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The Abominable Pig

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An aversion to pork seems at the outset even more irrational than an aversion to beef. Of all domesticated mammals, pigs possess the greatest potential for swiftly and efficiently changing plants into flesh. Over its lifetime a pig can convert 35 percent of the energy in its feed to meat compared with 13 percent for sheep and a mere 6.5 percent for cattle. A piglet can gain a pound for every three to five pounds it eats while a calf needs to eat ten pounds to gain one. A cow needs nine months to drop a single calf, and under modern conditions the calf needs another four months to reach four hundred pounds. But less than four months after insemination, a single sow can give birth to eight or more piglets, each of which after another six months can weigh over four hundred pounds. Clearly, the whole essence of pig is the production of meat for human nourishment and delectation. Why then did the Lord of the ancient Israelites forbid his people to savor pork or even to touch a pig alive or dead?

> Of their flesh you shall not eat, and their carcasses you shall not touch; they are unclean to you (Lev. 11: 1) . . . everyone who touches them shall be unclean. (Lev. 11:24)

Unlike the Old Testament, which is a treasure trove of forbidden flesh, the Koran is virtually free of meat taboos. Why is it the pig alone who suffers Allah's disapproval?

> These things only has He forbidden you: carrion, blood, and the flesh of swine. (Holy Koran 2, 168)

For many observant Jews, the Old Testament's characterization of swine as "unclean" renders the explanation of the taboo self-evident: "Anyone who has seen the filthy habits of the swine will not ask why it is prohibited," says a modern rabbinical authority. The grounding of the fear and loathing of pigs in self-evident piggishness goes back at least to the time of Rabbi Moses Maimonides, court physician to the Islamic emperor Saladin during the twelfth century in Egypt. Maimonides shared with his Islamic hosts a lively disgust for pigs and pig eaters, especially Christian pigs and pig eaters: "The principal reason why the law forbids swine-flesh is to be found in the circumstance that its habits and food are very filthy and loathsome." If the law allowed Egyptians and Jews

to raise pigs, Cairo's streets and houses would become as filthy as those of Europe, for "the mouth of a swine is as dirty as dung itself." Maimonides could only tell one side of the story. He had never seen a clean pig. The pig's penchant for excrement is not a defect of its nature but of the husbandry of its human masters. Pigs prefer and thrive best on roots, nuts, and grains; they eat excrement only when nothing better presents itself. In fact, let them get hungry enough, and they'll even eat each other, a trait which they share with other omnivores, but most notably with their own masters. Nor is wallowing in filth a natural characteristic of swine. Pigs wallow to keep themselves cool; and they much prefer a fresh, clean mudhole to one that has been soiled by urine and feces.

In condemning the pig as the dirtiest of animals, Jews and Moslems left unexplained their more tolerant attitude toward other dung-eating domesticated species. Chickens and goats, for example, given motivation and opportunity, also readily dine on dung. The dog is another domesticated creature which easily develops an appetite for human feces. And this was especially true in the Middle East, where dung-eating dogs filled the scavenging niche left vacant by the ban on pigs. Jahweh prohibited their flesh, yet dogs were not abominated, bad to touch, or even bad to look at, as were pigs.

Maimonides could not be entirely consistent in his efforts to attribute the abstention from pork to the pig's penchant for feces. The Book of Leviticus prohibits the flesh of many other creatures, such as cats and camels, which are not notably inclined to eat excrement. And with the exception of the pig, had not Allah said all the others were good to eat? The fact that Maimonides's Moslem emperor could eat every kind of meat except pork would have made it impolitic if not dangerous to identify the biblical sense of cleanliness exclusively with freedom from the taint of feces. So instead of adopting a cleaner-than-thou attitude, Maimonides offered a proper court physician's theory of the entire set of biblical aversions: the prohibited items were not good to eat because not only was one of them—the pig—filthy from eating excrement but all of them were not good for you. "I maintain," he said, "that food forbidden by the Law is unwholesome." But in what ways were the forbidden foods unwholesome? The great rabbi was quite specific in the case of pork: it "contained more moisture than necessary and too much superfluous matter." As for the other forbidden foods, their "injurious character" was too self-evident to merit further discussion.

