (Wiley 537). Clay may be eaten in the first, second, or third trimesters. When eaten in the first trimester, clay traps dietary toxins that are tartogenic, or catalysts of abnormalities, for the embryo. At the same time, clay suppresses the common symptoms of pregnancy such as nausea and vomiting. In the second trimester, as pregnancy nausea ends, clay can supply essential nutrients to the mother and the developing fetus. One of the most important of these nutrients is calcium, which is critical for the development of strong fetal skeletons. In the third trimester, calcium supplementation through clay may also reduce the risk of pregnancy-induced hypertension. Clay eating during pregnancy also absorbs harmful toxins; and thus, prevents the developing child from being harmed. In addition, it may increase appetite and nutrient absorption as explained above. Furthermore, in pregnant women who are particularly susceptible to toxins from cravings, as well as non-pregnant women, clay can form a protective coating within the digestive tract that then protects mucus cells from damage by toxins (Wiley 540).

Wiley and Katz support the calcium-supplementation argument in their analysis of non-dairying tribes in Africa versus dairying tribes and the rates of geophagy among pregnant women. They hypothesized:

> Geophagy during pregnancy should be most common in populations that do not practice dairying or do not consume dairy products. The abundance or lack of dairy products in the diets of pregnant women in different populations is likely to manifest itself in marked variation in calcium consumption. In addition, populations subsisting on a diet based almost exclusively on plant foods (e.g., many non-dairying populations) may profit from other qualities of clay, including its ability to adsorb toxic secondary plant compounds. (Wiley & Katz 536)

Although they found that the times, such as pregnancy, versus weddings, and versus death, at which tribes ate clay were highly different, they did

discover that 60% of the dairying populations scored "very few or no pregnant women practicing" while 76% of the non-dairying populations of pregnant women reported "regular and consistent earth eating." This implies that clay is a source of nutrients during pregnancy due to the limited exposure of non-dairying populations to calcium-rich foods.

Although geophagy has many proven health benefits, it can also have negative health consequences. Parasitic infections can occasionally occur depending on the regions from which the dirt is extracted. Geophagists in America, who are in the delta regions of the Mississippi, as Frate has pointed out, seem to have higher levels of these infections (Frate "Holmes County"). Most problems with earth eating, however, stem from a general abuse of the practice. To illustrate, when one consumes an unorthodox amount of clay it can impact or block the colon, which, if not quickly treated, can lead to death. Additionally, a fierce consumption of dirt may lead to a disruption in the balance of potassium (*Whole Earth* 41). Severe disruption in potassium levels, called hypocalcaemia, may lead to heart failure and eventually death. In 1964, Mengel identified that geophagy "may cause sluggishness, mental insensibility, profound muscular weakness, and lassitude" (471). Yet, the negative consequences of geophagy are irrelevant when one puts them in perspective with any other food product. Of course, eating 3 pounds of dirt will be harmful to the body just as eating 3 pounds of candy will make one sick, but people still eat candy.

Furthermore, by principles of osmosis, clay can rob iron and other nutrients from the body and disrupt equilibrium. Thus, if the clay has lower iron levels than the stomach and body in which it is digested, then it will take up iron and replace it via ion exchange with another mineral, possibly a non-nutritive element. This iron deficiency may lead to anemia. The absorptive effects of clay can also be dangerous. When eaten, the clay can absorb water from the body and expand giving a false sense of "being full." Although this is an excellent benefit to fight the early stresses of starvation, continued abuse may lead to dehydration or possibly malnutrition. Anorexics will sometimes use the "false sense of being full" property of clay to the point where geophagy becomes an addiction. This abuse of geophagy leads to dehydration, malnutrition and possibly a form of anorexic suicide *(Whole Earth* 42). Again, one must remember that eating anything may have unavoidable consequences, such as cavities, heart failure, and scurvy. Thus, the consequences of geophagy must be taken "with a grain of salt."

Geophagy & Culture

Now that clay has been proven fit to eat, it is necessary to prove that the practice is not abnormal. An analysis of why cultures and individuals eat dirt can show why geophagy is not so extraordinary. Frate declares, "Geophagy is not developed individually through biological processes but is learned" (7). For a habit to be taught there has to exist a motivation behind the lesson. Among several possibilities, there are primarily seven major motivations or reasons as to why people eat dirt.

One of the most common reasons for geophagy is religion. Many cultures believe that to eat the earth is to transfer the ferrility and fruitfulness of the earth to their body. They consider clay a blessing from within—almost a sort of edible prayer. In Eweland, Ghana, for example, kaolinic clay is called "the eye" and is prepared in the shape of an egg, which symbolizes longevity, good health, and well being in Ewe culture (Vermeer 57). The egg enters the body and blesses the woman, making her as bountiful and fertile as the earth. In Guatemala, the holy clay tablets of Esquipulas show another combination of religion and geophagy. These tablets have been formed from the springs and quarries surrounding the Esquipula shrine since before the arrival of Christ. "No stage of the process--mining, making, buying, blessing, or eating the holy clay tablets—is unattended by faith" (*Whole Earth* 41). A similar type clay is sold in another part of Central America. These cakes are white and are called *tierra santa.* These clay items are obviously symbolically chosen and named by color—the whiteness symbolizing purity that cleanses the soul. The *tierra santa* is then eaten and celebrated in connection with the Black Christ Festival (Hunter 174). Geophagy makes its debut at weddings as well. In India, detailed clay figurines are given as bridal gifts. As in Ewe culture, these figurines are broken and eaten during pregnancy (Aschenbach H6).

