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## Claimed Effects in the *Babylonian Talmud* (*Ketubbot* 60b) of Geophagia on a Child Given Birth to by a Soil-Eating Woman, and on the Iraqi *ṭīn khāw* — Kaolin used as Soap or a Cosmetic, or Eaten by Some Women, and Parallels from World Cultures

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**Abstract:** A passage in the *Babylonian Talmud* ascribes the effects of the ingestion of various foods or even non-foods on the child born to a woman who ate them. Soil-eating is mentioned, unfavourably. In fact, soil-eating is a cultural practice in several world cultures, and one of the contexts is gestational geophagy, the ingestion of soil by a pregnant woman. Both Jews and non-Jews in twentieth-century Iraq have had *ṭīn khāw* 'bulk mud' in their material culture. It was, and is, collected e.g. by Baghdadis on the banks of the river Tigris, and used as soap. It was processed with lime peel, to give it a citrus scent. Twenty-first century YouTube videos show *ṭīn khāw* (kaolin) being discussed by influencers, or used as a cosmetic by Iraqi women, in the form of flat cylindrical tablets, or even being nibbled and eaten as flakes by women, as a trendy practice recommended to modern women. Geophagia or geophagy, soil-eating, is a cultural practice found around the world. As a medical condition, it is a form of pica, i.e., the crave for ingesting inedible stuff). The spread of geophagia across world cultures is related to social factors, such as poverty. Geophagia is also found in non-human animal species. It carries both medical risks (e.g. infection with parasitic worms, poisoning from toxic minerals) and possible benefits (by diluting toxic substances found in the gut, or as an antacid, or by supplementing minerals of which the individual is deficient).

**Key Words:** Geophagia / geophagy (soil eating); Gestational geophagy; Kaolin; Iraq; *ṭīn khāw*; *Babylonian Talmud*; YouTube influencers; cosmetics.

Abstract

1. Introduction
  2. A passage from *Genesis Rabbah*, about the impoverished youngster Eliezer the son of Hyrcanus, who as a student eats clods of earth
  3. A passage in tractate *Hullin* of the *Babylonian Talmud*
  4. An oral tradition, transmitted intergenerationally, about an item in the material culture of the previous generation in their native locale
  5. Uses of *ṭīn khāw* in (Iraqi) Arabic YouTube videos up to 2022
  6. An intermediate remark about Iraqi *ṭīn khāw* and the Talmudic passage
  7. *Tin Khaw* in anthroponomastics
  8. Soap as a product whose manufacture was widespread since premodern times
  9. Clay-eating in earliest Paris?
  10. Flaky minerals in the sediments of the Tigris River
  11. Soil in the traditional *materia medica* of the Middle East
  12. Leishmaniasis
  13. Soil-tasting farmers were like urine-tasting physicians
  14. Gestational geophagia, from the Hippocratic corpus on
  15. The anthropology of geophagia: soil-eating's spread across world cultures, and social factors involved
  16. Risks to health of soil-eating
  17. Soil-eating by slaves
  18. Geophagia as a medical condition being a subcategory of pica (eating the inedible)
  19. Geophagia as practised by non-human animals
  20. Concluding remarks
- References

## 1. Introduction

This is an interdisciplinary study. We begin by identifying early rabbinic passages about soil eating (geophagia or geophagy), the first one in the context of poverty, and the other as ascribed to women who then give birth. In fact, in the modern sociology and anthropology of geophagia, it is precisely poverty and gestational geophagia that are prominent contexts for that pattern of behaviour.

The first instance we consider is from Roman Palestine (a fifth-century homiletic collection originating there, which relates an anecdote about the youth of a prominent rabbi of the second half of the first century). The second passage is from the *Babylonian Talmud*, and is in folk beliefs concerning the effect of mothers' behaviour on features of their children. The locale being Sasanian Mesopotamia leads us to a modern ethnographic exploration of the use in Iraq of about *ṭīn khāw*, from river banks (in Baghdad, it is from the banks of the river Tigris) as food, or in *materia medica*, in particular to treat the boil of leishmaniasis (which is also a subject of this paper), or in cosmetics.

After a parenthesis about another riverine city, Paris (was the ancient name, *Lutetia*, or Paris, related to clay-eating?), we turn to the mineralogy of the sediments of the Tigris, and then we take a wider view of geophagia. This is a subject we discuss in detail, and a survey of that topic in several sections takes the bulk of this article, rather aptly for foodstuff that is definitely *bulk*. This is justified, as the subject is fascinating, ranging from geology, to anthropology, to medicine, to zoology, to the history of slavery, and so forth.

## 2. A passage from *Genesis Rabbah*, about the impoverished youngster Eliezer the son of Hyrcanus, who as a student eats clods of earth

Rabbi Yohanan ben Zakkai is traditionally credited with saving rabbinic learning and Judaism by escaping besieged Jerusalem, and getting per mission from the Roman general Vespasian,<sup>1</sup> a hate figure in Jewish tradition,<sup>2</sup> to establish a rabbinic school in Yavne/Jamnia. One of his pupils is claimed by hagiography to have been Eliezer, the son of Hyrcanus. The latter is claimed to have been a wealthy landowner.

The following Hebrew text is a brief, partial version of that tale, as found in *Genesis Rabbah* 42:1, curiously in the context of homiletic exegesis about the coalition of kings who raid the Dead Sea Pentapolis and take Lot prisoner (in chapter 14 of *Genesis*):

וַיְהִי בַיָּמִי אֲמַרְפֵּל מֶלֶךְ שְׁנַעַר (בראשית יד, א), רַבִּי יְהוֹשֻׁעַ  
 דְּסַכְנִין בְּשֵׁם רַבִּי לְוִי פֶתַח (תהלים לז, יד טו): חָרַב פְּתַחוֹ רְשָׁעִים  
 וּגּוֹ' חָרַבְםָ תָּבוֹא בְּלַבָּם וּגּוֹ', מַעֲשֵׂה בְּרַבִּי אֱלִיעֶזֶר בֶּן הַיִּרְקָנוֹס  
 שֶׁהָיוּ אֲחָיו חוֹרְשִׁים בְּמִישׁוֹר וְהוּא חוֹרֵשׁ בְּהָר וְנִפְלָה פָּרְתּוֹ  
 וְנִשְׁבְּרָה, אָמַר לְטוֹבָתִי גִשְׁבְּרָה פָּרְתִי, בָּרַח וְהִלֵּךְ לוֹ אֶצֶל רַבִּי  
 יוֹחָנָן בֶּן זַכַּאי, וְהָיָה אוֹכֵל קוֹזְזוֹת אַדְמָה, עַד שֶׁעָשָׂה פִּיּוֹ רֵיחַ רַע,  
 הִלְכוּ וְאָמְרוּ לְרַבִּי יוֹחָנָן בֶּן זַכַּאי רֵיחַ פִּיּוֹ שֶׁל רַבִּי אֱלִיעֶזֶר קָנְשָׁה  
 לוֹ, אָמַר לוֹ כְּשֵׁם שֶׁהִבְאִישׁ רֵיחַ פִּיּוֹ עַל הַתּוֹרָה, כִּי יְהִי רֵיחַ  
 תְּלַמוּדָהּ הוֹלֵךְ מִסּוּף הָעוֹלָם וְעַד סוּפוֹ. לְאַחַר יָמִים עָלָה אָבִיו  
 לְנִדּוּתוֹ מִנְּכֶסֶיו, וּמִצָּאוּ יוֹשֵׁב וְדוֹרֵשׁ וּגְדוּלֵי מְדִינָתוֹ יוֹשְׁבִים לְפָנָיו,  
 בֶּן צִיצִית הַפֶּסֶת וְנִקְדִּימוֹן בֶּן גּוֹרִיוֹן וּבֶן כְּלָבָא שְׁבוּעָה, וּמִצָּאוּ יוֹשֵׁב  
 וְדוֹרֵשׁ הַפֶּסוּק הַזֶּה, חָרַב פְּתַחוֹ רְשָׁעִים וּגּוֹ', זֶה אֲמַרְפֵּל וְחַבְרִיו.  
 לְהַפִּיל עָנִי וְאֲבִיוֹן, זֶה לוֹט. לְטָבוֹחַ יִשְׂרָאֵל דָּרָה, זֶה אֲבָרְהָם. חָרַבְםָ  
 תָּבוֹא בְּלַבָּם, (בראשית יד, טו): וַיִּחַלֵּק עֲלֵיהֶם לִילָה הוּא וַעֲבָדָיו  
 וַיִּכְּסוּ. אָמַר לוֹ אָבִיו בְּנִי לֹא עָלִיתִי לְכָאן אֶלָּא לְנִדּוּתָהּ מִנְּכֶסֶי,  
 עַכְשָׁיו הָרִי כָּל נְכֶסֶי גְתוּנִים לָךְ מִתְּנָה. אָמַר הָרִי הֵם עָלִי חָרַם וְאִינִי  
 אֶלָּא שׁוֹהַ בָּם כְּאֲחֵי. דָּבָר אַחֵר, חָרַב פְּתַחוֹ רְשָׁעִים וְדָרְכוּ, זֶה  
 אֲמַרְפֵּל וְחַבְרִיו.

Highlighted in yellow is “and he was eating *qozezot adamah* (clods of earth)”.

<sup>1</sup> Vespasian's name was adapted as *Aspasyanos*, in early rabbinic Jewish texts, by likely attraction to the Greek personal name *Aspasia*.

<sup>2</sup> His son is even more prominently a hate figure, in the Jewish collective memory, since early rabbinic corpus. Both Vespasian and Titus became the subjects of folkloric reconception.

At the time of my present writing, the English public-domain translation at the Sefaria database<sup>3</sup> is not yet complete, for this part of *Genesis Rabbah*, so I am translating it myself:

“It came upon to pass, at the time of Amraphel, King of Shinar” (*Genesis* 14:1). Rabbi Joshua of Sikhnin, in the name of Rabbi Levi, began [his exposition of this as follows, by citing from *Psalms* 37, 14–15]: “A sword they unsheathed [literally: opened], the wicked ones” etc., “Let their sword penetrate [literally: come into] their heart” etc. It came upon to pass, concerning Rabbi Eliezer ben Hyrcanus, that his brothers were ploughing in the plain, whereas he was ploughing on the mountain, and his cow fell and was broken [i.e., her bones were broken]. He said: “It was to my advantage, that my cow was broken”. He fled and went to Rabbi Yoḥanan ben Zakkai, and he [this new pupil] used to eat clods of earth, so much so that his mouth became smelly. They [other pupils] went and told Rabbi Yoḥanan ben Zakkai: “The smell of the mouth of Rabbi[!!!] Eliezer is difficult for him [i.e., is barely tolerable”. He [the teacher] told him [Eliezer]: “Just as the odour of thy mouth became putrid for [the sake of] the Law, likewise let the odour of thy study go [i.e., expand] in the world from end to end”. Some time later, his father came up in order to down him, and found him sitting and expounding, and the notables of his city were sitting in front of him, Ben Tsitsit ha-Kassat, and Nakdimon ben Gurion, and Ben Kalba Savua, and he found him explaining this verse, “A sword they unsheathed [literally: opened], the wicked ones” etc., this is Amraphel with his companions. “To cause the fall of the poor and the needy”, this is Lot [who had been rich but became helpless], “To massacre those whose path is righteous”, this is Abraham. “Let their sword penetrate [literally: come into] their heart” etc. “And he [Abraham] divided [his armed men] upon them [the raiding party], he and his servants, and he defeated them” (*Genesis* 14:15). His father told him: “My son! I had come up here for no other purpose than to disown thee from my assets. Now all my assets are given to three as a present”. He [Eliezer] said: “I swear they are forbidden to me, and I shall only be equal, concerning them, to my brothers”. Another interpretation: “A sword they unsheathed [literally: opened], the wicked ones, and they stretched [their longbow]”, this is Amraphel with his companions.

Early rabbinic hagiography has it that Eliezer was a young farmer, the son of a wealthy landowner, and went to study, without seeking permission his brothers stressed to their father that Eliezer had defected. When the father went to a rabbinic academy with the intention of disowning that son of his, he was surprised and thrilled to see Eliezer deliver a lecture in front of famous notables, Nakdimon (Nicodemus) ben Gurion and Ben Tsitsit ha-Kassat (the two tycoons whose food warehouses were later feeding the Jerusalemites during the Roman siege, but were allegedly set on fire by Zealots in order to compel the locals to fight, as a very long siege may have resulted in surrender provided the Zealots were extradited), and Ben Kalba Savua.

The latter appears in this tale, even though he is not known to have been a Jerusalemite (but then Hyrcanus was not). He is claimed in hagiography to have been the unwilling father-in-law of the future Rabbi Akiva, while the latter was still an illiterate shepherd: his daughter eloped with this man she liked and then prodded him to study, whereas her father vowed that she would never again have any benefit from him, and this plunged her into penury while her husband was away studying. Her father was only being able to rescind his vow upon seeing his son-in-law, now a famous and revered rabbi. Probably this other rich man is inserted in this version of the tale about Eliezer ben Hyrcanus because he, too, like Hyrcanus, waived his

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<sup>3</sup> [https://www.sefaria.org/Bereishit\\_Rabbah.42.1?vhe=Midrash\\_Rabbah\\_-\\_TE&lang=bi&with=all&lang2=en](https://www.sefaria.org/Bereishit_Rabbah.42.1?vhe=Midrash_Rabbah_-_TE&lang=bi&with=all&lang2=en)

opposition once he witnessed the honour in which the target of his opposition had come to be held.

The Hebrew genitival compound *qozezot adamah* for “clods of earth” is already found in an early third-century text, namely, in the *Mishnah*, tractate *Ma'aser Sheni* [Second Tithe] 5: 1:

כָּרֶם רְבָעִי, מְצִינִין אוֹתוֹ בְּקוֹזְזוֹת אֲדָמָה, וְשָׁל עֶרְלָה  
בְּחֶרְסִית, וְשָׁל קְבָרוֹת בְּסִיד, וּמְמַחָה וְשׁוֹפֵךְ.

A vineyard in its fourth year, they mark it with clods of earth, and of *orlah* [i.e., fruit-trees or vines in their first three years: their fruit is forbidden for consumption] with potter's clay, and graves [which would defile those in a state of ritual purity] with lime which is dissolved and poured on.

### 3. A passage in tractate *Hullin* of the *Babylonian Talmud*

The *Babylonian Talmud* was developed in Sasanian times in pre-Islamic central Iraq (its editing continued into the early Islamic period). It is written in a mix of Middle Aramaic and the so-called Tannaitic B stratum of Hebrew. Its tractate *Ketubbot* [Marriage Writs] is concerned with nuptial contracts, detailing the obligations of the husband towards his wife.

The following passage, from the *Gemara* (elaboration) in *Ketubbot* 60b, is concerned with expected undesirable or desirable effects of a mother's behaviour (in what she ingests, or other behaviour) on her children to be born. The original Aramaic is quoted below, with the diacritical marks of the vowels as published online in the public domain in the *sefaria.org* database. This is followed with their translation (also in the public domain): the original text is translated in boldface, and what is not bold in the translation's typeface is in-text commentary (their brackets, our underlining>):

דְּמִשְׁמָשָׂא בִּי רִיחָא — הוּוּ לֵה בְּנֵי נִכְפִּי. דְּמִשְׁמָשָׂא עַל  
אַרְעָא — הוּוּ לֵה בְּנֵי שְׁמוּטִי. דְּדַרְכָּא עַל (רְמָא) [דְּמָא]  
דְּחֶמְרָא — הוּוּ לֵה בְּנֵי גִירְדְּנִי. דְּאַכְלָה חֶרְדְּלָא — הוּוּ  
לֵה בְּנֵי זְלִזְלָנִי. דְּאַכְלָה פְּחֻלִי — הוּוּ לֵה בְּנֵי דוּלְפָנִי.  
דְּאַכְלָה מוּנִינִי — הוּוּ לֵה בְּנֵי מְצִינִי עֵינָא. דְּאַכְלָה  
גְּרָגוּשְׁתָּא — הוּוּ לֵה בְּנֵי מְכוּעְרִי. דְּשִׁתְּיָא שִׁיכְרָא —  
הוּוּ לֵה בְּנֵי אוּפְמִי. דְּאַכְלָה בִישְׂרָא וְשִׁתְּיָא חֶמְרָא — הוּוּ  
לֵה בְּנֵי בְּרִי. דְּאַכְלָה בִיעֵי — הוּוּ לֵה בְּנֵי עֵינִי. דְּאַכְלָה  
כוּוּרִי — הוּוּ לֵה בְּנֵי חֵינִי. דְּאַכְלָה פְּרָפְסָא — הוּוּ לֵה  
בְּנֵי זִינְתָנִי. דְּאַכְלָה כּוּסְבִּרְתָּא — הוּוּ לֵה בְּנֵי בִישְׂרָנִי.  
דְּאַכְלָה אֲתְרוּגָא — הוּוּ לֵה בְּנֵי רִיחָנִי. בְּרִתִּיהָ דְּשִׁבּוּר

מִלְכָּא אֶכְלָה בֵּיה אִמָּה אֶתְרוּגָא, וְהוּוּ מְסָקִי לָהּ לְקַמֵּיהּ  
אֲבוּהַּ בְּרִישׁ רִיחָנֵי.

The Gemara cites other possible consequences of a mother's behavior that could affect her children: **A woman who engages in intercourse in a mill will have epileptic children; one who engages in intercourse on the ground will have long-necked children; one who steps on a donkey's dung when pregnant will have bald children; one who eats mustard during pregnancy will have gluttonous children; one who eats garden cress [*tahlei*] will have tearful children; one who eats fish brine [*moninei*] will have children with blinking eyes; one who eats soil will have ugly children; one who drinks intoxicating liquor will have black children;**<sup>4</sup> one who eats meat and drinks wine during pregnancy will have children who are healthy; one who eats eggs will have large-eyed children; one who eats fish will have graceful children; one who eats celery will have beautiful children; one who eats coriander [*kusbarta*] will have corpulent children; and one who eats *etrogim* will have sweet-smelling children. It is related with regard to the daughter of King Shapur of Persia, that her mother ate *etrogim* while pregnant with her and they used to place her in front of her father on top of all the spices, as she was so fragrant.