Maimonides's public health theory of pork avoidance had to wait seven hundred years before it acquired what seemed to be a scientific justification. In 1859 the first clinical association between trichinosis and undercooked pork was established, and from then on it became the most popular explanation of the Jewish and Islamic pork taboo. Just as Maimonides said, pork was unwholesome. Eager to reconcile the Bible with the findings of medical science, theologians began to embroider a whole series of additional public health explanations for the other biblical food taboos: wild animals and beasts of burden were prohibited because the flesh gets too tough to be digested properly; shellfish were to be avoided because they serve as vectors of typhoid fever; blood is not good to eat because the bloodstream is a perfect medium for microbes. In the case of pork this line of rationalization had a paradoxical outcome. Reformist Jews began to argue that since they now understood the scientific and medical basis of the taboos, pork avoidance was no longer necessary; all they had to do was to see to it that the meat was thoroughly cooked. Predictably, this provoked a reaction among Orthodox Jews, who were appalled

at the idea that the book of God's law was being relegated to the "class of a minor medical text." They insisted that God's purpose in Leviticus could never be fully comprehended; nonetheless the dietary laws had to be obeyed as a sign of submission to divine will.

Eventually the trichinosis theory of pork avoidance fell out of favor largely on the grounds that a medical discovery made in the nineteenth century could not have been known thousands of years ago. But that is not the part of the theory that bothers me. People do not have to possess a scientific understanding of the ill effects of certain foods in order to put such foods on their bad-to-eat list. If the consequences of eating pork had been exceptionally bad for their health, it would not have been necessary for the Israelites to know about trichinosis in order to ban its consumption. Does one have to understand the molecular chemistry of toxins in order to know that some mushrooms are dangerous? It is essential for my own explanation of the pig taboo that the trichinosis theory be laid to rest on entirely different grounds. My contention is that there is absolutely nothing exceptional about pork as a source of human disease. All domestic animals are potentially hazardous to human health. Undercooked beef, for example, is a prolific source of tapeworms, which can grow to a length of sixteen to twenty feet inside the human gut, induce a severe case of anemia, and lower the body's resistance to other diseases. Cattle, goat, and sheep transmit the bacterial disease known as brucellosis, whose symptoms include fever, aches, pains, and lassitude. The most dangerous disease transmitted by cattle, sheep, and goats is anthrax, a fairly common disease of both animals and humans in Europe and Asia until the introduction of Louis Pasteur's anthrax vaccine in 1881. Unlike trichinosis, which does not produce symptoms in the majority of infected individuals and rarely has a fatal outcome, anthrax runs a swift course that begins with an outbreak of boils and ends in death.

If the taboo on pork was a divinely inspired health ordinance, it is the oldest recorded case of medical malpractice. The way to safeguard against trichinosis was not to taboo pork but to taboo undercooked pork. A simple advisory against undercooking pork would have sufficed: "Flesh of swine thou shalt not eat until the pink has been cooked from it." And come to think of it, the same advisory should have been issued for cattle, sheep, and goats. But the charge of medical malpractice against Jahweh will not stick.

The Old Testament contains a rather precise formula for distinguishing good-to-eat flesh from forbidden flesh. This formula says nothing about dirty habits or unhealthy meat. Instead it directs attention to certain anatomical and physiological features of animals that are good to eat. Here is what Leviticus 11: 1 says:

> Whatever parts the hoof and is cloven footed and chews the cud among animals, you may eat.

Any serious attempt to explain why the pig was not good to eat must begin with this formula and not with excrement or wholesomeness, about which not a word is said. Leviticus goes on to state explicitly of the pig that it only satisfies one part of the formula. "It divideth the hoof." But the pig does not satisfy the other part of the formula: "It cheweth not the cud."