Perhaps, too, the religious significance of eating dirt may be seen when one reflects upon Christian beliefs. When Christ died on the cross, some of his blood was shed onto the ground. Although this happened centuries ago, the symbolic value of being a part of Christ and his sufferings through eating the clay upon which His blood once flowed may still exist. Furthermore, clay is connected to Christianity through the creation of man himself—"and the Lord God formed man of the dust of the ground. And breathed into his nostrils the breath of life..." (Gen.2.7). Hence, through eating dust or clay, that from which he was created, man is able to connect with God and the life-living elements which produced him.

Cultures may also use clay for its medicinal properties, just as the Greeks and Romans did. The first pharmaceutical value of clay stems from its structure. The crystalline composition of clays can trap poisonous particles or deadly bacteria and parasites. African people recently brought to America through the slave trade made use of this trapping property to cure hookworm and prevent infection and typhoid that may stem from the parasite (Laufer). Still other cultures harness clay's ion-exchange properties to cure metal poisoning, such as that from mercury. Clays are also a well-known anti-diarrhea medication and can relieve gastrointestinal discomfort and pain (Hunter 182). More recently, however, "clay is eaten in Uganda as a perceived cure for AIDS" (Abrahams 68).

Geophagy is culturally valuable and normal in other ways beyond those connected with religion and medicine. For example, clay is commonly used as a remedy for nostalgia. Frate describes how it is common for a black woman of the South to send the daughter, who has moved away from her birth city, clay from her original home. This reminds the daughter of her family and the place where she grew up, relieving her possible anxieties about being away from the places and people she loves. Clay is a communication medium in this case. The use of clays as relief from nostalgia may also be found in Siberian tribes. The Siberian people once carried small balls of earth on their nomadic journeys. They ate them along the way; the taste reminded them of home (*Whole Earth* 42). African slaves were geophagists for a similar reason. They ate clay to become part of the earth, so that when they died, they would return to their homeland. This form of nostalgic relief is very similar to the theories proposed in Sidney Mintz's book, *Tasting Food, Tasting Freedom.* In the case of slaves, eating dirt may have been a way to become freer or to live in the liberation of memory and death, rather than the persecution and oppression of their current time.

Other reasons for soil consumption are of nutritional or physiological value. Soils are chosen by cultures based on location, color, flavor, softness, and plasticity. The soils are said to have a variety of flavor from sour and sweet to salty and chalky (Abrahams 66). After being chosen, the soil is prepared in a number of ways. Some cultures eat it raw; others bake it and eat it with salt and vinegar. Some even smoke the flavor from the clay. Clay has some nutritional benefits as a famine food, including its potential as a source for calcium and iron. The Ainu people of Japan recognized this potential and had a special recipe for clay-lump soup (*Whole Earth* 41). Clay may also be seen as a food substitute. For example, in 19th century

Sweden, soils were mixed with flour to produce bread. German workers used fine kaolinic clays as a butter substitute (Aufreiter 296).

Clay is most commonly used in conjunction with other food products or as a food additive. Through the structure and chemical composition of clay, certain foods that would normally be poisonous or unbearable become edible. The Aymara of Peru harness these detoxification properties of soil; they create a "neutralizing clay dip for feral potatoes which belong to the poisonous night shade family" (43). Those cultures that eat large quantities of acorns also incorporate the use of clay as a food additive. These acorn consumers use clay to neutralize normally indigestible tannic acids found within the nut, thus creating a nutritional, non-toxic food source through clay. Within the last century, soil still functioned as an additive in Sweden's bread to create a longer sensation of fullness (Hunter 190).

Many cultures believe that clay not only increases fertility, but also increases beauty. Just as the mud mask is now popular among the women of Western society in rejuvenating their skin, some cultures believe that when digested, the beauty and the fruits of the earth will appear on the exterior of the body. Dirt also provides beauty in another way—thinness. Paralleling today's American society, thinness was considered the most desirable and beautiful body shape amongst the Javanese women of 1895. They ate soil, known as ampo, in order to grow thin; in this case, feeling thin stemmed from the false feeling of fullness. In the Javanese culture, looking thin and frail was at this time highly regarded (Abrahams 73).

Conclusions

To review, geophagy has been proven to have health benefits. Soil can supply vital minerals such as iron, calcium, and potassium to a primary consumer or to a developing fetus. Clay is also a natural detoxifying agent; it can rid the body of harmful heavy metals and poisons. In addition, it can protect the body from bacterial and parasitical infections, cure diarrhea, relieve gastrointestinal pain, and deter nausea due to pregnancy. Furthermore, clay eating is not at all abnormal. Cultures all over the world from the United States, India, and Mexico, to Africa, Europe, and Japan practice geophagy; its boundaries are non-existent. Thus, the sheer extent to which clay consumption is practiced reserves its place in normal society. The cultural significance behind geophagy is at least as convincing it terms of its ordinary nature. Without a doubt, one cannot deny the religious, dietary, medicinal, cosmetic, psychological, and physiological value and symbolism behind this ancient practice.

So, if another one bites the dust, then is it correct to say that he is suffering from Pica? As stated, pica is defined as "an abnormal appetite for substances that are not fit to eat." With the proven benefits of geophagy, dirt is definitely fit to eat. In addition, geophagy has been shown to be normal through the exploration of its limitless practice and the plethora of cultural importance that it holds. Thus, geophagy is not to be considered a form of pica, but rather a deep-rooted, global culinary tradition, with infinite cultural meaning and significance.

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