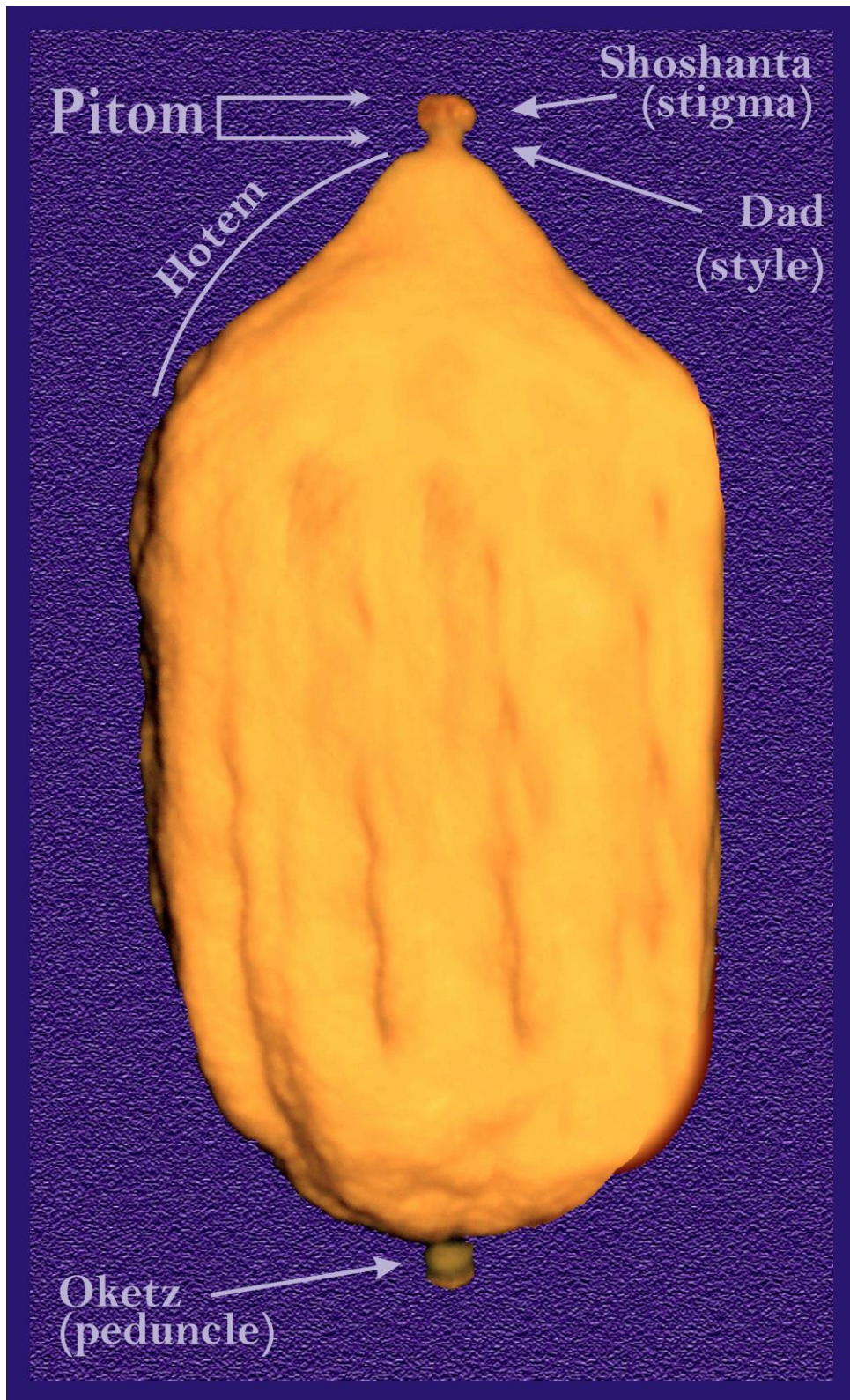
*Etrogim* are citrons (*Citrus medica*),<sup>5</sup> the earliest citrus to be available between Mesopotamia and the Mediterranean, and one used in the Jewish rites of the Feast of Tabernacles. Citrons are fragrant. At present, after nearly two thousand years of selective breeding, citrus contains very little flesh, and a very thick rind. The peel is bitter; some Jews (I have tried this) slice them and pour boiling water they throw away (at least) seven times, and then they cook them in water with much sugar and honey; after replacing the boiling water seven times, on the latest festival of Chanukah (in December 2022) I cooked a sliced *etrog* (which I had used on the Feast of Tabernacles in the autumn) for 45 minutes in water in an aluminium foil at 180 °C in an ordinary electrical oven, and the outcome was chewable slices, pleasantly bittersweet.

<sup>4</sup> A possible reason for the statement about a heavy-drinking mother (or one who even just once had an intoxication event during pregnancy?) getting children whose skin is black (thus running counter to the aesthetics documented to have emerged in late antiquity, in both the Roman / Byzantine Empire, and the Sasanian Empire), is that the Aramaic and Hebrew lexical root *škr* (with the middle radical phoneme /k/ taking the value [x], i.e., *kh*, as an allophone) being associated with intoxication and intoxicating drinks, whereas the Hebrew lexical root *šhr* is associated with blackness (and with dawn, because of the black sky before dawn).

It is as though Aramaic *šikhra* שִׁיכְרָא 'intoxicating liquor' (Hebrew *šekhár* שֶׁכָּר 'beer')

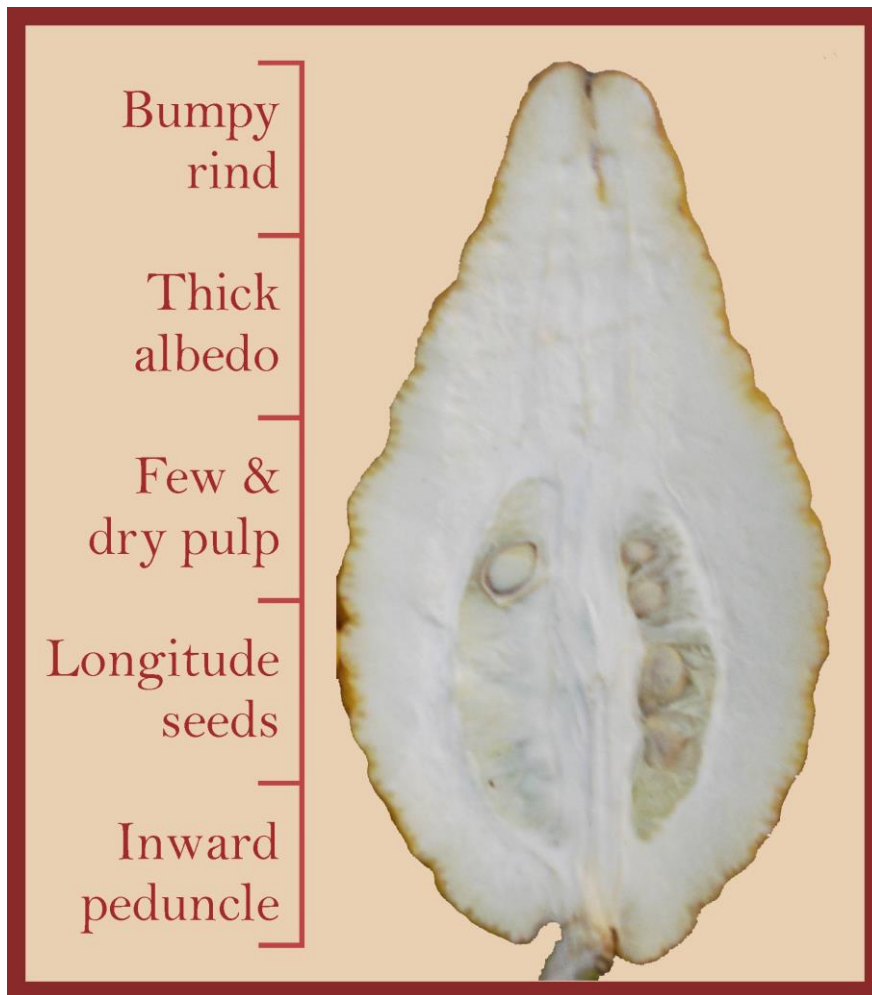
were suggestive of Hebrew *šahór* שָׁחַר 'black'.

<sup>5</sup> See <https://en.wikipedia.org/wiki/Citron> and <https://en.wikipedia.org/wiki/Etrog>



An outside view of an etrog, and Jewish (Hebrew or Aramaic) names for features salient for its suitability for ritual use during the Feast of Tabernacles (Sukkot).<sup>6</sup> *Piṭmá* (also *piṭom*) literally means ‘nipple’. *Hótem* literally means ‘nose’. *Ókets* literally means ‘sting’. *Dad* literally means ‘breast, udder’. *Shoshánta* is Aramaic (originally for ‘lily’, but later perceived as denoting ‘rose’) used in Hebrew for ‘rosette’.

<sup>6</sup> [https://commons.wikimedia.org/wiki/File:Etrog\\_diagram.jpg](https://commons.wikimedia.org/wiki/File:Etrog_diagram.jpg)



Indicators (*simaním*) of a kosher *etrog* (*Citrus medica*) of the Baladi cultivar (cultivated variety).<sup>7</sup>

What is of special interest to us here in the quotation from tractate *Ketubbot* is this statement:

דְּאָכְלָה גַּרְגוּשָׁתָא — הִוּוּ לָהּ בְּנֵי מְכוּעָרִי.

*De'akhla gargushta, havu lah bnei mekho'arei.*

One who eats soil, she will have ugly children.

In this article, we are going to make sense of this reference to soil-eating women, with special reference to the practice in Iraq in recent generations, and still in the present.

<sup>7</sup> [https://commons.wikimedia.org/wiki/File:Citron\\_Balady\\_Etrog\\_Simanim.jpg](https://commons.wikimedia.org/wiki/File:Citron_Balady_Etrog_Simanim.jpg)



#### 4. An oral tradition, transmitted intergenerationally, about an item in the material culture of the previous generation in their native locale

My late mother, who was born in Baghdad in 1927 and passed away here in London in 2019, told me more than once about a kind a clay of the Tigris River bank traditionally used as soap, in particular as shampoo for washing one's hair (and apparently, historically also eaten by some). Its name is

طين خاو

*ṭīn khāw* (*ṭīn hāw*), i.e., literally, 'bulk mud', as in "You need bulk", as a dietitian once told me here in London. *Khāw* 'bulk' is something you need in your tummy to contrast acid, or then to fill your stomach, and you usually get that from carbohydrates.

Trying to understand whether *ṭīn khāw* is kaolin (which is white, and is a kind of soil more widely consumed by world cultures that practise soil-eating, i.e., geophagia or geophagy), I inquired with my maternal aunt (born in Baghdad in 1942), who explained that *ṭīn khāw* is cement-coloured, grey, and that at any rate, this is what it looks once it has been mixed with lime peel. I reckon that this is intended to enrich *ṭīn khāw* with a pleasant scent when intended for use as a soap.

#### 5. Uses of *ṭīn khāw* in (Iraqi) Arabic YouTube videos up to 2022

The YouTube video <https://www.youtube.com/watch?v=hfQCxTuDTN0> is about cosmetics, and in it, two Iraqi ladies discuss in Arabic cosmetic creams, and refer to *ṭīn khāw*, as I found out by searching the Web for that compound as written in the Arabic script:

طين خاو

That video's length is 31 minutes, and frankly, after six minutes I did not keep listening until *ṭīn khāw* as a cosmetic would also be mentioned. However, the same search also returned a Facebook page advertising a pharmacy, as well as several images showing white pieces of what is definitely kaolin. What is more, an image also shows a plastic bag with inside, small flat cylinders of whitish mineral, this being kaolin, and this is intended as a cosmetic. I also found among the results a YouTube video<sup>8</sup> that in both English and Arabic suggest: "Eat yellow clay and swallow", while a woman was about to eat a whitish and yellowish flat plate of mineral (shaped almost like a flat plate of slate, but clearly much softer).

The YouTube videos returned when searching for the compound *ṭīn khāw* as written in the Arabic script were each presented by the inference engine with quoted Arabic text beneath the one still from the given video that was being shown. Not all those videos were necessarily from Iraq. What is more, clearly some of the videos were filmed in countries using the Cyrillic script (appearing in the caption of the still shown), or even in Anglo-Saxon countries (with an English label promoting soil-eating), and this reflects a niche culture that makes it trendy for a woman to nibble at

<sup>8</sup> [https://www.youtube.com/watch?v=sEuOc\\_bW0cY](https://www.youtube.com/watch?v=sEuOc_bW0cY)

a flake of white or grey soil, and yet, those videos were returned with text quotations in Arabic, for some Arab audiences whose culture possesses such uses of soil.



A Web search<sup>9</sup> just for images for that Arabic compound as in the Arabic script returned images (from videos, some of them with Cyrillic labels) showing assemblies of fragments of mineral, in some images white, in others light grey (cement-like, as my aunt had said), or whitish-yellowish indeed. One of the images (from a YouTube video) shows a lady eating a grey piece of clay, rather than a yellowish one. Yet another one shows a lady eating thin fragments from a big piece of white kaolin she is holding in her hand.



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<sup>9</sup> <https://www.bing.com/images/search?q=%22d8%b7%d9%8a%d9%86+%d8%ae%d8%a7%d9%88%22&qpv%22d8%b7%d9%8a%d9%86+%d8%ae%d8%a7%d9%88%22&form=IQFRML&first=1&tsc=ImageHoverTitle>









## 6. An intermediate remark about Iraqi *ḥīn khāw* and the Talmudic passage

Clearly, what turned up in the previous two sections provides clarification for soil-eating women as mentioned in the *Babylonian Talmud*. But in the latter, as the context is the outcome on babies born to women who ingest various things, it may be that soil-eating is in the context of gestational geophagy. Or perhaps the urge to eat soil is motivated by hookworm disease (but if soil is infected with faeces, soil-eating itself may bring about such an infection).

## 7. *Tin Khaw* in anthroponomastics

Prior to carrying out the Web search for *ḥīn khāw* as per its spelling in the Arabic script,

طين خاو

I had used a search engine to search the Web for “tin khaw” (romanised that way), and this retrieved a webpage at a genealogy website:<sup>10</sup> it stated that Vikram Airi was born circa 1964, and married Tin H. Khaw (born in 1963) in Ohio in 1996.

There exists a Facebook page<sup>11</sup> of Khaw Tin, a man of Asian background, a Facebook employee living in Indianapolis. He was schooled in Dagon, i.e., Dagon Township, “located immediately north of downtown Yangon”<sup>12</sup> (this being Rangoon, the capital city of Myanmar, formerly Burma), and the site of the famous golden Shwedagon Pagoda.

Clearly, the personal names Tin Khaw and Khaw Tin are unrelated to the Iraqi Arabic sense of *ḥīn khāw*.

## 8. Soap as a product whose manufacture was widespread since premodern times

Soap manufacture has been quite widespread, also in the premodern period, in Europe and the Middle East. Jews were not only consumers of soaps, but often also involved in its manufacture or trade. Let us sample relevant data. “[A]s the [Cairo] geniza [repository of discarded documents] has taught us, the Mediterranean economy was not about silk and jewels, but about soap and flax” (Rustow 2020, p. 442).

Writing in the *Encyclopaedia Judaica, Second Edition*,<sup>13</sup> about the Jews of Marseilles in the 14th and 15th centuries, Morton Rosenstock remarked: “The Jewish surname Sabonarius has led to the belief that it was the Jews who introduced the soap industry to Marseilles” (2007, p. 578).

The King of Aragon, Pedro IV (who was to reign until 1387), conquered the Balearic Isles in 1343. Writing about Majorca, Haim Benart related: “In 1381 Pedro IV appointed Solomon b. Abraham Benallell as *mustaṣaf* (‘town market supervisor’) over the Jews of Majorca in appreciation of his services, also leasing him the right to manufacture soap on the island. Granting him a ‘rabbinical’ position in

<sup>10</sup> [https://www.myheritage.com/names/tin\\_khaw](https://www.myheritage.com/names/tin_khaw)

<sup>11</sup> <https://www.facebook.com/people/Khaw-Tin/100006224477878/>

<sup>12</sup> [https://en.wikipedia.org/wiki/Dagon\\_Township](https://en.wikipedia.org/wiki/Dagon_Township)

<sup>13</sup> Freely accessible from <http://www.bjeindy.org/resources/library/access-to-encyclopedia-judaica/>

Palma, he authorized him to appoint a ritual slaughterer or to slaughter for the requirements of the community” (2007, p. 412).

“At first the Jews in Leghorn [i.e., Livorno in Tuscany] specialized in certain industries, such as working of coral, which they exported as far as Russia and India, and soap and paper manufacture. Later, they utilized their family and commercial connections in various ports of the Mediterranean to develop a widespread bilateral trade” (Milano and Guetta 2007, p. 608).

In Kozienice, a town in the Kielce province of Poland, “[i]n the 1780s, through Jewish initiative, a soap factory was established in the town. From 1791 the Jews of Kozienice also engaged in the production of stockings”, states, on p. 331, Vol. 12 of the *Encyclopaedia Judaica, Second Edition*, crediting for authorship the old *Encyclopaedia Judaica* from Germany,<sup>14</sup> in the entry for Kozienice on pp. 330–331. Let us turn to the entry for Kalisz, a city in Poznan province. “After the economic standstill resulting from the Polish uprising (1863–64) came to an end, and following the opening of the railway (1871), Jews with capital opened factories for soap, candles, and liqueurs, and in the 1870s began to develop the lace industry in Kalisz which soon became celebrated on the Russian and Chinese markets”, states a section by Arthur Cygielman within that entry, p. 739 in that same volume. In the Vol. 19, on p. 166, at the beginning of the entry for Staszów, a town in the Kielce province, Shimshon Leib Kirshenboim (2007) states: “The Jewish settlement there developed from the beginning of the 18th century. In 1765 there were 609 Jews paying the poll tax in Staszow and 169 in the surrounding villages. Jews in this period were occupied in tailoring, hatmaking, goldsmithery, glaziers, and soap manufacture”.

In “Milwaukee, Wisconsin’s largest city, located on the southeast tip of the shores of Lake Michigan [...] [f]rom 1895 into the 1920s Jews owned many clothing factories and retail shops. Wholesale dry goods, knitting goods, and yarn mills were developed with Jewish initiative. Jews had a substantial presence in flour milling, soap, and tobacco manufacturing and department store enterprises” (Zaret 2007, p. 261).