To their credit, champions of the good-to-eat school have stressed the importance of

the cud-chewing, split-hoof formula as the key to understanding Jahweh's abomination of the pig. But they do not view the formula as an outcome of the way the Israelites used domestic animals. Instead they view the way the Israelites used domestic animals as an outcome of the formula. According to anthropologist Mary Douglas, for example, the cud-chewing, split-hoof formula makes the split-hoof but non-cud-chewing pig a thing that's "out of place." Things that are "out of place" are dirty, she argues, for the essence of dirt is "matter out of place." The pig, however, is more than out of place; it is neither here nor there. Such things are both dirty and dangerous. Therefore the pig is abominated as well as not good to eat. But doesn't the force of this argument lie entirely in its circularity? To observe that the pig is out of place taxonomically is merely to observe that Leviticus classifies good-to-eat animals in such a way as to make the pig bad to eat. This avoids the question of why the taxonomy is what it is.

Let me attend first to the reason why Jahweh wanted edible animals to be cud-chewers. Among animals raised by the ancient Israelites, there were three cud-chewers: cattle, sheep, and goats. These three animals were the most important food-producing species in the ancient Middle East not because the ancients happened capriciously to think that cud-chewing animals were good to eat (and good to milk) but because cattle, sheep, and goats are ruminants, the kind of herbivores which thrive best on diets consisting of plants that have a high cellulose content. Of all domesticated animals, those which are ruminants possess the most efficient system for digesting tough fibrous materials such as grasses and straw. Their stomachs have four compartments which are like big fermentation "vats" in which bacteria break down and soften these materials. While cropping their food, ruminants do little chewing. The food passes directly to the rumen, the first of the compartments, where it soon begins to ferment. From time to time the contents of the rumen are regurgitated into the mouth as a softened bolus—the "cud"—which is then chewed thoroughly and sent on to the other "vats" to undergo further fermentation.

The ruminant's extraordinary ability to digest cellulose was crucial to the relationship between humans and domesticated animals in the Middle East. By raising animals that could "chew the cud," the Israelites and their neighbors were able to obtain meat and milk without having to share with their livestock the crops destined for human consumption. Cattle, sheep, and goats thrive on items like grass, straw, hay, stubble, bushes, and leaves—feeds whose high cellulose content renders them unfit for human consumption even after vigorous boiling. Rather than compete with humans for food, the ruminants further enhanced agricultural productivity by providing dung for fertilizer and traction for pulling plows. And they were also a source of fiber and felt for clothing, and of leather for shoes and harnesses.

I began this puzzle by saying that pigs are the most efficient mammalian converters of plant foods into animal flesh, but I neglected to say what kinds of plant foods. Feed them on wheat, maize, potatoes, soybeans, or anything low in cellulose, and pigs will perform veritable miracles of transubstantiation; feed them on grass, stubble, leaves, or anything high in cellulose, and they will lose weight.

Pigs are omnivores, but they are not ruminants. In fact, in digestive apparatus and nutrient requirements pigs resemble humans in more ways than any mammal except monkeys and apes, which is why pigs are much in demand for medical research concerned with atherosclerosis, calorie-protein malnutrition, nutrient absorption, and metabolism.