In Kolin, a city in central Bohemia, after the German conquest in 1938, “[a]bout 600 Jews organized themselves for collective emigration and were offered the support of the French government in establishing a settlement in New Caledonia, but with the outbreak of World War II the project could not be realized. In January 1940 Jewish shops were confiscated, three months sooner than in the rest of the German protectorate of Bohemia and Moravia. Jewish women were forced to work in a local soap factory” (Herman and Lamed 2007, p. 273). In the end, the Jews of the city were exterminated.

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<sup>14</sup> “Encyclopedias are important reference works. They are meant to summarize the state of knowledge in any given field and convey it to both the layperson and the scholar in a clear, concise manner. For Jews and Judaism, the first major effort in this regard was the [New York] *Jewish Encyclopedia* of 1906, which drew upon the knowledge of a cadre of European and American scholars of the Science of Judaism (Wissenschaft des Judentums). Its successor the German *Encyclopaedia Judaica* began to appear in 1929 but was interrupted in 1934 by the rise of Nazism. It had only reached the end of the letter L. After the war, efforts resumed which resulted in the production of two major encyclopedias, The Hebrew *Encyclopaedia Hebraica (ha-Entsiklopedyah ha-Ivrit)*, completed in 1982, and the English *Encyclopaedia Judaica* (henceforth *EJI*), which first appeared in 1971 followed by a corrected edition in 1972. Both works were published in Israel and are considered to be major achievements. The latter used a lot of material from both its German and Hebrew predecessors” (Walfish 2011, pp. 195–196).



In the entry for Lebanon in the *Encyclopaedia Judaica, Second Edition*, Vol.12, different sections are credited to different authors. On pp. 578–579, Eliyahu Ashtor mentions Jewish involvement in the manufacture of soap, when stating:

There were also Jews living in the village districts. In the town of Deir al-Qamar in Mount Lebanon, situated halfway between \*Beirut and \*Sidon, there was a Jewish community (80 families at the beginning of the 19th century), which engaged in agriculture and the breeding of silkworms as well as commerce, the manufacture of soap, and the extraction of some iron from the surrounding ore deposits. Some Jews also lived in villages within the direct or outlying vicinity of Deir al-Qamar (including Mukhtara, 'Ayn Qanya, 'Ayn Zahlata, and others). The common factor which characterized almost every one of these Jewish concentrations was their dependency on the Druze inhabitants, with whom they coexisted on friendly terms. In 1860, as a result of the inter-communal war between the Druze and the Maronites of Lebanon, the Druze gradually abandoned the region of Deir al-Qamar. by the Jews who settled in Beirut, the town of Aley (southeast of Beirut), and Sidon.

As for the general population of some cities, note that traditionally, the economy of Nablus was based on the manufacture of soap, making use of the produce of the olive trees grown (then as now) in the region. “In the early 18th century Jaffa was the manufacturing and export center of the ‘Jaffa soap’ industry, and apparently, the first oranges in Palestine were grown in Jaffa”, Joseph Braslavi (Braslavski) states in the section about the pre-Napoleonic Ottoman period in the entry for Jaffa in the *Encyclopaedia Judaica, Second Edition*, Vol. 12, on p. 62. “Changes took place in Jaffa’s sea trade in the 50 years preceding World War I. Exports of grains and olive oil nearly ceased, but more sesame and sesame oil, watermelons, and particularly citrus fruit and soap were exported. Imports began to exceed exports in volume, as new products — petrol, building wood, cement, paints, caustic soda (as a raw material for soap production), European flour and machines — arrived” (*ibid.*). “In 1913 exports came to £745,413, and imports to £1,312,695: citrus fruit (with 1,400,000 cases worth £297,000) and soap (6,250 tons worth £200,000) came first” (*ibid.*). In the pre-Ottoman, Mamluk period, “Jerusalem produced soap, manufactured from the olive oil which was supplied by the villages of central Erez [i.e., Land of] Israel, but the Mamluk authorities encroached upon this industrial activity, e.g., by the establishment of monopolies and the forced purchase of large quantities of the raw material at high prices”, the same volume states on p.159, in a section credited to Eliyahu Ashtor and Haïm Z’ew Hirschberg. As for the Ottoman period, Jerusalem underwent decline: “Apart from soap and Christian religious objects, almost nothing was manufactured in Jerusalem which could be exported to other districts or abroad. Nor did local trade play an important role in the city, since industry and craft did not develop in Jerusalem, which had no fertile rural areas surrounding it. Jewish, Muslim, and Christian sources were therefore justified in repeatedly emphasizing that most of the city’s inhabitants were extremely impoverished” (*ibid.*, p. 162).

## 9. Clay-eating in earliest Paris?

Bear in mind that in Roman antiquity, Paris was known as Lutetia Parisiorum, and this has been etymologised from *lutum*, Latin for ‘mud’ (but it is more cogent that the etymon is the Celtic root *lut* for a marsh or a swamp), with reference to the fat clay of the Île de la Cité, which apparently attracted prehistoric people because their foraging could be supplemented with eating clay. At any rate, the remains of a Neolithic

settlements have been found at the former site of the city, founded again in the middle of the third century B.C.E. by the Parisii, a Gallic tribe.<sup>15</sup> The Neolithic remains are along the Seine, at Bercy and close to the Louvre.

## 10. Flaky minerals in the sediments of the Tigris River

Mineral composition in the soil of the Iraqi alluvial plain is the subject of Saleh and Muhemied (2010). Kaolinite in Iraqi soil was researched by Raad A. Al-Tamimi (2021).<sup>16</sup> He was concerned with the “difference among the studied soils which formed from Tigris and Euphrates alluvium material with regard to the presence of soil chlorite and kaolinite” (*ibid.*). Citing earlier studies, Tamimi remarks (2021, p. 32):

There was a contradiction between these studies in the ratio of kaolinite in these soils type. Some of these studies indicated that it is the third component, while others reported that its ratio is low and it is between 5–10% in Iraqi alluvial soils. This contradiction is probably due to the difficulties to recognize the mixture of clay minerals components in the same sample using routine x-ray diffraction analysis (XRDA).

Also see “Nature of clay minerals of some Iraqi soils” (Al-Tamimi et al. 1989). X-ray diffraction<sup>17</sup> as applied to kaolinite is the subject of Jackson and Abdel-Kader (1978).

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<sup>15</sup> See <https://en.wikipedia.org/wiki/Lutetia> “The original location of Lutetia, the early capital of the Parisii, is still disputed by historians. Traditionally, historians had placed the settlement on the Île de la Cité, where the bridges of the major trading routes of the Parisii crossed the Seine. This view was challenged after the discovery between 1994 and 2005, during the construction of a highway, of a large early Gallic settlement in Nanterre, in the suburbs of Paris. This is composed of a large area of several main streets and hundreds of houses over 15 hectares. Critics also point out the lack of archaeological findings from the pre-Roman era on the Ile de la Cité. ¶ Other scholars dispute the idea that Lutetia was in Nanterre. They point to the description given by Julius Caesar, who came to Lutetia to negotiate with the leaders of the Gallic tribes. He wrote that the oppidum, or fortress of Lutetia, which he visited, was on an island. In his account of the war in Gaul, ‘De Bello Gallico’, Caesar wrote that, when the Romans later laid siege to Lutetia, ‘the inhabitants had burned their structures and the wooden bridges which served to cross the two branches of the river around their island fortress’, which appears to describe the Île de la Cité” (*ibid.*).

<sup>16</sup> He used to be affiliated with the College of Agriculture of the University of Diyala, is no longer there, and was never ever in contact with me: this is something that needs to be emphasised, given the recent reaffirmation by the Iraqi legislature of liability to custodial sentences and the death penalty for such Iraqi citizens who enter contact with “Zionists”, which even before Baathist rule was a code-name for Jewish persons as an excuse for penalising them for their ethnic guilt. It is somewhat surreal, yet a fact of life, that in research that pertains in Iraq, I could not contact academics there, and in fact, I grew up reiterating that I should never name persons who helped or even saved the lives of her family back in Iraq, lest they or their families be harmed (out of anti-Jewish delirious sentiment).

<sup>17</sup> X-ray diffraction is a subject on which I co-authored a paper (Kimmel et al. 2009). “Diffraction is a special case of the scattering of wave or particles into discrete directions. The modern definition of a crystalline material is as follows: a crystalline material diffracts any radiation with a wavelength below the interatomic distances. The common radiation source is x-rays, which can easily be produced even in small laboratories. Other sources, like neutrons or synchrotron beams, are limited to central regional laboratories” (*ibid.*, p. 283). “In materials science and physical chemistry, the definition of a phase is: a portion of a material in which all the intensive properties, such as density or specific heat capacity, are continuous variables in any coordinate systems. The phases are divided into three groups: alloys, compounds, and pure elements. An alloy is a phase with more than one element existing in a wide composition range. A compound is a phase that consists of more than one element in a fixed composition. A pure element is a phase consisting of a single element. ¶ In this article, by the concept of crystalline phases (CPs) we will be referring to any particular state of material that is defined by the exact molecular and crystallographic structure. Based on this definition, even a slight difference in

Research into Iraq's geology has looked into flaky minerals in sediments of the Tigris River, but apparently more so by considering the geology of northern Iraq. At the ResearchGate repository of scholarly papers and elsewhere, I have come across some such geology papers in English, and among their authors, a constant co-author, and perhaps the most mature scholar (but roughly of the same generation and maturity as Al-Tamimi), is Ali Ismail Abdulla Al-Juboury, of the University of Mosul, a city that like Baghdad, is on the River Tigris (but Mosul is on its western bank, whereas Baghdad is mostly on its eastern bank). Al-Juboury and Ghazal (2008) write:

Flaky minerals such as muscovite, biotite and chlorite, can constitute up to 60% of the total heavy mineral fraction from recent sandy sediments of the Tigris River at certain locations in northern Iraq. Chemical analyses of the studied white mica indicate that they are of late to post-magmatic and hydrothermal types with close affinities to the mica composition in mica-schist.

Al-Juboury and Al-Miamary (2009) are concerned with heavy minerals in sand of the Tigris in northern Iraq. They write that “the sandy sediments of the Tigris River are finer than those of the Greater and Lesser Zab rivers [eastern tributaries of the Tigris somewhat downstream of Mosul] and other seasonal tributaries. these sediments show different sorting due to the composition of source rocks and different modes of transportation. Mineralogically, they are composed of quartz, feldspars, mica, rock fragments (mainly sedimentary) and heavy minerals” (*ibid.*, p. 33). “Heavy minerals have been widely used to study the weathering processes, provenance and diagenesis of siliciclastic rocks” (*ibid.*). “Heavy mineral assemblages of the Holocene sediments from the Tigris River in northern Iraq include opaque minerals such as magnetite, chromite and/or chromian spinels, hematite, ilmenite, goethite and pyrite, and non-opaque minerals including epidotes, pyroxenes, amphiboles, garnet, zircon, tourmaline, rutile, kyanite, staurolite, olivine, sphene, apatite, white mica, biotite and chlorite” (*ibid.*).

There are geochemical variations: “Opaque minerals and epidotes increase in content downstream, mica decreases, whereas amphiboles, pyroxenes and garnet show irregular distributions. Chemical characteristics of selected heavy minerals suggest their derivation from a complex of metamorphic and igneous source rocks” (*ibid.*).

Also see a paper by Garzanti et al. (2016) — Al-Jubouri is the second author named in that paper — bearing the title “The Euphrates-Tigris-Karun river system: Provenance, recycling and dispersal of quartz-poor foreland-basin sediments in arid climate”. Among the other things, they point out:

Characteristic of the Mesopotamian and Gulf regions is the arid climate, resulting in negligible chemical weathering and almost complete preservation of unstable detrital components. Because of the consequently limited erosion rates and fluvial-transport capacity, the Gulf represents today a rare case of partially underfilled marine foreland basin associated with a large collision orogen. Eolian sediment transport plays a major role in such an arid region. In the Pleistocene, during periods of low global sea-level, sand was deflated by reinforced northerly winds along the exposed floors of the Gulf and blown south and south west up the Rub' al-Khali [Saudi Arabia's barren “quadrilateral” desert, a sand sea]. [...] [M]onitoring the compositional variability of modern sediments in big-river systems such as the Euphrates-Tigris-Karun drainage basin, over 10<sup>6</sup> km<sup>2</sup> wide and ranking about twentieth on Earth, provides us with a key

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composition must define two different CPs. Each CP exists in a certain temperature and pressure; otherwise the interatomic distances are not certain” (*ibid.*, pp. 282–283).

to understand the information stored in sedimentary archives, and to reconstruct the evolution of the Earth's surface from the recent to the less recent past.

## 11. Soil in the traditional *materia medica* of the Middle East

In his *Historia Naturalis*, 35.32, Pliny the Elder mentions *sinopis*, a red clay used in *pota* (drink) as medicine. In an article in Hebrew by Efraim Lev (2001), "The Galilee, Mount Hermon and Mount Lebanon as Sources of Unorganic Medicinal Substances during the Middle Ages", he includes "Earth (Clay)", in a table on p. 115, and the Hebrew equivalent is 'afār (*tin*). On p. 120, Lev discusses clay as referred to, in Arabic, by the name *ṭrab al-jabr* 'powder of conjunction'. This is because one of the traditional uses in medicine of soil, was in trying to heal broken bones. According to al-'Othmānī, such a powder was even exported far away, and persons as well as horses and fowl were administered it in drink, in order to heal broken bones.

Lev (2001, p. 120) also mentions the use of soil as medication for skin diseases (al-Kindī mentioned the use of soil in the *carte* for leishmaniosis), and in order to fortify pregnant women. He mentions the wording from *Psalms* 72:9, "His enemies, soil they shall lick", which is likened to what snakes do (*Micah* 7:17). A reproachful interpretation of the name of the *Hivvites*, one of the seven peoples of the pre-Israelitic Land of Canaan, is "that they used to taste the soil, like a snake (*hivyay*)" (*Babylonian Talmud*, tractate *Shabbat* 85a). I seize this opportunity to signal my article Nissan (2017 [2018]).

Concerning the use of the use of soil in the care of leishmaniasis, consider that my mother as a toddler, when she was under a tree, for some reason contracted leishmaniasis (which left a scar, called *ikht* in Arabic, which also means 'sister') on the side of her nose (there used to be a wrong expectation that anybody would contract leishmaniosis at some time in their lives), and that modern medicine was not as successful in treatment in her case, as traditional medicine: if I remember correctly, it was with a kind of soil indeed, and apparently it reduced irritation. See in the next section.

Lev (2001, p. 120) mentions that in the Middle Ages, Ibn al-Bayṭar ["the Son of the Veterinarian"] listed eight kinds of soil or specifically clay that were used in medicine. On the same page, Lev also states:

רפואה עממית : באירן ובעירק נעשה שימוש בארבעה  
טיפוסי עפר (טיט ארמני, טיט נאכל, טיט רוסי וטיט  
חתום) והוזכר השימוש בתשעה מנים נוספים. אלה  
שימשו לריפוי פצעים, מחלות עור, ניקוי השיער  
וחיזוק נשים הרות.<sup>67</sup> יהודי עירק עשו שימוש במיני  
עפר וטין להורדת יבלות, לטיפול בפצעים  
ולשימושים רפואיים נוספים.<sup>68</sup>

That is to say:

Folk-medicine: in Iran and Iraq, use was made of four kinds of soil (Armenian clay, edible clay, Russian clay, and sealed clay), and the use was mentioned of nine more kinds. These were used for healing wounds, skin diseases, cleaning hair, and for fortifying pregnant women. The Jews of Iraq used kinds of soil and clay to remove calluses, to treat wounds (skin lesions), and for further medical applications as well.

Lev (2001) also states:

בסקר חומרי מרפא עממיים שנערך בשוקי סוריה  
בסוף שנות השמונים תועדו שני מיני עפר : עפר  
אדום וטיט ארמני.<sup>69</sup> מתוצאות מחקר חומרי  
המרפא העממיים בשוקי ישראל, שנערך לאחרונה,  
עולה כי עד היום ניתן לקנות בחנויות מוכרי  
התרופות (בעיקר בשכם) ארבעה מיני עפר (טין רגיל,  
טין מקומי, עפר לבן ועפר אדום). אלה משמשים  
לטיפול במחלות עור שונות, כתכשיר נגד גירוד  
ולריפוי גירויים בעור.<sup>70</sup>

In a survey of folk-medicines carried out at markets in Syria in the late 1980s, two kinds of soil were documented a red soil, and Armenian clay. From a recent research project into folk-medicines in the markets of Israel, it turned out that even at present, one can buy in the folk-medicine shops (especially in Nablus) four kinds of soil (normal clay, local clay, white soil, and red soil). These are used in the treatment of various skin diseases, as a medication against itching, and to treat skin irritation.

Lev (2001) also points out that in India and other Eastern countries, more than forty kinds of soil or clay are in use as edible stuff, and for medical use, such as in treating diarrhoea, against cholera, and to treat pain, and that moreover, pregnant women as well as children are fed soil in order to strengthen their bodies and to improve their health.

## 12. Leishmaniasis

In the previous section, I stated:

Concerning the use of the use of soil in the care of leishmaniasis, consider that my mother as a toddler, when she was under a tree, for some reason contracted leishmaniasis (which left a scar, called *ikht* in Arabic, which also means 'sister') on the side of her nose (there used to be a wrong expectation that anybody would contract leishmaniosis at some time in their lives), and that modern medicine was not as successful in treatment in her case, as traditional medicine: if I remember correctly, it was with a kind of soil indeed, and apparently it reduced irritation.

Let us say something more on leishmaniasis. My mother's father consoled her as a toddler, for the boil and its effects: it was on an ala<sup>18</sup> of her nose, and the scar was relative small, for this kind of boil, as it had a diameter of 10 to 15 mm, the same colour as the skin. The original impression (though she eventually studied medicine, as well as music at the Conservatorium) was that while resting under a fig tree, something dripped on her nose. Actually, it would have been a bite by a sandfly, and the boil does not erupt right away.

There used to be a belief that anybody in Iraq would eventually contract leishmaniasis, but (and this was apparently incorrect) that it would only be once in a lifetime. Therefore, in some families there was a custom of letting babies or toddlers rest in the open with their thighs or even the cheeks of the buttock uncovered, as it was deemed preferable for the scar to be in such a covered part of the body, than in an always uncovered part. Bear in mind that in the generations when vaccination against smallpox was universal, the vaccine was usually injected up in the shoulder, precisely out of the expectation that the scar left by the single smallpox boil would always be uncovered, even though by the middle of the 20th century, in the Western culture of dress not only men, but also sometimes women would have their shoulder uncovered, and the convention developed of not bothering about the scar left on the shoulder by the smallpox vaccination scar.

We are now reverting to talking about leishmaniasis, more precisely Old World cutaneous leishmaniasis (presumably caused by the bite of a sandfly transmitting *Leishmania* protozoa). The skin sore erupts “weeks to months after the person is bitten by infected sand flies”.<sup>19</sup> It used to be called *Jericho buttons* in English during WW1,<sup>20</sup> whereas inflected American soldiers during the Iraq War used to call it *Baghdad foruncle* (during the Allied conquest of Sicily during WW2, it had already posed a problem to the American army), and its Israeli Hebrew name<sup>21</sup> is *shoshannat Yerihó*, literally ‘Jericho lily’, but popularly understood as ‘Jericho rose’, which must have been the semantic motivation, as when festering, the skin lesion is red, not white, and it is round, and has been likened to a rose or rosette. Cf. French *leishmaniose*, Polish *Leiszmanioza*. The entry<sup>22</sup> for *cutaneous leishmaniasis* in the *Encyclopaedia Britannica* mentions also the English names *Aleppo boil* and *Oriental sore*. Other English names for the same disease<sup>23</sup> include: *Delhi boil*, *desert boil*, *tropical sore*, *chiclero ulcer* or *chiclero's ulcer* (a *chiclero* is a gatherer of *chicle*, a resin, in Latin America).

The traditional Arabic name *ikht* [ʔəxt] is properly the name for the scar left once cutaneous leishmaniasis is healed. Like elsewhere, the cutaneous form is the most common form of the disease, and for example, in Saudi Arabia it “is commonly known as *okhet*, *dommal*, *nafra*, and *El-mohtafara*” (Salam et al. 2014). However, concerning the broken plural which Nasir Salam and his co-authors transcribed as “*dommal*”, consider that the feminine singular [dømlæ] is rather vague in this context, and more properly describes a mole. As for *al-muhtáfara*, the etymological sense is ‘the excavated one’ (f.), as the scar is a concavity rather than a convexity,

<sup>18</sup> The two alae (wings) of the nose are the lower lateral surfaces of the external nose.

<sup>19</sup> <https://en.wikipedia.org/wiki/Leishmaniasis>

<sup>20</sup> A photo taken in Palestine in 1917 is at <https://loc.getarchive.net/media/jericho-buttons-fe9aa2> (it was apparently shot by the American Colony Photo Department in Jerusalem, of a Protestant community in town.

<sup>21</sup> [https://he.wikipedia.org/wiki/%D7%A9%D7%95%D7%A9%D7%A0%D7%AA\\_%D7%99%D7%A8%D7%99%D7%97%D7%95](https://he.wikipedia.org/wiki/%D7%A9%D7%95%D7%A9%D7%A0%D7%AA_%D7%99%D7%A8%D7%99%D7%97%D7%95)

<sup>22</sup> <https://www.britannica.com/science/cutaneous-leishmaniasis>

<sup>23</sup> As listed as [https://en.wikipedia.org/wiki/Cutaneous\\_leishmaniasis](https://en.wikipedia.org/wiki/Cutaneous_leishmaniasis)

which a mole is. But before the boil bursts open, it is convex indeed; so *dumla* — though vague — is not quite off the mark in respect of how it blemishes the surface of a smooth skin.

In a book that makes no mention of leishmaniasis, yet is devoted to clay in healthcare, Rautureau et al. (2017, p. 116) point out:

In fact, clay does not cure wounds directly but provides a protection that reinforces natural defenses in two ways. The barrier effect is initially a physical mechanical effect: clay isolates from the external medium and maintains the humidity level necessary for tissues but without maceration. The second effect, less easy to describe, utilizes the reserve of exchangeable chemical elements from which the body can possibly benefit when it is locally in a very disturbed situation or chemically imbalanced. In this type of use, some perseverance is necessary until the wound is beginning to heal so that the surface part of the damaged tissue builds up a new barrier.

On p. 144, that same book traces a history of mud treatments, and also points out potential risks from microorganisms found in mud:

The use of mud for health care purposes goes back to prehistory. Egyptians used muddy sediments from the river Nile, as topical applications to treat disorders of the feminine genital system and to treat skin burns.

Romans were the first to recommend mud baths for therapeutic purposes, mud having origin in deposits occurring at the bottom of seas, lakes, and rivers (such as the Danube) as well as in peat from marshlands.

In France, before Roman occupation, mud baths were practiced in the so-called thermal stations of Dax (Aquitaine), Balaruc-les-Bains (Hérault), and Saint-Amand-les-Eaux (Nord), and after Roman occupation these and other stations were expanded, becoming quite prosperous.

The barbarian invasions in Europe significantly diminished the prosperity of the thermal stations, and only in the Middle Ages did the balneal activity recuperate.

Since the Renaissance (end of the fifteenth century) in Italy thermalism and the use of warm mud have become popular, particularly in resorts located in the Euganean basin famous for thermal springs. Many documents exist reporting the application of warm mud washed out with thermal water when the mud application was finished.

In France what we call today thermal medicine was initiated at the end of the seventeenth century.

In Europe several countries used mud for therapeutic purposes, such as Germany, Italy, Romania, Hungary, Greece, Spain, and Russia, before and after Roman occupation.

Over time and due to public concern related to malpractice in terms of hygiene, the initially usually collective and general baths were replaced by individual baths, and these days the most common treatments involve the use of mud packs, compresses, and facial masks on local and limited regions of the body (lower back, knee, hand, face, etc.).

Certain bacteria pathogenic to humans could be present in muds and in peloids too, and mud packs or cataplasms due to their direct contact with the skin are potentially more hazardous than compresses.

Salam et al. (2014) explained:

Parasitic diseases of the genus *Leishmania* are a huge burden on human health and society. [...] They are categorized as a neglected tropical disease because although they cause significant mortality, there is little effort on the part of the global community and pharmaceutical industry to invest in research and development of better and innovative therapeutics because of a lack of sufficient incentives.

It is spread through the bite of female phlebotomine sandflies by nearly 20 different species of *Leishmania*. Leishmaniasis can manifest itself in different forms; depending upon the infecting species of *Leishmania*, the disease could emerge as cutaneous,

mucocutaneous, or visceral leishmaniasis [...]. Cutaneous leishmaniasis (CL) is the most common and least fatal form of the disease, identified by ulcerative skin lesions, and it is caused by *Leishmania major*, *L. tropica*, *L. aethiopica*, *L. mexicana*, *L. braziliensis*, *L. guyanensis*, *L. panamensis*, *L. peruviana*, and *L. amazonensis*. Almost two-thirds cases of CL are reported from six countries: Afghanistan, Algeria, Brazil, Colombia, Iran (Islamic Republic of), and the Syrian Arab Republic. [...] The most life-threatening form of the disease is visceral leishmaniasis (VL), in which the pathogen disseminates to internal organs like the liver, spleen, and bone marrow. It is caused by *L. donovani* and *L. infantum* (known as *Leishmania chagasi* in South America). Clinical symptoms of visceral leishmaniasis generally include prolonged and irregular fever associated with chills, hepatosplenomegaly, lymphadenopathy, progressive anemia, weight loss, and hypergammaglobulinemia. More than 90% of visceral leishmaniasis cases are reported from Bangladesh, Brazil, Ethiopia, India, Sudan, and South Sudan [...] Pentavalent antimonials are the drug of choice and have been in use for more than 70 years now. Sodium stibogluconate and meglumine antimoniate are widely used for treatment of all kinds of leishmaniasis. Both these drugs are very toxic and can have serious side effects that include cardiac arrhythmia and pancreatitis, and their use could lead to life-threatening situations. Additionally, there is widespread emergence of drug resistance due to non-standard intake and misuse of the drug. [...]

Leishmaniasis is endemic in Iraq, where both forms of the disease, cutaneous and visceral, are found. Iraq, with a population of nearly 32 million, where 23% are living below the national poverty line, has seen much strife and struggle in the past 25 years. Maximum number of cases of Leishmaniasis were reported in these early years of war and population displacement; in 1992 the number peaked at 45.5 cases per 100,000 of population [...]

Cases of CL have been endemic in the Aleppo region in Syria for a very long time, with the first occurrence being reported as far back as 1745 when it was commonly referred to as “Aleppo boil” [...]. Antimalarial spraying in the 1950s led to fewer reported cases of leishmaniasis; an estimated 217 cases per year were reported from 1962 to 1971. However, there has been a gradual increase in the number of cases reported from the 1990s onwards, with a maximum number of cases of 58,156 being reported in 2011 from Idlib, Hamah, and Halab provinces [...]

CL is the most common form of the disease present in Saudi Arabia and is commonly known as okhet, dommal, nafra, and Elmohtafara. The disease is prevalent in Al-Hassa oasis [in Saudi Arabia eastern coastal region], and reached epidemic proportions in 1983 with 18,000 cases of CL being reported but subsided later on after a National Control Program was set up [...]. Initial rise in disease was due to rapid urbanization and large-scale immigration from other countries to Saudi Arabia. The species causing the disease is *L[eishmania] major* in central and eastern provinces and *L. tropica* in west and southwest provinces. The main vector of the disease is *P. sergenti*, and the disease affects males and females equally [...]. The disease mostly affects patients of 15–44 years of age and generally affects extremities; most patients have a single lesion, with less than 5% showing multiple lesions on hands, legs, and face. [...]

Like other countries in the Middle East, CL is endemic in Jordan, with the first case being reported back in 1929. Around 524 cases were reported between 1973 and 1978, with most of them being reported from Jordan valley, which represents the endemic region of CL in Jordan [...]. In Swaimeh region of Jordan valley, which is considered to be hyperendemic, 100% positivity was reported in 1992 for CL based on *Leishmania* skin tests in individuals over five years of age. More males (72.4%) are infected than females (27.6%), and in the majority of cases skin lesions are present on face and neck as compared to hands, arms, and legs. The major causative species is *L. major*, which is responsible for 75% of the cases and is spread through [the sandfly species] *P[hlebotomus] papatasi*; cases from *L. tropica* are few and are reported from the northern region of Jordan. [...]

In 2008, 244 cases of cutaneous leishmania were reported in Jordan, 1,250 cases in Iraq, 2,321 cases in Saudi Arabia, and 29,140 cases in Syria (Salam et al. 2014, p. 5, Fig. 4). Of the visceral kind, 17 cases were reported in Syria, 32 in Saudi Arabia, and



1,041 cases in Iraq (*ibid.*, p. 6, Fig. 5). But “there are cases of severe underreporting from some parts of the Middle East” (*ibid.*, p. 7).

### 13. Soil-tasting farmers were like urine-tasting physicians

Consider again our statement from the previous section (based on Lev 2001):

A reproachful interpretation of the name of the *Hivvites*, one of the seven peoples of the pre-Israelitic Land of Canaan, is “that they used to taste the soil, like a snake (*hivyay*)” (*Babylonian Talmud*, tractate *Shabbat* 85a).

This kind of ascribed behaviour is congruent with advice given by early imperial Roman authors about agriculture, recommending to taste the soil.

Still in living memory, some medical doctors would taste the urine of patients, in order to detect whether it was sweet, as a symptom of diabetes. It was part of the profession. It even apparently was part of the considerations whether to undertake that profession, and possibly a factor in the ascertained dislike for the profession among some prospective fathers-in-law. Urine belongs in the category of inedible stuff, and so is soil. But for professional reasons, some farmers would taste soils. That, too, was part of their vocational calling.

Soil-tasting on the part of farmers of landowners is known at least as early as ancient Roman agriculture. In her paper “Senses and the Sacred in Pliny’s *Natural History*”, Eleni Hall Manolaraki points out (Hall Manolaraki 2018, pp. 225–226):

Unlike [the Latin verb] *redolere*, *sapere* implies taste as well as smell, adding a gustatory layer to the experience. The *divinus halitus* is so appealing and so pure, *sapere* implies, that it renders the earth practically edible. The idea of soil-tasting suggested here is not as extreme as it sounds. In Virgil’s *Georgics*, the prospective farmer is taught how to make and taste soil-infused water to assess the ground for salinity (*G.* 2.238–247). If the earth is unsuitable, “the taste will give the sign plainly, and with its bitter flavor will distort the tasters’ soured mouths” (*at sapor indicium faciet manifestus, et ora / tristia temptantum sensu torquebit amaro, G.* 246–247). Pliny’s elder contemporary Columella advises Virgil’s experiment (*Rust.* 2.2.20), and he adds others to ascertain that the earth is sweet (*dulcem terram . . . dulcibus terrae venis*).<sup>47</sup> In the versified part of his work, Columella depicts the petrichor as “sweet soil, if now it lies drowsy and drenched by rain” (*dulcis humus, si iam pluuiis defessa madebit, Rust.* 10.46). Pliny alludes to this soil-tasting tradition, and he even echoes Columella’s sweet earth when he claims that the petrichor is of incomparable sweetness (*suauitas, HN* 17.39). He, however, nuances the practice by making rainbow essential to it and by his explicit designation of the intersensory smell-taste as *diuinus*. His own sweet earth resembles less that of Columella and more the magically healing honey of high summer (*non alia suauitas, HN* 11.37).

In her paper, to say it with her abstract, she

discusses an overlooked aspect of Pliny’s *Natural History* (*HN*): the embodiment through the senses of the Stoics’ universal deity. At several junctures in the work, readers are prompted to make contact with the immanent *numen naturae* by hearing, tasting, smelling, and touching its perishable manifestations. Pliny’s emphasis on the “lesser” senses as vehicles for a human-divine relation is worth examining as an innovative gesture in connection with the prominence of sight in imperial Stoicism. Moreover, identifying the function of Pliny’s sensorium brings the *HN* in dialogue with the field of the senses in antiquity, and especially with the role of the senses in religion.

This is relevant for my project with Abraham Ofir Shemesh about olfaction and metaphysics in the history of ideas, our point of departure being *Isaiah* 11:3–4 (Nissan and Shemesh 2017 [2019]; 2019; and in press).

The religious dimension of tasting the soil in Pliny the Elder is shown, by Eleni Hall Manolaraki, and she remarks: “The incarnate quality of the Plinian *numen* encourages readers to infer it everywhere, even in the very soil underneath humans, animals, and plants. An early juncture in one of the agricultural books instructs how to choose the best arable land for a new farm” (Hall Manolaraki 2018, p. 222). She proceeds to quote:

ita est profecto, illa erit optima quae unguenta sapient. quod si admonendi sumus, qualis sit terrae odor ille qui quaeritur, contingit saepe etiam quiescente ea sub occasum solis, in quo loco arcus caelestes deiecere capita sua, et cum a siccitate continua immaduit imbre. tunc emittit illum suum halitum diuinum ex sole conceptum, cui conparari suauietas nulla possit. is esse e commota debebit repertusque neminem fallat, ac de terra odor optime iudicabit. (Plin. *HN* 17.39)

It is certainly the case that soil which has a taste of perfumes will be the best soil. And if we need to be instructed as to what the nature of this desirable odor is, it is that which often occurs even when the ground is uncultivated, around sunset, at the place where the ends of rainbows bend down to earth, and when the soil has been drenched with rain after a long period of drought. The earth then sends out that divine breath of hers, of quite incomparable sweetness, which she has conceived from the sun. This is the odor which ought to be emitted when the earth is turned up, and, once found, it will deceive no one; the scent of the soil will be the best criterion of its quality.

Pliny the Elder deplored exotic perfumes, yet extolled the perfume of the soil, something about which Gianpiero Rosati (1997) elaborated. Hall Manolaraki also remarks (2018, p. 223):

The assertion that good arable soil, when turned, will smell like untilled land, at dusk, after rain, and under a rainbow, is curious for its exactitude on preconditions. These elusive circumstances trace to one of the pseudo-Aristotelian *Problems*, in which the question is why the rainbow makes some trees and soil fragrant. The author explains that, when scorched by the sun, some trees and soils acquire a certain flavored dryness. The infusion of moisture from the rain causes a sizzling of this smoky essence, which carries a singed odor above ground; *that* is the fragrance in question. Witnesses, continues the account, mistakenly attribute that smell to the rainbow because the rainbow happens to accompany the rain. Moreover, the association between the aroma and the rainbow is predicated on the unverified belief that the latter is a physical entity. Yet the association is erroneous, “if” (as Pseudo-Aristotle seems to believe), “the rainbow is not of a tangible nature, but is an effect of refraction on the organ of sight” [...]

Concerning the rainbow in culture, see e.g. Nissan and Bar-Ilan (2018 [2020]).

#### 14. Gestational geophagia, from the Hippocratic corpus on

In the corpus of the medical writings by Hippocrates, the craving of pregnant women for ingesting soil is mentioned: καὶ λίθους τε καὶ γῆν τρώγουσι (Hippoc. *Prorrh.* 2.31) ~ κῦσκομένη γῆν ἐπιθυμέη ἐσθίειν ἢ ἄνθρακας (Hippioc. *Superf.* 18). Hall Manolaraki (2018, p. 225, fn. 47) cites for this Gradvohl (2016).

Geophagia in pregnancy is the subject, from an anthropological perspective, of Wiley and Katz (1998), who tested a hypothesis (see below) relating the behaviour to

whether a population consumes dairy products. “The compulsion to eat earth including clay or other types of soil (geophagia) by pregnant women is very widespread. Clay has a high calcium content but there is some evidence that its intake in substantial quantity may lead to anaemia because it inhibits absorption” of iron as needed by the blood (Nag 1994).