But there was more to the ban on pork than the pig's inability to thrive on grass and other high-cellulose plants. Pigs carry the additional onus of not being well adapted to the climate and ecology of the Middle East. Unlike the ancestors of cattle, sheep, or goats, which lived in hot, semiarid, sunny grasslands, the pig's ancestors were denizens of well-watered, shady forest glens and riverbanks. Everything about the pig's body heat-regulating system is ill suited for life in the hot, sun-parched habitats which were the homelands of the children of Abraham. Tropical breeds of cattle, sheep, and goats can go for long periods without water, and can either rid their bodies of excess heat through perspiration or are protected from the sun's rays by light-colored, short fleecy coats (heat-trapping heavy wool is a characteristic of cold-climate breeds). Although a perspiring human is said to "sweat like a pig," the expression lacks an anatomical basis. Pigs can't sweat—they have no functional sweat glands. (Humans are actually the sweatiest of all animals.) And the pig's sparse coat offers little protection against the sun's rays. Just how does the pig keep cool? It does a lot of panting, but mostly it depends on wetting itself down with moisture derived from external sources. Here, then, is the explanation for the pig's love of wallowing in mud. By wallowing, it dissipates heat both by evaporation from its skin and by conduction through the cool ground. Experiments show that the cooling effect of mud is superior to that of water. Pigs whose flanks are thoroughly smeared with mud continue to show peak heat-dissipating evaporation for more than twice as long as pigs whose flanks are merely soaked with water, and here also is the explanation for some of the pig's dirty habits. As temperatures rise above thirty degrees celsius (eighty-six degrees Fahrenheit), a pig deprived of clean mudholes will become desperate and begin to wallow in its own feces and urine in order to avoid heat stroke. Incidentally, the larger a pig gets, the more intolerant it becomes of high ambient temperatures.

Raising pigs in the Middle East therefore was and still is a lot costlier than raising ruminants, because pigs must be provided with artificial shade and extra water for wallowing, and their diet must be supplemented with grains and other plant foods that humans themselves can eat.

To offset all these liabilities pigs have less to offer by way of benefits than ruminants. They can't pull plows, their hair is unsuited for fiber and cloth, and they are not suited for milking. Uniquely among large domesticated animals, meat is their most important produce (guinea pigs and rabbits are smaller equivalents; but fowl produce eggs as well as meat).

For a pastoral nomadic people like the Israelites during their years of wandering in search of lands suitable for agriculture, swineherding was out of the question. No arid-land pastoralists herd pigs for the simple reason that it is hard to protect them from exposure to heat, sun, and lack of water while moving from camp to camp over long distances. During their formative years as a nation, therefore, the ancient Israelites could not have consumed significant quantities of pork even had they desired it. This historical experience undoubtedly contributed to the development of a traditional aversion to pig meat as an unknown and alien food. But why was this tradition preserved and strengthened by being written down as God's law long after the Israelites had become settled farmers? The answer as I see it is not that the tradition born of pastoralism continued to prevail by mere inertia and ingrown habit, but that it was preserved because pig raising remained too costly.

Critics have opposed the theory that the ancient Israelite pork taboo was essentially a cost/benefit choice by pointing to evidence of pigs being raised quite successfully in many parts of the Middle East including the Israelite's promised land. The facts are not in dispute. Pigs have indeed been raised for ten thousand years in various parts of the Middle East—as long as sheep and goats, and even longer than cattle. Some of the oldest Neolithic villages excavated by archaeologists—Jericho in Jordan, Jarmo in Iraq, and Argissa-Magulla in Greece—contain pig bones with features indicative of the transition from wild to domesticated varieties. Several Middle Eastern pre-Bronze Age villages (4000 B.C. to 2000 B.C.) contain concentrated masses of pig remains in association with what archaeologists interpret as altars and cultic centers, suggestive of ritual pig slaughter and pig feasting. We know that some pigs were still being raised in the lands of the Bible at the beginning of the Christian era. The New Testament (Luke) tells us that in the country of the Garadines near Lake Galilee Jesus cast out devils from a man named Legion into a herd of swine feeding on the mountain. The swine rushed down into the lake and drowned themselves, and Legion was cured. Even modern-day Israelites continue to raise thousands of swine in parts of northern Galilee. But from the very beginning, fewer pigs were raised than cattle, sheep, or goats. And more importantly, as time went on, pig husbandry declined throughout the region.