Hunter and de Kleine (1984) began their paper by remarking:

Geophagy, or earth eating, is a nearly universal, transcultural phenomenon. The custom is a complex, multicausal behavior with roots in spiritual and religious beliefs, ritual oaths and ceremonies, medicinal practice, and perhaps nutritional need. Clay may be eaten to reduce abdominal pain caused by hookworm, to ease the pangs of hunger, to soothe heartburn and nausea, or simply to satisfy a craving because the soil tastes good. The most common manifestation of geophagy is clay eating during pregnancy. Because pregnancy exerts a strict physiological cost in terms of calcium, iron, and other minerals that must be delivered to the growing fetus, many of the so-called cravings during pregnancy and the resultant increase in eating may be a behavioral response to a physiological need.

Jo Hunter-Adams is concerned with the urban South African context of clay eating, and explores clay eating among pregnant migrants from other African countries; she interviewed Somali, Zimbabwean, and Congolese women and men in South Africa. “While Somali women did not report consuming clay or charcoal, Congolese and Zimbabwean participants self-reported commonly consuming clay during pregnancy, and at times also when not pregnant. Despite having heard public health messaging that discouraged the practice, participants largely did not describe this consumption in terms of health, but rather in terms of craving and habit. Participants described continued consumption of clay in South Africa, and the only reason for ceasing consumption was in cases of severe constipation”.

Moni Nag’s article (1994) is about “traditional beliefs in India regarding specific food items a pregnant woman should or should not eat during pregnancy and about the proper amount of food desirable for a pregnant woman for successful reproductive outcome”, and it “reviews the empirical evidence available from community or hospital studies regarding these beliefs as well as the reasons reported for these beliefs and the extent to which these are reflected in their food behaviour” (*ibid.*, p. 2427). In a section bearing the title “Craving for Unusual Foods”, Nag writes (*ibid.*, p. 2432):

Some pregnant women in India, as in many other regions of the world, are reported to have craving for unusual — often bizarre — foods. Four studies among those reviewed for this paper report the prevalence of such craving [...] In rural Uttar Pradesh some pregnant women have craving for earth, ash from cooking stove (‘chulah’), uncooked rice, bitter foods and sweet things [...]. Among 500 mothers interviewed in hospitals and clinics in Karnataka 18 per cent stated that during pregnancy they had the habit of taking mud, clay, ash, lime, raw rice and charcoal. Craving for mud and clay was mentioned more commonly than other items [...]. In another Karnataka community a few women reported craving for small pieces of stone and limestone during pregnancy [...]. Out of 50 pregnant women interviewed in a Gujarat community six reported consumption of baked clay (‘mati’) and tamarind seeds [...]. There are reports of pregnant women’s craving for tamarind in Madurai district of Tamil Nadu [...], for clay in West Bengal [...] and for handloom cloth, slate pencil, clay, charcoal and brick in unspecified localities [...]

Nag’s review of the literature concerning pregnant women in India signals as food items craved for, in Table 4 on p. 2436: “Baked clay (mati) and tamarind seeds”; “Mud and clay (more common); ash, lime, raw rice, charcoal”; “Small pieces of stone

or limestone”; and “Earth, ash from chulha (cooking stove made of earth), uncooked rice, bitter foods, sweet foods”.

The conclusion of Wiley and Katz (1998) concerning gestational geophagy in African women in such population that do not consume dairy products was as follows (*ibid.*, p. 543):

In the African context geophagy during pregnancy has several potential adaptive consequences for maternal and fetal health. Indeed, clay seems to be an important component of the biocultural management of pregnancy, particularly for women in societies that do not keep dairy animals or utilise dairy products. First, clay consumption may provide an important supplemental source of minerals such as calcium that are essential to fetal skeletal development and may be limited to heavily plant-based diets, particularly those in which fiber, phytates, or oxalates are common or overall nutritional status is marginal. Populations that practice dairying and rely heavily on dairy products have readily available rich sources of calcium to draw on and therefore do not need the mineral supplementation from clay during pregnancy. Additionally, clay consumption during pregnancy may increase the efficiency of calcium absorption in the small intestine by slowing transit time of foods through the gastrointestinal tract and reducing calcium loss.

Second, geophagy during the first trimester of pregnancy may reduce both the discomfort of and the loss of nutrients through pregnancy sickness while providing additional protection against potentially toxic secondary compounds that are likely to be ingested by women eating heavily plant-based diets. Pregnant women in dairying populations have less need of this protection, since their diet is focused on dairy products, which are generally not toxic to the embryo. That is, it may be that what women in dairying populations do not eat (i.e., large quantities of plant foods which secondary compounds, the chemical composition and activity of pregnancy clays, especially as they interact with commonly consumed plant compounds, the consumption of clay in relation to other components of the diet (i.e., whether clay substitutes for other foods or is supplemental), and access to suitable clays in different populations. Most important, a controlled study of the effects of clay consumption during pregnancy on fetal and infant health is necessary to confirm its adaptive significance.

They noted “widespread bias against this practice” (Wiley and Katz 1998, p. 543). Detoxification and mineral supplementation as functions of geophagy were discussed by Johns and Duquette (1991). Consider that some populations, e.g. in the far East, have milk intolerance. This is also found e.g. in Tanzania, as discussed by Jackson and Latham (1978).

John Hunter (1993), concerned with pregnancy clays in Southern Africa, was specifically interested in “macroterme geophagy”, i.e., in termite mounds as a soil source for the trade in edible soil at urban markets. As he explained in the abstract:

Field observations in five countries of southern Africa reveal that geophagy among pregnant women is very widespread in rural areas and that a geophagy trade exists in urban markets. Giant mounds built by the termite genus *macrotermes* are a major source of pregnancy clay. In terms of supplying essential minerals and trace elements to the fetus, in needy circumstances, it is argued that geophagy is pragmatic folk wisdom and environmentally adaptive behavior.

## **15. The anthropology of geophagia: soil-eating’s spread across world cultures, and social factors involved**

Berthold Laufer, about whom I wrote elsewhere (Nissan 2019–2020 [2021]), among the other things wrote about geophagia (Laufer 1930). Starks and Slabach (2012)

dealt with geophagia in the *Scientific American*. Abrahams and Parsons (1996) surveyed in *The Geographical Journal* the scholarly literature about geophagia in the tropics. Geophagia in literature and art is the subject of MacClancy (2009).

See in Woywodt and Kiss (2002) a history of geophagia reports. In a presidential address, an American folklorist, Michael Owen Jones, has written (2007, p. 131):

Medical and nutritional literature often pathologizes behavior, labeling other people's food habits "odd dietary practices" (Edwards, McSwain, and Haire 1954) or "abnormal" (Callahan 2003) and a serious "problem" (Federman, Kirsner, and Federman 1997:209). Geophagy (literally, the eating of earth) is often translated as the unappetizing "dirt eating" (Dickens and Ford 1972; Gardner and Tevetoglu 1957; Reid 1992). Long-standing but seldom questioned explanations of the "disease" range from insanity to depression, iron deficiency, and hookworm (Callahan 2003; Twyman 1971). Geophagy is more properly referred to as eating clay (particularly kaolin), for that is what people typically consume (Grigsby et al. 1999). Some Native Americans used clay to detoxify foodstuffs, people worldwide and through time have seasoned dishes with it, Siberian tribesmen ate it like modern Americans eat candy, and ceramicists frequently taste clay to determine its texture (Callahan 2003; Johns 1986; Solien 1954). Americans take kaolin in Kaopectate to treat diarrhea and consume calcium carbonate when they chew on Rolaids or swallow Maalox to relieve indigestion, thus practicing "a form of geophagy every time they take an antacid or an anti-diarrhea medication" (Henry and Kwong 2003:367). Some clay has appealing sensory qualities. One person told me: "I ate clay because I had seen my mother and cousins doing it. The taste was pleasing and I enjoyed it. I used to eat clay back home. I love it. I wish I had some now. It tastes sort of sour. It's good: clay from the sides the river. I'd just get a spoon and eat a couple of spoonfuls. It was sort of soft, like peanut butter, and it tasted good." Slaves ingested clay as a statement of protest, and some people in the South consider it a "woman's dish" and a symbol of womanhood (Twyman 1971). It has a desirable texture and taste, chewing it provides oral gratification, it produces saliva and stimulates the appetite, and although some dirt can pose a health threat, the consumption of clay might well have beneficial consequences for the immune system (Callahan 2003).

A short report<sup>24</sup> from Washington, North Carolina, on p. 8, col. 4, in *The Catholic Standard and Times* (Philadelphia) of 12 June 1964, headlined "Parochial Pupils Finish High In National Spelling", related:

Parochial school students captured three of the top six places in, the 37th annual National Spelling Bee finals here. The first prize went to a diminutive seventh grader from Bolich Junior High School, Cudahy Falls, Ohio.

William Kerek, 12, took the national honors (June 4) by correctly spelling "syncophant" [*sic!!!* The journalist got it wrong!] which means a hanger-on. He won \$1,000, a trip to the New York World's Fair and an appearance on a nationwide television show.

#### Second Place Winner

The second-place finisher was Robert O Mathews, 13, of Gahanna, Ohio. He missed on the word "geophagy", which is the practice of eating dirt. In fourth place was Anne Restivo, 13, an eighth-grader at Christ the King School In Denver. After correctly handling such words as "agnostic" and "aphelion". she stumbled in the 18th round on "nubilous". [...]

It must be said that geophagia was more culturally salient in rural areas of South Carolina, a Southern state, than in that pupil's Ohio, in the Midwest. Beginning his article, Robert Twyman noted (1971, p. 439): "Those who teach Southern history seldom fail to make at least a passing reference in their classes to an intriguing segment of the

<sup>24</sup> It is accessible at <https://www.jstor.org/stable/community.32147711>

southern population known as the ‘clay eaters’, if for no better reason than to add a bit of color to an otherwise prosaic lecture”. Note an irony: Twyman, a historian, was affiliated with Bowling Green State University, so he was based in Ohio. His article is important for understanding the history of how authors and physicians took notice of, and perceived, soil-eating in the United States’ Southern states. Importantly, soil-eating has long been there a cultural practice of both Black and some white people (*ibid.*, 439–400):

Some studies on slavery have commented briefly on “dirt eating” among the Negroes, but most historians mention clay eating as such only among the whites and seldom note that essentially the same problem was shared by the two races in the Old South. Early reminiscences and travel accounts used by most writers inform us that the clay eaters were the most degraded of the “poor white trash” and lived in the barren and sandy areas of the south-eastern states, especially the Carolinas and Georgia. One early theory (since discredited) held that they were the descendants of the debtors that James Edward Oglethorpe brought from England to settle Georgia and of the convicts and redemptioners of colonial Virginia; that is, they were the spawn of the lowest class of colonial immigrants. Although they sometimes hunted and fished, the food of these poverty-stricken people was limited largely to what could be fashioned from corn meal and the flesh of razor-back hogs. They were characteristically beset by malaria, hook-worm, and a variety of nutritional ailments. The clay that they ate was either taken directly from the ground or was simply picked from between the logs of the cabin or from the hearth where it had served as a crude mortar. How much clay they ate and how numerous they were are never explained; but a Georgia schoolteacher [Emily P. Burke] before the Civil War [her memoirs appeared in 1850] wrote that “when a person has once seen a clay-eater, he can, ever after, instantly recognize any one of their number by their sickly, sallow, and most unnatural complexions...” Ignorant, dirty, shiftless, uncouth, and morally degraded, they were thoroughly despised, not only by their white neighbors but even by the slaves. Not much other than this type of information has been known, and it explains why twentieth-century historians have been vague in discussing the subject and have been inclined to make false assumptions as to its cause and effects — and its importance.

Twyman also explained (1971, p. 442):

That geophagy, as the practice is known medically, was not peculiar to the Negroes in the South was evident at least as early as 1709 when it was observed among the whites of the Carolinas. Thereafter its appearance was noted among the poorer whites of all ages and was believed to be common in many parts of the antebellum South, but it was reported most frequently in the infertile sandhills and piney woods regions of the Carolinas, Georgia, and the Gulf states.

He also states that there used to be, in his times, reticence among patients to admit they ate soil (Twyman 1971, pp. 444–445):

The practice seems to have been more widespread than was generally assumed. Victims are reluctant to admit that they eat clay, often not doing so until confronted with positive medical evidence. Doctors at some of the major southern university clinics have found the practice in its more acute stages among Negro women during pregnancy. According to one estimate close to a quarter of the patients at the Obstetrics-Gynecology Out-Patient Clinic at Duke Medical Center in recent years have been clay eaters.

Another discovery has been that the assumption of some earlier historians that all clay eaters were really just “tasters”, that they occasionally chewed or sucked on a small lump “like chewing tobacco or resin”, is not true. The quantity eaten varies considerably. Some victims admit claim that they then spit it out. Many, however, consume the substance regularly and in large quantities. There are cases on record of patients who have ingested as much as three handfuls of clay prior to every meal. These observations about modern

clay eaters are sufficiently verified by earlier writers to make it reasonable to assume that they have always been true.

It has also been established, contrary to earlier assumptions, that many clay eaters suffer no apparent ill effects from their habit. To be sure, the practice can sometimes affect the health of pregnant mothers and their offspring, and when continued on a large scale it has been shown in some cases to bring about severe anemia, weakness, muscular cramps, and even eventual death, the same symptoms described among the clay-eating slaves in the early nineteenth century. But the listlessness, the pasty complexion, and the general debilitation always thought to be associated with the clay eater are often absent, and doctors are convinced that untold numbers, reluctant to admit their habit, pass through medical offices completely undetected. [...]

Twyman also mentions (1971, p. 446) beliefs entertained by soil-eaters in the United States about their habit: “Some men apparently believed it increased their sexual prowess. Women claimed ‘you have to eat clay when you are carrying your baby, or it won’t be born right’. Some said that ‘the baby will carry a ‘mark’ if its mother has not eaten clay’”. He concluded (*ibid.*, pp. 447–448):

In summary, the evidence would seem to indicate that in clay eating, as in smoking or drinking, what begins as an experiment can result in a craving and a habit, a habit difficult to break despite occasional serious harm to the body. From colonial times the practice has been handed down from one generation to the next, being continued by persons from youth often into old age partly from a desire for the social approval of those among whom they live. No original inner need necessarily impelled its use, except on occasion temporary hunger pangs and the desire to suck or chew. It has been more common among the poor because people in the upper economic groups seldom go hungry for any length of time and because education and good manners oppose so filthy and degrading a habit. Clay eating has been neither the usual cause nor the result of hookworm, and the long-assumed causal relationship of iron deficiency to clay eating is still to be proved. Rather than being just an interesting but rare oddity of the past, it has been practiced continuously over the years apparently by hundreds of thousands of southerners among both races and both sexes, and it is still prevalent in the South today from Maryland to Texas.

Mason (1833, p. 291) had claimed: “The practice is well known to be frequent on some properties [i.e., American plantations], while on others it is quite unknown. Dirt-eaters, also, have been overheard urging their companions to partake of their favourite material; and if we can safely draw conclusions from analogy, it would not be difficult to prove the influence of advice and example in the acquisition of habits no less destructive and disgusting at first than dirt-eating. I may notice dram-drinking and chewing tobacco”.

Vermeer and Frate (1979) were concerned with geophagia in Rural Mississippi. Lagercrantz (1958) discussed at length geophagy as practised in Africa as well as among Afro-Americans; also see the even longer Anell and Lagercrantz (1958). Also Hunter (1973) was concerned with geophagia in both Africa and the United States. Reid (1992) offers both cultural and medical perspectives on geophagia. Geophagy in Ghana was the subject of Vermeer (1966); in Nigeria, of Vermeer (1984) and Vermeer and Ferrell (1985); the latter paper was especially concerned with the use of geophagia as a traditional remedy for diarrhoea.

Prudence Rice, in an article (1999) about the origins of pottery, has written:

In general, culinary hypotheses concerning the origins of pottery have long embedded this innovation in the so-called "Neolithic transition" and the interwoven processes of food production and sedentarization that accompanied large-scale lifestyle transformations at the beginning of the Holocene [...]. The theoretical grounding of the

association of these processes is based, to a greater or lesser degree, in the prevailing discourse of Western-biased reconstructions of the origins of civilization: Societal complexity is believed to have originated in temperate (highland and/or arid riverine) areas where the economic base of cultivated cereals (wheat, barley, corn) provided storable surpluses to feed large, sedentary populations. Pottery was considered an integral part of this Neolithic complex, partly in order to boil these grains, but also because sedentary village existence permitted the use and elaboration of these fragile vessels.

Most of the explanations supporting the culinary context of pottery invention and subsequent adoption fall into the category of what Brown [...] has called "adaptationist" or "enabling" explanations. In response to the question, Why would people have begun making containers out of clay if containers for storage, transport, and processing were already available in other raw materials?, adherents would answer that pottery provided a new technology — an adaptation — that enabled a range of new foods to be processed. This was part of the much-heralded "broad spectrum collecting" strategies for adapting to changing environments at the close of the Pleistocene. In these circumstances, fired clay containers are thought to have had numerous advantages [...]

Two of those advantages are: "(5) reducing the time spent in tending or pot-watching (Schiffer and Skibo, 1987), compared to containers of gourds, stone, bark, skin, or basketry used for stone-boiling; and (6) allowing processing of foods containing toxins or that otherwise could not have been incorporated into the diet without prolonged soaking or cooking (e.g., Arnold, 1985, pp. 127-135, 232-233). Related to this last point, geophagy — ingestion of earth, especially clay — is widely known in human populations (and also among primates)" (Rice 1999, p. 9). On p. 10, Rice offers, by way of a cursory survey of hypotheses, about the cause for that behaviour, that those hypotheses include:

to alleviate mineral (including salt) deficiencies; to detoxify certain compounds, enhancing protein absorption; to aid digestion; to eliminate digestive disorders; and as a response to internal parasite infestations. Clays' role in detoxification is a consequence of their well known adsorptive properties. Geophagy has been associated with human consumption of potatoes to bind or eliminate the bitter taste of glycoalkaloids [...] Clay-eating was practiced among Native Americans in the south eastern United States and in sixteenth- and seventeenth-century northern Florida, the Timucua ate both dirt and broken pottery in times of famine [...] As Vitelli [...] suggests, pottery fragments might have absorbed fats or other nutrients from prior use in food preparation. In the Southeast, the ingestion of clays and earth also may have helped eliminate tannins present in acorns and other nuts that were commonly eaten. Early usage of low-fired or sun-baked pottery could have inadvertently, but salubriously, contributed clay to the diet.

*Clays and Health: Properties and Therapeutic Uses* is a 2017 book by Michel Rautureau, Celso de Sousa Figueredo Gomes, Nicole Liewig, and Mehrnaz Katouzian-Safadi, Mehrnaz. Chapter 8 is "Principal Modes of Clay Use". Section 8.1. is about external application in contact with skin, whereas Sec. 8.2 is about internal applications, namely, as a food supplement or to treat intestinal disorders. We have already quoted from that book, in this article. On p. 112, they refer to clay in contact with the digestive system:

We have just described the simplest elementary applications where clay is in direct contact with a well-defined target and intervenes with a reduced number of parameters. A simple example of a situation is the direct application of clay on skin.

Often reality is much more complicated, in particular in the case of a use that brings into play the digestive function, because in this case, introduced clay is mixed with an alimentary bolus which moves from the mouth to the anus, and this extremely complex situation makes the reaction mechanisms very delicate to interpret. Another complex situation is to be found in beauty care: it results from the addition of many molecules to



the clay (necessary for obtaining the properties wished in this field). The interactions with minerals are then not always well known or easily controllable.

Rautureau et al. (2017, p. 162) is concerned with geophagia:

As a food supplement clay consumption is an established fact in all civilizations. More generally geophagia is literally defined as “soil or earth eating,” but in this work the concept is limited to clay consumption.

The nature and assimilation of food plays a central role in the general equilibrium of the body. Clays have always been used in more or less large quantities and absorbed at shorter and shorter intervals in the food process with which they are associated. From this point of view there is often confusion between the concepts of food and drug. (It is necessary to pay great attention to this distinction.)

The act of geophagia relates to consumption and must be considered separately or complementary to geotherapy which relates to consumption with a therapeutic aim. Clays, the so-called edible clays, have also been used to satisfy famished populations by ensuring, without much danger, an alleviating and hydrating alimentary bolus of a sufficient volume. Nevertheless, some types of clay can facilitate food digestion when associated with it.

Let us recall, on a purely historical level, that one of the current methods of recognizing the clay character of a mineral sample is its property “to adhere to the tongue,” thus recognizing the aptitude of a sample to fix water, a property specific to many types of clay. By this affinity this simple sign indicates the recognition of clay by the tongue, the first organ of the digestive chain.

Anthropologists found evidence of the use of clay in the food of very old civilizations. They relate to the practice of geophagia: “clayey soils can be eaten in the raw state with some seasonings or after being cooked”. One may consult the book: *The Treaty of Simples*, a translation by L. Leclerc, devoted to the study of translations from Greek authors by Arabs, which has precise details on the subject. The markedly green soil of Siráf (probably nontronite clay), smoked with orange peel becomes red and tastes good. The author adds that it is seldom eaten smoked. This book also quotes Ali Ibn Mohamed in connection with the soil of Nisabour [i.e., Nishapur] which is eaten “well roasted” or equally raw.

A book edited by MacClancy, Henry, and Macbeth (2009a, introduced in 2009b) is concerned with consuming the inedible. Geophagia is only one mode of such consumption. Eating snot, i.e., “nose-picking and putting the product into the mouth” (Portalatín 2009, p. 177) is another mode, and so is cannibalism (Macbeth et al. 2009).

Hunter and de Kleine (1984) discussed geophagia in Central America: “The purpose of this study is to ascertain the nutritional utility, if any, of a clay tablet that is eaten by pregnant Black Caribs, also known as Garifuna, in Belize. The tablet originates as a commercial trade item from neighboring Guatemala in association with the Christian cult of the Black Christ”. Twyman (1971) is concerned with geophagia in the southern states of the United States of America, for which, also see an encyclopaedia entry, Henry (2012), where the difference is stated *vis-à-vis* pica:

Geophagia (or geophagy) is the intentional consumption of earth. In Western culture, it is commonly labeled a pica, an eating disorder characterized by the consistent consumption of nonnutritive substances such as feces (coprophagy), starch (amylophagy), or wood (xylophagia). In 2000 a panel convened by the Agency for Toxic Substances and Disease Registry in Atlanta proposed to distinguish between geophagia (culturally sanctioned behavior) and soil pica (“recurrent ingestion of unusually high amounts of soil ... on the order of 1,000–5,000 milligrams per day”). Other differences between both behaviors include impacted populations (pica is more prevalent among children under six, [...]) [...]

In contrast, geophagia occurs among all age groups.

In an anthology bearing the title *The Gastronomica Reader*, a chapter by Susan Allport (2010) bears the title “Women Who Eat Dirt”. Gardner and Tevetolu (1957) discussed the X-ray diagnosis of dirt-eating in children, and reported about sixty cases. The age range was between 11½ months to 4½ years of age. All those children were from the Driscoll Foundation Children’s Hospital in Corpus Christi, Texas; 53 of the children (29 girls and 24 boys) were Latin American, four were Anglo-American (two boys and two girls), and three boys were Black. Of those children, 35 were urban (living in Corpus Christi), and 25 in the countryside nearby.

Hypotheses about the physiological functions of human geophagia were evaluated by Young et al. (2011): “Geophagy has been hypothesized to be an adaptive behavior, either as a means to allay nutrient deficiency or to protect against ingested pathogens and toxins. Others have proposed that geophagy is non-adaptive, occurring either to allay hunger or as an epiphenomenon of nutrient deficiencies. This paper evaluates these hypotheses using 482 published cultural-level accounts of human geophagy and 330 accounts of geophagy among 297 species of mammals, birds, and reptiles” (*ibid.*, p. 97). They pointed out: “Human geophagy did not parallel changes in nutrient requirements, occurred most frequently among children and pregnant women and in tropical areas (where pathogen densities are highest), and was associated with ingestion of toxic substances and gastrointestinal distress” (*ibid.*). “Our results indicate that human geophagy is best explained as providing protection from dietary chemicals, parasites, and pathogens, whereas animal geophagy may involve both micronutrient acquisition and protection” (*ibid.*, p. 98).

An article by Iemanjá Brown (2020) is concerned with dirt-eating (geophagia), but it (a chapter in a book about “ecological temporalities”) takes off in a rather unusual manner: “The mouth is a good place for collapsing human and geological timescales. On the one hand, anxiety about ongoing and immanent climate disaster lends itself to a singular conception of the human who is all mouth, devouring what used to be called nature, annihilating it and thus also self-destructing. But appetite, as an urge to get close to something by incorporating it into the body, is also productive of numerous relations other than those of destruction. The attempt to conceive of climate change requires thinking at once across multiple scales”.

## 16. Risks to health of soil-eating

Woywodt and Kiss (1999) reported about the perforation of the sigmoid colon due to geophagia, with fatal peritonitis, an adult, non-pregnant African woman. Such “grave surgical complications are infrequently observed” (*ibid.*, p. 88). Hooda and Henry (2009) discussed geophagia in respect of human nutrition. Iron deficiency as a potential biological consequence of geophagia, is the subject of Young (2009). As early as a classic paper of 1961, Ananda S. Prasad established the role of geophagia in human zinc and iron deficiency (Prasad 2009). The impact of geophagia on the iron status of women in South Africa is the subject of van Onselen et al. (2015).

Mengel et al. (1964) were concerned with cachexia africana, a condition in which geophagia co-occurs with iron deficiency and hypokalemia, i.e., below normal blood potassium level. They observed this in one female patient. They found her condition matched the clinical picture described more than one hundred years earlier by Cragin and Carpenter as *cachexia africana*. In 1964, Mengel et al. were writing: “Although geophagia is still prevalent today, particularly in pregnant Negro women, the severe illness produced in our patient by the ingestion of large quantities of clay over a

prolonged period of time is extremely rare”. Severence et al. (1988), too, referred to hypokalemia, which along with profound muscle weakness, they ascribed to clay ingestion. Halsted (1968) remarked:

It is pointed out that geophagia leads to iron deficiency. The probable mechanism whereby this occurs is the cation-exchange capacity of clay to inhibit iron absorption. There is suggestive evidence from single case reports that the cation-exchange capacity of clay may also prevent absorption of potassium and mercury. It is speculated that the same mechanism may result in the inhibition of absorption of zinc, leading to zinc deficiency.

Lead poisoning is a risk, in geophagia. In an article considering the consumption of miniature pottery as possibly resulting in the ingestion of toxic lead, Phipps et al. (2012) have stated:

Geophagia (the pica of pottery, clay, earth, or dirt) is practiced before and during pregnancy in several countries, including Mexico, Turkey, Australia, and some African countries, and has been linked with cultural fertility beliefs and the satisfaction of cravings. Unfortunately, consumption of contaminated pottery can represent a source of lead exposure. Concerns regarding ingested pottery are two-fold; first, that people consuming these pots might be exposed to high concentrations of lead, and, second, that ingestion of these pots by pregnant women could result in elevated *in utero* lead exposure for the fetus. [...] Preliminary research indicates that although it is not common, “pot eating” can represent a high-risk lead exposure for pregnant women and their fetuses.

A report by Kortei et al. (2019), whose geographical focus is the Ho metropolitan area in Ghana, pointed out that white clay soils, consumed by pregnant women, and sold there in almost all markets, mainly come from Anfoega in the Volta Region. Whereas they do contain essential nutrients such as potassium, iron, calcium and zinc, they were also found to contain “toxic metals such as Arsenic, Lead and Mercury. The presence of these metals in the clay could be due to natural occurrence and human activities such as handling and or the baking process”. Whereas pregnant women may find clay eating pleasurable, they remarked, that behaviour “comes along with its own attendant problems such as exposure to potentially hazardous substances like bacteria, fungi, helminths and ova, radioactive materials, and toxic elemental minerals in the soil depending on the geographical location”.

Annette van Onselen’s 2013 doctoral dissertation in dietetics, “Nutritional Status and Risk Factors Associated with Women Practicing Geophagia in Qwaqwa, South Africa” — QwaQwa is a very densely populated rural area, with the largest concentration of Basotho people in South Africa — includes a detailed and thorough discussion, with an observational epidemiological study, and had a practical aim, so that women be informed in nutrition intervention brochures about the dangers of eating soil: “Soil binds important minerals such as iron, calcium and zinc which”, however it also contains bacteria which can cause e.g. cramps and diarrhoea (itself explained as “running stomach”); parasites and worms can grow inside you and make you sick; lead is very toxic and can make you die. “[A]lmost forty per cent of participants in the group with geophagia stopped consuming soil after the intervention” (*ibid.*, p. 211). “The logistic regression showed that women who were wage earners and those that owned a refrigerator (and thus had a higher socio-economic status), were less likely to practice geophagia” (*ibid.*, p. 209). “The majority (57.1%) of participants consumed soil once a day and 42.9% more than once a day. The craving for soil was reported by most of the participants as the reason that they

practiced geophagia (97.6%) and a preference for whitish clay was also found” (*ibid.*, p. 211). There was iron deficiency (*ibid.*, p. 210):

The mean serum iron levels of the geophagia group were significantly lower [...] than that of the control group [...] There was also a significant difference in the serum haemoglobin [...] and serum ferritin levels [...] between the geophagia and control groups. Serum transferrin and serum transferrin saturation levels also differed significantly between groups [...] The logistic regression also established which of the measured blood variables were significantly affected by the practice of geophagia. A highly significant association between the practice of geophagia and the cluster of metabolic indicators of iron status, including serum iron, haem-iron, non-haem iron, haemoglobin, ferritin, transferrin, and transferrin saturation was identified.

A study by Amidu Mustapha and co-investigators (2011), all of them affiliated with a department of physics at universities in Kenya (but Mustapha had moved to Bologna), evaluated geophagia as a pathway for chronic internal exposure to ionising radiation, and called for further studies. They pointed out that pieces or packets of volcanic ashes for eating are essential consumer products in Kenya; they suggested that based on further studies, it may be determined whether the sale of such products should be controlled. To say it with the abstract:

The most common geophagic materials in Kenya are the soft volcanic ashes. They occur naturally in various hues and shades of grey and pink colours. The volcanic ashes are quarried and sold in various kiosks and supermarkets either in pieces or in packets of about 100g. The concentrations of radionuclides in some of the common geophagic materials are determined, and the rates of their intakes (by ingestion) were estimated using the information obtained from a survey among people, including young mothers and pregnant women, who practice geophagia in Kenya.

In the conclusions, they stated that the findings, resulting from the screening survey, “indicate that some of the geophagic materials in Kenya contain elevated concentrations of naturally occurring radionuclides”.

Clement Narh et al. (2021) evaluated the risk involved in geophagia (which itself mainly occurs during pregnancy) of squamous cell esophageal cancer/carcinoma (ESCC). The results are from multicountry case-control studies in the so-called African esophageal cancer corridor, comprising Tanzania, Malawi, and Kenya. “Among controls, ever-geophagia was common in women (Malawi 49%, Kenya 43% and Tanzania 29%) but not in men (10% Malawi, <1% Tanzania)”. “In conclusion, geophagia is too rare to contribute to the male ESCC burden in Africa. In women, the practice is common but we did not find consistent evidence of a link to ESCC. The study cannot rule out selection bias masking modest effects. Physical effects of geophagia do not appear to have a large impact on overall ESCC risk. Research with improved constituent-based geophagia exposure assessment is needed”.

## 17. Soil-eating by slaves

The context of some discussions of soil-eating in the first half of the 19th century, was that slave-holders in the America considered such a habit in their slaves as being contrary to the owner’s interests. This took a number of forms. An interpretation had it that the purpose was achieving suicide, by a slave fiercely resenting one’s enslavement. Or it was considered to result in poorer health and lower productivity. One medical doctor suggested having slaves switch from soil-eating, to opium.



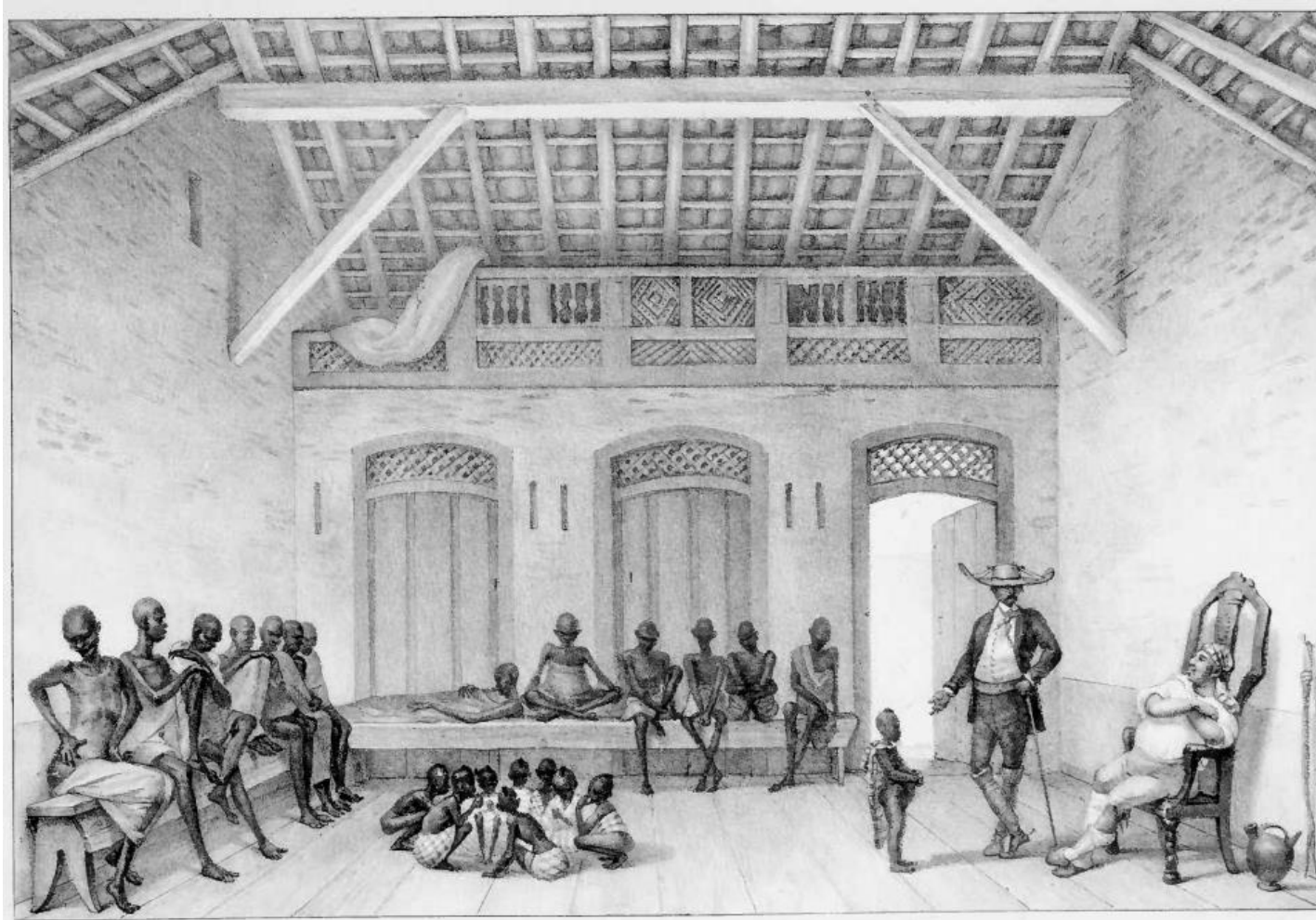
This is the context of the previous image, but is itself a detail (the left side) of a lithograph by the French artist Jean-Baptiste Debret (1768–1848). He was court painter to the Emperor of Brazil. His stay in Brazil was in 1816–1831. Some of his lithographs depict quite degrading situations. This lithograph is Plate 10 in Vol. 2 of Debret's *Voyage pittoresque et historique au Brésil* (Paris: F. Didot, 1835).



Detail.



Enlarged detail, showing the woman with the mouth-lock.