Carlton Coon, an anthropologist with many years of experience in North America and the Levant, was the first scholar to offer a cogent explanation of why this general decline in pig husbandry had occurred. Coon attributed the fall of the Middle Eastern pig to deforestation and human population increase. At the beginning of the Neolithic period, pigs were able to root in oak and beech forests which provided ample shade and wallows as well as acorns, beechnuts, truffles, and other forest floor products. With an increase in human population density, farm acreage increased and the oak and beech forests were destroyed to make room for planted crops, especially for olive trees, thereby eliminating the pig's ecological niche.

To update Coon's ecological scenario, I would add that as forests were being destroyed, so were marginal farmlands and grazing lands, the general succession being from forest to cropland to grazing land to desert, with each step along the way yielding a greater premium for raising ruminants and a greater penalty for raising swine. Robert Orr Whyte, former director general of the United Nations Food and Agricultural Organization, estimated that in Anatolia the forests shrank from 70 percent to 13 percent of the total land area between 5000 B.C. and the recent past. Only a fourth of the Caspian shorefront forest survived the process of population increase and agricultural intensification; half of the Caspian mountainous humid forest; a fifth to a sixth of the oak and juniper forests of the Zagros Mountains; and only a twentieth of the juniper forests of the Elburz and Khorassan ranges.

If I am right about the subversion of the practical basis of pig production through ecological succession, one does not need to invoke Mary Douglas's "taxonomic anomaly" to understand the peculiarly low status of the pig in the Middle East. The danger it posed to husbandry was very tangible and accounts quite well for its low status. The pig had been domesticated for one purpose only, namely to supply meat. As ecological conditions became unfavorable for pig raising, there was no alternative function which could redeem its existence. The creature became not only useless, but worse than useless—harmful, a curse to touch or merely to see—a pariah animal. This transformation

contrasts understandably with that of cattle in India. Subject to a similar series of ecological depletions—deforestation, erosion, and desertification—cattle also became bad to eat. But in other respects, especially for traction power and milk, they became more useful than ever—a blessing to look at or to touch—animal godheads.

In this perspective, the fact that pig raising remained possible for the Israelites at low cost in certain remnant hillside forests or swampy habitats, or at extra expense where shade and water were scarce, does not contradict the ecological basis of the taboo. If there had not been some minimum possibility of raising pigs, there would have been no reason to taboo the practice. As the history of Hindu cow protection shows, religions gain strength when they help people make decisions which are in accord with preexisting useful practices, but which are not so completely self-evident as to preclude doubts and temptations. To judge from the Eight-fold Way or the Ten Commandments, God does not usually waste time prohibiting the impossible or condemning the unthinkable.

Leviticus consistently bans all vertebrate land animals that do not chew the cud. It bans, for example, in addition to swine, equines, felines, canines, rodents, and reptiles, none of which are cud-chewers. But Leviticus contains a maddening complication. It prohibits the consumption of three land-dwelling vertebrates which it specifically identifies as cud-chewers: the camel, the hare, and a third creature whose name in Hebrew is *shāphān*. The reason given for why these three alleged cud-chewers are not good to eat is that they do not "part the hoof":

> Nevertheless, these shall ye not eat of them that chew the cud . . . the camel because he . . . divideth not the hoof. And the *shāphān* because he . . . divideth not the hoof . . . And the hare, because he. . . divideth not the hoof. (Lev. 11: 4–6)

Although strictly speaking camels are not ruminants, because their cellulose-digesting chambers are anatomically distinct from those of the ruminants, they do ferment, regurgitate, and chew the cud much like cattle, sheep, and goats. But the classification of the hare as a cud-chewer immediately casts a pall over the zoological expertise of the Levite priests. Hares can digest grass but only by eating their own feces—which is a very uncud-like solution to the problem of how to send undigested cellulose through the gut for repeated processing (the technical term for this practice is coprophagy). Now as to the identify of the *shāphān*. As the following stack of Bibles shows, *shāphān* is either the "rock badger," "cherogrillus," or "cony":

Bibles Translating Shāphān as "Rock Badger"

The Holy Bible. Berkeley: University of California Press.

The Bible. Chicago: University of Chicago Press, 1931.