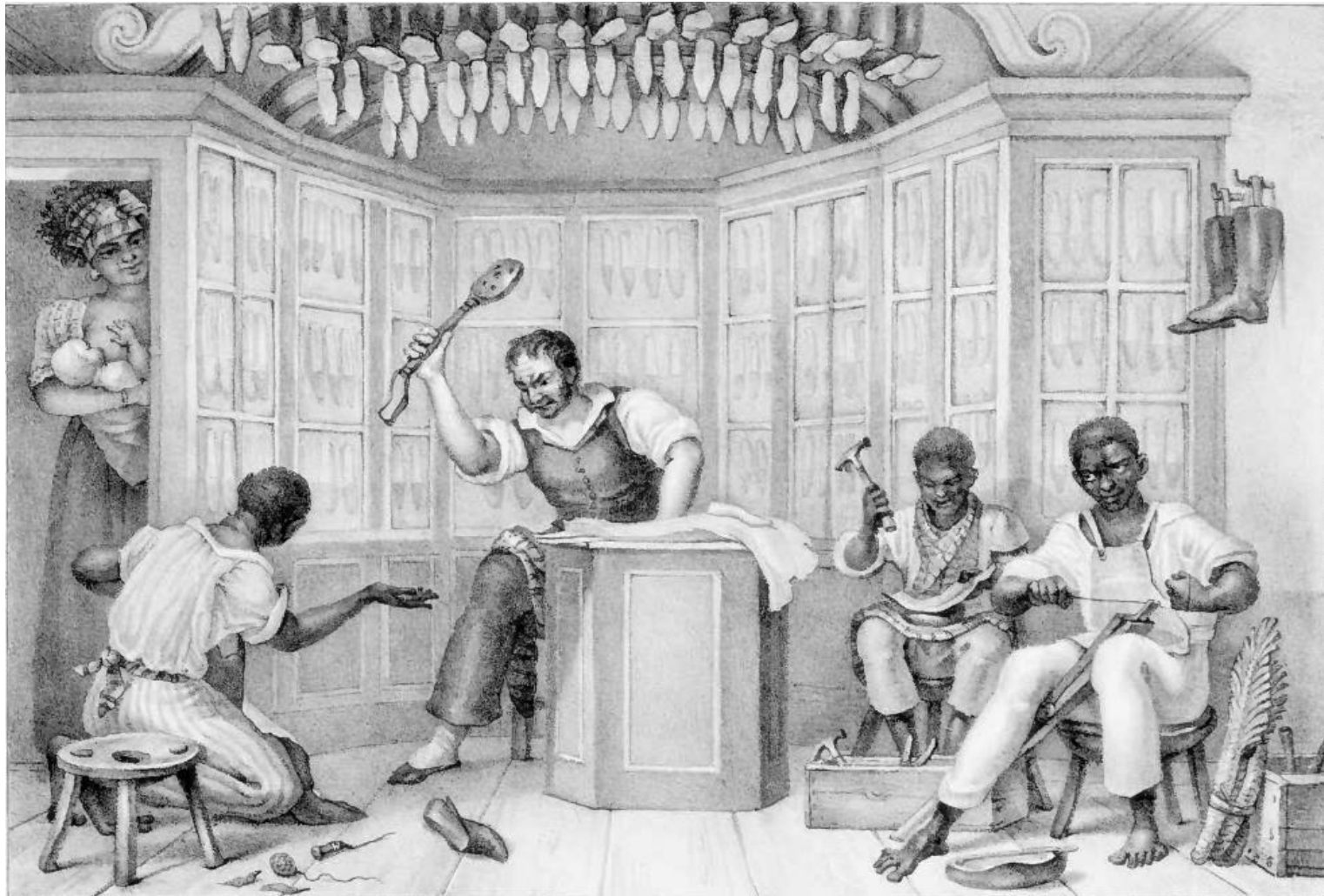


This other plate (Plate 23) from Vol. 2 shows slaves being sold in Brazil.





Punishment of a slave (Plate 25).



A cobbler punishing a subordinate (Plate 29).



Recaptured fugitive slaves has an iron collar linked by a chain to one of their feet (Plate 42): so the mouth-lock was not unique.

On p. 47 in Vol. 1 of his *Voyage pittoresque et historique au Brésil*, published in 1835, Jean-Baptiste Debret explains the situation of an adult female slave made to wear a mouth-lock lest she would kill herself by ingesting soil:

Derrière la maîtresse de la maison, une de ses jeunes esclaves, chargée de l'ennuyeux emploi de chasser les mouches et les cousins, en agitant deux branches d'arbre qu'elle tient à la main, offre ici à l'Européen l'exemple d'un surcroît de malheur à sa captivité, dans le spectacle affligeant du masque de fer-blanc dont le visage de cette victime est enveloppé; sinistre indice de la résolution qu'elle avait prise de se faire mourir, en mangeant de la terre (\*). [...]

(\*) Cette force de caractère, appelée vice par les propriétaires d'esclaves, appartient plus ordinairement à de certaines nations nègres passionnées pour la liberté, et spécialement aux Mougeoles. On reconnaît déjà à la blancheur livide de la partie intérieure de la paupière inférieure de l'œil du nègre, le funeste effet des tentatives de cette héroïque exaspération. Aussi s'assure-t-on soigneusement de l'existence de ce symptôme, lors de l'achat d'un nègre: pour cela il suffit d'appuyer légèrement le doigt au-dessous de l'œil de l'individu; et, amenant ainsi la paupière inférieure par en bas, elle s'isole du globe de l'œil et laisse voir parfaitement sa partie interne, qui dans ce cas, est d'un blanc légèrement jaunâtre.

In the footnote, Debret explained that slave-owners considered such strength of character a vice; he claimed that some ethnic groups from sub-Saharan Africa were more fiercely attached to their freedom. A livid whitish lower part of the lower eyelid was considered a symptom of previous attempts at suicide, and when buying a slave, buyers would watch out for that symptom, by exerting pressure with the finger under an eye of a slave offered for sale, so as to make the interior of the lower eyelid visible: if it was whitish, a bit yellowish, this slave was considered at risk of suicide.

I got the idea of looking for what Debret had written (as well as drawn), from Abrahams and Parsons (1996, pp. 65, 67), who stated the following, which begins with the clinical case of an Afro-American woman in the second half of the 20th century, who

for 25 years had regularly consumed more than one cup of clay per day. Six months before hospital admission she had increased her clay consumption, eating 'more clay than food'. The result was a physical condition which was similar to those in Cachexia Africana. The clay was found to adsorb significant amounts of potassium thereby inducing hypokalaemia. With potassium replacement and discontinuance of clay ingestion, the signs of the disease abated.

The preceding discussion indicates uncertainty as to whether geophagy is a cause or a consequence of disease. What is certain is that Cachexia Africana and soil-eating was a major problem which the slave owners had to deal with. A cure proved difficult since a craving and uncontrollable urge for soil often developed (what today may be called geomania) which led to slaves undertaking 'crafty and cunning plans' which they 'stealthily execute to procure their desired repast' (Cragin, 1836: 358). Methods to deter the practice could be very harsh and included tin face masks, iron gags and chaining to plank floors (Plate I). In some instances, the bodies of those who perished as a consequence of Cachexia Africana were dismembered. This proved effective (Haller, 1972), possibly because the slaves believed that a mutilated body could not return spiritually to the homeland (Anell and Lagercrantz, 1958). More enlightened ideas to solve the problem evolved during the nineteenth century (Mason, 1833). These included better food, exercise, clothing and cleanliness, along with tonics containing iron and 'potassa' (potassium hydroxide), two elements of significance in light of the iron-deficiency anaemia and hypokalaemia described above.

ART. III.—On Atrophia a Ventriculo (*Mal d'Estomac*,) or  
*Dirt-Eating*. BY DAVID MASON, Esq. M. R. C. S. L.

THE name dirt-eating is a common but inappropriate appellation, in as much as the habit is rather a consequence than a cause of the disease, the desire for that unnatural material being obviously excited by a previous disordered condition of the stomach.

*Mal d'estomac* of the French is rather more applicable, and conveys a more correct notion of the seat and proximate cause of the disorder, than the erroneous and vulgar term dirt-eating. *Mal d'estomac*, however, is a name too general, and is referable to so many different derangements of the same organ, that it annuls all claim to precision. *Atrophia a ventriculo*, which I have chosen, perhaps expresses the origin and nature of the disease a little more correctly than the before-mentioned terms. Although this disease is properly classed under the genus Atrophy, it is not strictly referable to any of the species noticed by Sauvages or Cullen.

From the accounts of various travellers, it appears that the practice of eating peculiar earths is not uncommon among the native inhabitants in many tropical countries. In Java, we are informed, that a species of reddish clay, impregnated with iron, is baked into thin cakes, and toasted, and in that state eaten by pregnant women. It is also said, that the vanity of females prompts them to use these earthen cakes, for the purpose of impairing the appetite, and producing a thin and meagre figure, which is reckoned a fashionable form among the Javanese. We can scarcely suppose, however, that a personal exterior so formed would be of long duration. The progressive emaciation, pallid features, and debility, the natural result of such a practice, must ultimately prove disgusting to the most whimsical taste. But the habit, when once acquired, is not easily overcome, and thus youthful vanity, in this, as in many other instances, lays the foundation of future disease and misery.

M. Humboldt, and other travellers, describe the practice of eating earths as frequent among the various native tribes in the tropical regions of South America. This celebrated scientific traveller, in his account of the habits of the Ottomaques, on the river Orinocco, makes particular mention of their eating a peculiar kind of clay, during the periodical inundations of the river, by which they are prevented from catching their usual supply of fish; and he speculates a little upon its probable constitutional uses, among that disgusting tribe who devour it

in such large quantities. M. Humboldt questions whether or not portions of it may be assimilated by the digestive organs, and fitted for absorption and the nourishment of the body. The Ottomaques themselves consider it nourishing, as it satisfies the appetite for food; nor are they unhealthy, it is said, although during the season of scarcity consuming such extravagant quantities of this singular aliment. Humboldt, however, notwithstanding all the facts he could gather on the spot, considered the following questions undecided. Can earth really be a nutritive substance? can it assimilate itself to the substance of our frame? or is it only a load on the stomach merely keeping it distended, and thereby alleviating hunger? The only circumstance that appears to give any probability to the affirmative of the first question, arises from the Ottomaques preserving their health, during a time when they are so slenderly supplied with any other nourishment. This season, however, does not continue long; and although during that time their health may have partially suffered, the subsequent abundance of nutritious food, which the cessation of the rains, and consequent subsiding of the river, enables them to procure, would speedily counteract the effects which a temporary famine had produced, and which may have escaped hasty and transitory observation.—This conjecture is supported by a fact also related by Humboldt, that other tribes in South America never fail to become diseased by the practice of eating earth; and its injurious effects among the negroes in the West Indies are well known. If, then, it is admitted that this unnatural aliment can in no case afford nourishment, the most probable conclusion is, that all such earths, being only used by those people who are insufficiently supplied with nourishing food, serve to allay the sensation of hunger, as well as to correct the products of bad food and digestion, and the unhealthy secretions which arise from a disordered state of the organs, sometimes the result of other causes.

Among the negroes in Jamaica, the disease and the habit of dirt-eating is most commonly brought on by long abstinence, bad food, and an irregular and inadequate supply. The persons most frequently exposed to these privations are fugitive negroes, who have absconded from their homes, and taken refuge in the woods, or lead a wandering and necessarily watchful life, in the vicinity of the villages, without any certain or constant means of subsistence. The continued exposure to cold and rain, and the inclemencies of the weather, which are inevitably encountered by such vagrants, combine with hunger to effect the same constitutional injury. The stomach along with the system gradually suffers from these hardships and privations. A tormenting gnawing pain in this organ is always the first and most constant symptom,

It may sound laughable at present, but Mason (1833, p. 296) concluded:

I omitted to mention the occasional use of opium as a part of the medical treatment. I believe this medicine is seldom given in cases of dirt-eating; and from my own experience, I am unable to say much on its efficacy. In a few cases, however, I have found a moderate dose of opium exert its usual influence in relieving the incessant pain in the stomach of which all dirt-eaters complain. Perhaps opium combined with ammonia judiciously administered, with the before-mentioned remedies, by relieving the pain, may contribute to remove the desire for the destructive practice of eating earth.

Robert Twyman (1971, pp. 440–442) pointed out that slave-holders in the United States did indeed resort to mouth-locks and other devices, in order to prevent slaves from eating soil, but he does not ascribe suicidal intents to the slaves:

Colonial and antebellum [e.g., pre-Civil War] physicians made the first attempts in America to investigate clay eating as a subject of scientific inquiry rather than as simply a curiosity. These doctors reported that the malady, then called cachexia Africana, caused considerable anxiety among plantation owners in the West Indies as well as the American South because of its prevalence among their slaves. The Negroes easily became addicted, and, once addicted, they persisted in the habit regardless of the severity of the punishment inflicted by the master. Negroes who acquired the habit became sluggish and debilitated, their skin changed to a whitish hue, and many of them eventually died. In desperation, planters attempted to effect cures by confining the afflicted slaves in stocks, by attaching metallic masks or mouthpieces to them, and by other preventive measures to break the habit; but once the physical restraint was removed the “patient” invariably returned to his old ways. According to Dr. William Carpenter, an antebellum physician, the habit was so common among the slaves in parts of Louisiana and so difficult to eradicate that a few plantations had to be completely abandoned.

As might be expected in an era when the science of medicine was still fairly crude, there was little agreement as to the cause of the malady. Some blamed it on mental depression, others on an improper diet, and still others on overwork and exposure to dampness, cold, and filth. Interestingly, a belief that the habit was somehow caused by a deficiency of iron in the body and that the symptoms could be ameliorated by supplementing the patient’s diet with this ingredient (a medical theory only recently revived) appeared frequently in the writings of the earliest doctors.

### **18. Geophagia as a medical condition being a subcategory of pica (eating the inedible)**

“The craving for unusual substances that have no nutritional value is often referred to as pica. The word is derived from [L]atin magpie, a bird of fickle appetite noted for its habit of eating or carrying away all manner of extraneous objects. Pica has been reported in all parts of the world and for all age groups and for both sexes. But it seems to occur more characteristically among young children, women in the childbearing cycle and in groups suffering from dearth of food or from deficiency in any important nutrient” (Nag 1994, p. 2432).

Geophagia is a kind of pica, a craving or sense of compulsion for eating the inedible, but when geophagia is performed because it is culturally prescribed (e.g., by older women) or even religiously prescribed, geophagia is not pica. There exists indeed, around the world, religiously prescribed geophagia: it occurs in Christianity, Islam, Hinduism, and

Hoodoo;<sup>25</sup> “religiously prescribed geophagy is not pica”, a chapter by Sera Young (2011) devoted to that phenomenon points out. That chapter is part of her book *Craving Earth: Understanding Pica — the Urge to Eat Clay, Starch, Ice, and Chalk*. Another book about eating the inedible (that other one, an edited volume with chapters by several authors) is MacClancy et al. (2009a).

Let us say something about religiously prescribed geophagia. We have already seen that Hunter and de Kleine (1984) were concerned with clay tablets that is “eaten by pregnant Black Caribs, also known as Garifuna, in Belize. The tablet originates as a commercial trade item from neighboring Guatemala in association with the Christian cult of the Black Christ” (*ibid.*, p. 157).

A photograph on their p. 163 shows such a rectangular clay tablet, weighing almost 39 grams, and with, in relief, a coarsely stylised crucifix without a cross. “The crown of thorns, outstretched fingers, head of Christ are clearly depicted in positive relief. A robe is wrapped waist of the figure. At the foot of the cross are symbolic representations [actually just a blob on each side] of the Virgin Mary and St. John the Apostle”.

The tablet shown there was 1 cm thick, its length was 6.5 cm, and its width 5 cm. “The tablets supposedly originate from a mountain in Guatemala, where the clay is washed, shaped, decorated with a religious design — usually the crucifixion — and dried on long boards in the sun. The bars of clay are then shipped to Guatemala City, which serves as a wholesale distribution center for Belize and other markets. Hearsay among traders and customers in Belize identified San José Pinula as the source of clay in Guatemala. The rumor is puzzling because other sources, for example, Montesinas and Cerro Miramundo, have been suggested” (*ibid.*, pp. 163–164). We are told (*ibid.*):

Of the eight clay-eating women, one ate one bar a week, one ate one bar a day, two ate two or three bars a day, and one each consumed three, four, five, and six bars a day. The high rate of six bars a day amounts to a daily consumption approximately of 232 grams or eight ounces.

Intake of clay during pregnancy would be consistent with the African origins of the Garifuna and with the dispersal of geophagy across the Atlantic Ocean during the black diaspora. African cultural traits predominate in food, dancing, and music among the Garifuna. A similar pattern of geophagy could be expected among the creole of Belize because of their African background. Both creole and mestizo women are known to eat the holy clay. The latter consume it for good luck or as a blessing. Children of both groups eat earth, a behavior which the mothers see as a symptom of worms that is quite distinct from adult consumption of purchased clay bars.

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<sup>25</sup> Hoodoo is not the same as Voodoo. [https://en.wikipedia.org/wiki/Hoodoo\\_\(spirituality\)](https://en.wikipedia.org/wiki/Hoodoo_(spirituality)) explains: “**Hoodoo** is a set of spiritual practices, traditions, and beliefs that were created by enslaved African Americans in the Southern United States from various traditional African spiritualities and elements of indigenous botanical knowledge. Practitioners of Hoodoo are called **rootworkers**, **conjure doctors**, **conjure man** or **conjure woman**, and **root doctors**. Regional synonyms for Hoodoo include **rootwork** and *conjure*. As a syncretic spiritual system, it also incorporates beliefs from Islam brought over by enslaved West African Muslims, and Spiritualism. Scholars define Hoodoo as a folk religion. It is a syncretic religion between two or more cultural religions, in this case being African indigenous spirituality and Abrahamic religion. Many Hoodoo traditions draw from the beliefs of the Bakongo people of Central Africa. Over the first century of the trans-Atlantic slave trade, an estimated 52% of all kidnapped Africans (over 900,000 people) came from Central African countries that existed within modern day Cameroon, Congo, Angola, Central African Republic and Gabon. By the end of the colonial period, enslaved Africans were taken from Angola (40 percent), Senegambia (19.5 percent), the Windward Coast (16.3 percent), and the Gold Coast (13.3 percent), as well as the Bight of Benin and Bight of Biafra in smaller percentages. Following the Great Migration of African-Americans, Hoodoo spread throughout the United States”.



The practice of eating white clay is overwhelmingly during a pregnancy, although some women assert that they consume the substance even when they are not pregnant. All of the Garifuna mothers in our survey said that they stopped eating *esquipulas*<sup>26</sup> after giving birth, but they also stated that the craving for clay was compelling during pregnancy, with more being eaten in the second half than the first half of a pregnancy. The bars were chewed plain or taken with a drink of water or a carbonated beverage like 7-Up. During pregnancy the rationale for geophagy included hunger, treatment of nausea, and, predominantly, “cravings”. These were so strong that other items like cassava, soda, chalk, or ground raw rice were ingested if the clay was not available or if a woman could not afford the clay. The holy white clay was preferred and, of course, enjoyed the added significance of religious provenance of blessed endorsement.

Two co-authors based in Kenya, Shivoga and Moturi (2009), are concerned with geophagia, as being a prominent case of pica, being a risk factor in the home environment, conducive to diarrhoea, considering that both pica and gastrointestinal ailments affect children in particular:

Pica is an eating disorder typically defined as the persistent eating of non nutritive substances for a period of at least one month at an age in which the behavior is considered mentally inappropriate [...] Geophagia (earth/clay/soil eating) is the most common form of pica in people who live in poverty [...], in the tropics and in societies who adhere more to their traditions [...] While it is believed by some that geophagia is a response to a physiological need and is related to growth periods such as pregnancy and childhood [...], in Africa, the habit is widespread and is passed from one generation to another because of cultural beliefs and genuine enjoyment of the habit rather than physiologic necessity [...]

Children who practice geophagia are prone to malnutrition, anemia, diarrhoea, constipation and worm infestation. Studies in Kenya [...] and Guinea [...] found a strong association between geophagia and prevalence and intensity of intestinal parasite infections. In a Jamaican study, children who practiced geophagia were prone to malnutrition, anaemia, diarrhoea and worm infestation [...].

Diarrhoea is defined as the passing of at least three loose stools within 24 hours. Episodes are regarded as separate if there are at least two intervening days between the passage of loose stools [...]

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<sup>26</sup> The name *esquipulas* for those clay tablets has a toponomastic origin: “As part of a pacification policy in the creation of New Spain, Spanish colonial authorities resettled the Chorti Indians between 1560 and 1570 in a new town called Santiago de Esquipulas, which was named after a famous Chorti chieftain [...] The pre-Columbian town of Esquipulas was on a trade and pilgrimage route that led to the Mayan ceremonial city of Copán in Honduras. Esquipulas was noted for its shrine, health-giving earth, and sulfurous springs” (Hunter and de Kleine 1984, p. 157).

“Small tablets of sacred earth, called *tierra santa*, are sold as part of the devotions at the shrine. These white clay tablets, blessed by the Roman Catholic Church before sale, are believed to have special health-giving properties. They are known also as *benditos*, or blessed ones. The clay is pressed into small cakes and is stamped with pictures of saints, the Virgin Mary, or most frequently the crucifix of Our Lord of Esquipulas. The cakes are eaten or are dissolved in water and then drunk. Devotees believe that the tablets cure innumerable ailments like diseases of the stomach, heart, and eyes or menstruation difficulties, and especially that the tablets will assure easy pregnancy and childbirth” (*ibid.*, p. 159).

There was precedent for the practice in Europe. “Embossed red clay medallions, called *terra sigillata* from the Latin, *sigillum* (seal), and manufactured on the Aegean island of Lemnos, were widely used as a medicine in the Greek and Roman eras. The process was later absorbed by Christianity, and Artemis, the ancient seal of Greek mythology, or Roman Diana was replaced by Christian symbols. Greek Christian monks performed the ceremonies under Turkish supervision. Encouraged by the religious blessing, the small clay disks from Lemnos were used as an antidote to poison and as a cure for agues, fluxes, and the plague. Women consumed them to hasten childbirth. With the approval of the Roman Catholic Church, the disks were traded throughout the Mediterranean region and western Europe. They continued to enjoy high esteem in the seventeenth and eighteenth centuries and were included in pharmacopoeias as later as 1848” (*ibid.*, p. 160).

Annually, diarrhoea accounts for the deaths of over 1.6 million children under the age of five or about 15% of all deaths of children under five in developing countries [...]. The average young child in the developing world, whether in Asia, sub-Saharan Africa, or Latin America, experiences four to five episodes of diarrhoea per year [...]. Diarrhoea is among the diseases of priority along with malaria, acute respiratory infections and intestinal worms in Kenya, as they account for 70% of the total health burden to children under five [...]

Pica is the subject of Strungaru (2009), in the wider context of consuming the inedible (MacClancy et al. 2009a). In the article “Geophagia: Benefits and Potential Toxicity to Human — A Review”, an author whose authors are based in Cameroon and Italy, Bonglaisin et al. (2022) claimed:

Geophagy is the habit of consuming clay soil such as chalk or kaolin. Though it is globally practiced, the safety of those involved is yet to be fully established. It is thought to be highly prevalent in pregnant women because of its antinausea or therapeutic effects. This practice is also thought to be provoked by some nutritional needs, but in modern society its etiology is obscure. The mineralogical and chemical compositions of clay may vary from one region to another and even in all form of rocks clay constitutes.

More in particular, they explained:

Geophagy or geophagia is the habit of consuming clay such as chalk or kaolin. Commonly referred to as Calabar chalk, ndom, nzu or Calabar stones by some ethnic groups in Nigeria or as mabele by the Lingala people of Congo or by Francophones as craie, poto or argile [...] or Calabar chalk in Cameroon, kaolin consumption varies in intensity from one region to the other. It is more common in children than in adults [...]; in women than in men [...]; in black race than in white race [...]; in rural areas than in urban areas [...]; and in pregnant women than normal women [...]

In earth science, kaolin is used broadly to cover a range of clay-compounds predominately made up of Kaolinite that is associated with many other minerals that are the products of felspathic rock alteration [...] It may be contaminated with toxic metals such as lead (Pb), nickel (Ni), cobalt (Co), Cadmium (Cd), chromium (Cr), copper (Cu), Mercury (Hg) Mercury (Hg), zinc (Zn), etc. [...] Kaolin is one of the most abundant clay compound that is also extremely exploited in the world industrially [...]

Kaolin-eating is common in the rural South of the United States, parts of Latin America, Asia and the Middle East [...] It is also common in Sub-Saharan Africa where several cultures especially farmers and nomad settings consume dirt, mainly clay [...] and in Australia during food scarcity [...] In most cases the habit is common amongst pregnant women. Many experts have suggested that geophagy is highly prevalent in pregnant women, who are either Africans or migrants from this continent, because of its antinausea effects [...]

Among the physiological effects of kaolin, they pointed out, there are benefits:

Physiologically, many nutritionists and researchers have viewed geophagy as amongst practices that help provide physical relief from painfulness or distress. In gastro-enterology, clay (kaolin) is suspected to sap toxins from food or bacteria that are related to stomach upset [...] Some kaolin constituents such as benzoic groups, aluminum oxide and magnesium oxide, have attributed antacid characteristics to kaolin, such that it can mitigate pains resulting from gastritis. Furthermore, an author has also observed that kaolin has “covering properties,” and plays a bandaging role in gastro-enterology [...] Kaolin has been observed to coat the gastro-intestinal tract, preventing it from biological and chemical attacks. It is also potentially therapeutic to esophagitis, colitis and diarrhea [...]

## 19. Geophagia as practised by non-human animals

“The idea that, in most cases, eating dirt is probably a way to get rid of toxins could explain why people and animals so often prefer claylike soils to other kinds of earth. Negatively charged clay molecules easily bind to positively charged toxins in the stomach and gut — preventing those toxins from entering the bloodstream by ferrying them through the intestines and out of the body in feces. Detoxification might also explain why some indigenous peoples prepare meals of potatoes and acorns with clay — these foods are bitter because they contain small amounts of toxins” (Starks and Slabach 2012, p. 32).

Sabrina Krief (2009) contrasted humans and non-human primates, inasmuch they consume materials with low nutritional value. Mattson et al. (1999) discuss geophagia as observed at Yellowstone among grizzly bears. “We documented 12 sites in the Yellowstone ecosystem where grizzly bears (*Ursus arctos horribilis*) had purposefully consumed activity known as geophagy). We also documented soil in numerous grizzly bear feces. Geophagy primarily occurred at sites barren of vegetation surficial geology had been modified by geothermal activity. There was no evidence of ungulate use at most sites. Purposeful consumption of soil peaked first from March to May and again from August to October, synchronous with peaks in consumption of ungulate meat and mushrooms” (*ibid.*, p. 109). Ungulates lick minerals (see Kreulen 1985), but such soils that were ingested by bears had a different composition, and also the purpose of the behaviour appears to be different than in ungulates: “Geophageous soils were distinguished from ungulate mineral licks and soils in general by exceptionally high concentrations of potassium (K) and high concentrations of magnesium (Mg) and sulphur (S). Our results do not support the hypotheses that bears were consuming soil to detoxify secondary compounds foliage, as postulated for primates, or to supplement dietary sodium, as known for ungulates. Our results suggest that grizzly bears could consuming soil as an anti-diarrheal” (Mattson et al. 1999, p. 109). In a section bearing the title “Additional Hypotheses”, Mattson et al. (1999) offered (*ibid.*, p. 114):

If bears emerging from hibernation experienced a K deficiency, they may not have been easily able to remedy their condition. In normal situations, herbivores can boost K intake by consuming rapidly growing vegetal material that is typically rich in K [...] However, such foods are not readily available to bears in the Yellowstone ecosystem until April. Our results suggest that geophagy by grizzly bears peaks in march and April. If bears are K-deficient, this condition may be exacerbated by diarrhea from consuming carrion [...]

If grizzly bears during our study were not K-deficient, they risked damagingly high levels of K (hyperkalemia) by geophagy. This risk would have been off-set somewhat by the relatively high levels of Mg in geophageous soils (Mg can serve as an antidote to high levels of K; [...]). However, such a risk is corroborated by records in the medical literature of human practitioners of geophagy experiencing hyperkalemia by ingesting soils with concentrations of K comparable to those of soils consumed by Yellowstone grizzly bears [...]

The consumption of elemental S may have had beneficial effects, especially during or soon after the transition from hibernation to active metabolism. Sulphur can act as a parasiticide and fungicide [...], and can also act as a bacteriostatic by altering the pH of intestinal fluids [...] Sulphates of Na and Mg together can further stimulate motility of the small intestine [...], which can be very beneficial after winter dormancy of the digestive tract.

Geophagy also could restore beneficial microflora to the intestines of bears after winter dormancy [...]

In their survey, Bonglaisin et al. (2022) remarked (citing Krief et al. 2008):

Studies involving some chimpanzees consuming clay-like soil have been observed prior to or after eating some plants possessing anti-malaria properties. Studies that simulated mastication and digestion observed that clay facilitates the release of active anti-malarial components from the leaves of these plants. These soils are also therapeutic toward diarrhea and have been exploited locally for diarrhea treatment [...]

There is a theory according to which, some parrots in the Amazon eat clay in order to neutralise toxins they ingest.<sup>27</sup> In a popularisation article, Starks and Slabach summarised this as follows (2012, p. 32):

In the 1990s James Gilardi, executive director of the World Parrot Trust, found support for the detoxification hypothesis in one of the few experimental studies on geophagia. While observing a flock of Peruvian parrots foraging on a particular band of exposed soil along the Manu River, Gilardi noticed that the birds neglected nearby stretches of soil with far more minerals. He surmised that the parrots were not ingesting soil for minerals but rather to counteract toxic alkaloids in the seeds and unripe fruit that make up a large part of their diet. Toxins prevalent in plants (and meats) often irritate the gut. To test this idea, Gilardi fed some parrots the toxic alkaloid quinidine with and without their preferred dirt and measured how much alkaloid made it into the birds' blood after the meal. Birds that did not consume the soil had higher levels of quinidine in their blood, whereas a side dish of dirt reduced quinidine levels in the blood by 60 percent. Researchers have shown the same benefit in chimpanzees and baboons that supplement their diets with clay.<sup>28</sup>

However, that theory for explaining the observed behaviour has been disproven, and those birds appear to be eating clay for the sake of the resulting sodium intake<sup>29</sup>

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<sup>27</sup> That hypothesis was made in a doctoral thesis by James Gilardi (1996).

<sup>28</sup> “Further evidence of dirt detox comes from studies of bats. A 2011 study in *PLoS ONE* asked whether Amazonian bats visit clay licks — cliff sides of exposed clay — for nutrition or detoxification. Christian Voigt of the Leibniz Institute for Zoo and Wildlife Research in Berlin and his colleagues captured bats of two different species: one that eats mostly fruit and one that eats mostly insects. If the bats were eating clay for minerals, Voigt predicted, he would find fewer fruit-eating bats at the clay licks because fruits have more dietary minerals than insects. But most of the bats he captured at the clay lick were fruit-eating bats — and many of them were pregnant or lactating. Voigt concluded that the pregnant fruit bats visited the clay licks to detox because they were eating twice as much to feed their babies, which meant twice the dose of plant toxins from unripe fruits, seeds and leaves” (Starks and Slabach 2012, p. 32).

<sup>29</sup> <https://en.wikipedia.org/wiki/Macaw> states: “Some foods eaten by macaws in certain regions in the wild are said to contain toxic or caustic substances which they are able to digest. It has been suggested that parrots and macaws in the Amazon Basin eat clay from exposed river banks to neutralize these toxins. In the western Amazon hundreds of macaws and other parrots descend to exposed river banks to consume clay on an almost daily basis – except on rainy days. Donald Brightsmith, the principal investigator of The Macaw Society, located at the Tambopata Research Center (TRC) in Peru, has studied the clay eating behaviour of parrots at clay licks in Peru. He and fellow investigators found [(Brightsmith and Muñoz-Najar 2004)] that the soils macaws choose to consume at the clay licks do not have higher levels of cation-exchange capacity (ability to absorb toxins) than that of unused areas of the clay licks and thus the parrots could not be using the clay to neutralize ingested food toxins. Rather, the macaws and other bird and animal species prefer clays with higher levels of sodium. Sodium is a vital element that is scarce in environments greater than 100 kilometres from the ocean. The distribution of clay licks across South America further supports this hypothesis – as the largest and most species-rich clay licks are found on the western side of the Amazon Basin far from oceanic influences [(Lee et al. 2009)]. Salt-enriched (NaCl) oceanic aerosols are the main source of environmental sodium near coasts and this decreases drastically farther inland”. Scarcity of sodium in some environments was researched in respect of biogeography by Kaspari et al. (2008), by considering ant communities.

(Powell et al. 2009). Nevertheless, this does not seem to be in order to enhance the formation of egg shells, because clay is consumed after the hatching.<sup>30</sup> That behaviour —which by the way, does not take place on rainy days, according to Brightsmith (2004) — is observed among macaws, but only in the Amazon, and it is not observed in other areas where the intake of toxins is higher.<sup>31</sup> “Another theory is that the birds, as well as other herbivorous animals, use the clay licks as a source of cobalamin, otherwise known as vitamin B<sub>12</sub>.”<sup>32</sup>

In a survey of geophagy in humans and animals, Young et al. (2011) remarked: “The frequency with which geophagy was reported in tropical leaf- and fruit-eating birds and mammals suggests that detoxification of plant secondary compounds is a more important function of the behavior than presently is realized” (*ibid.* p. 114).

Wiley and Katz (1998) began their article, which is about human gestational geophagy, by remarking as follows about rats:

The consumption of earthen clays (geophagy) has a wide distribution among animals. Despite fundamental differences in dietary ecology, large and small herbivores of arid and tropical forest environments eat clay and other soils, as do chimpanzees, gorillas, and various monkeys and many bird species, among others [...] Geophagy is particularly ubiquitous among rats, so much so that clay consumption is diagnostic of gastrointestinal disease or discomfort (McCaffrey 1985, Watson et al. 1987). In this case, clay consumption appears to substitute for emesis (rats cannot vomit) and allows rats to avoid being poisoned by their highly opportunistic diet. Geophagy is also common in many human populations. Clay may be incorporated into cuisine, used in food preparation, consumed for its medicinal qualities, or eaten during times of famine or food scarcity. However, in numerous societies the direct consumption of clay is often uniquely associated with pregnancy.

## 20. Concluding remarks

This article is concerned with the use of clay and soil as being used by some as food, but also of clay (*tīn khāw*) from the riverbanks of the Tigris as traditional in Iraq for application on a leishmaniasis boil. There is here ethnography as based on my late mother’s personal recollection to the latter use, but the paper begins with the discussion of Roman-age, early rabbinic passages about soil-eating: in one case (from Roman Palestine), because of poverty, and in the other (from Sasanian Mesopotamia), as gestational geophagia; in the latter case, the passage warns against that practice. In Iraq, there also are cosmetic use of *tīn khāw*, and there exist Arabic YouTube videos that deal with this. We considered soil in the traditional *materia medica* of the Middle East, and clay as a substitute for soap, especially in shampooing.

Geophagia is found in both humans, and mammals (herbivores, bears, rats, monkeys) and birds. We consider geophagia as practised by pregnant women, as well as a type of pica (eating the inedible), a condition that tends to affect children. There

<sup>30</sup> “Studies at TRC have shown a correlation between clay-lick use and the breeding season. Contents of nestling crop samples show a high percentage of clay fed to them by their parents. Calcium for egg development – another hypothesis – does not appear to be a reason for geophagy during this period as peak usage is after the hatching of eggs” (<https://en.wikipedia.org/wiki/Macaw>).

<sup>31</sup> “Clay-eating behaviour by macaws is not seen outside the western Amazon region, even though macaws in these areas consume some toxic foods such as the seeds of *Hura crepitans*, or sandbox tree, which have toxic sap. Species of parrot that consume more seeds, which potentially have more toxins, do not use clay licks more than species that eat a greater proportion of flowers or fruit in their diets” (*ibid.*, citing Lee 2010).

<sup>32</sup> <https://en.wikipedia.org/wiki/Macaw>

are medical risks to soil-eating, but some benefits have also been detected, for some kinds of soil. And we have considered geophagia among slaves, as well as that habit interpreted in 19th-century Brazil as being intended for achieving suicide, and the advice of a physician in an Edinburgh medical journal in 1833, that slaves be encouraged to replace their habit of soil-eating with addiction to opium. We have also considered the religiously prescribed ingestion of clay: seals from the Greek island of Lemnos (these were consumed by Greek Orthodox and Catholics alike), and tablets of clay in Belize. And, was the ancient name, *Lutetia*, or Paris, related to clay-eating?

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