The New Schofield Reference Library Holy Bible (Authorized King James Version). New York: Oxford University Press, 1967.

The Holy Bible. London: Catholic Truth Society, 1966.

The Holy Bible. (Revised Standard Version). New York: Thomas Nelson and Sons, 1952.

The American Standard Bible. (Reference Edition). La Habra, CA: Collins World, 1973.

The New World Translation of the Holy Scriptures. Brooklyn, NY: Watchtower Bible and Tract Society of Pennsylvania, 1961.

Bibles Translating Shāphān as "Cony"

The Pentateuch: The Five Books of Moses. Edited by William Tyndale. Carbondale: Southern Illinois University Press, 1967.

The Interpreter's Bible: The Holy Scriptures. 12 vols. New York: Abingdon Press, 1953.

The Holy Bible. King James Version (Revised Standard Version). Nashville: Thomas Nelson and Sons, 1971.

Holy Bible. Authorized version. New York: Harpers.

Holy Bible. Revised. New York: American Bible Society, 1873.

Modern Readers Bible. Edited by Richard Moulton. New York: Macmillan, 1935.

Bibles Translating Shāphān as "Cherogrillus"

Holy Bible. (Duay, translated from Vulgate.) Boston: John Murphy and Co., 1914.

The Holy Bible. (Translated from the Vulgate by John Wycliffe and his followers.) Edited by Rev. Josiah Forshall and Sir Frederick Madden. Oxford: Oxford University Press, 1850.

All three terms refer to a similar kind of small, furtive, hoofed herbivore about the size of a squirrel that lives in colonies on rocky cliffs or among boulders on hilltops. It has two other popular aliases: "dassie" and "damon." It could have been any of these closely related species: *Hyrax capensia, Hyrax syriacus,* or *Procavia capensis.* Whichever it was, it had no rumen and it did not chew the cud.

This leaves the camel as the only bona fide cud-chewer that the Israelites couldn't eat. Every vertebrate land animal that is not a ruminant was forbidden flesh. And only one vertebrate land animal that is a ruminant, the camel, was forbidden. Let me see if I can explain this exception as well as the peculiar mixup about hares and shāphān.

My point of departure is that the food laws in Leviticus were mostly codifications of preexisting traditional food prejudices and avoidances. (The Book of Leviticus was not written until 450 B.C.—very late in Israelite history.) I envision the Levite authorities as undertaking the task of finding some simple feature which good-to-eat vertebrate land species shared in common. Had the Levites possessed a better knowledge of zoology, they could have used the criterion of cud-chewing alone and simply added the proviso, "except for the camel." For, as I have just said, with the exception of the camel, all land animals implicitly or explicitly forbidden in Leviticus—all the equines, felines, canines, rodents, rabbits, reptiles, and so forth—are nonruminants. But given their shaky knowledge of zoology, the codifiers could not be sure that the camel was the only undesirable species which was a cud-chewer. So they added the criterion of split hooves—a feature which camels lacked but which the other familiar cud-chewers possessed (the camel has two large flexible toes on each foot instead of hooves).

But why was the camel not a desirable species? Why spurn camel meat? I think the separation of the camel from the other cud-chewers reflects its highly specialized adaptation to desert habitats. With their remarkable capacity to store water, withstand heat, and carry heavy burdens over great distances, and with their long eyelashes and nostrils that shut tight for protection against sandstorms, camels were the most important possession of the Middle Eastern desert nomads. (The camel's hump concentrates fat—not water. It acts as an energy reserve. By concentrating the fat in the hump, the rest of the skin needs only a thin layer of fat, and this facilitates removal of body heat.) But as

village farmers, the Israelites had little use for camels. Except under desert conditions, sheep and goats and cattle are more efficient converters of cellulose into meat and milk. In addition, camels reproduce very slowly. The females are not ready to bear offspring and the males are not ready to copulate until six years of age. To slow things down further, the males have a once-a-year rutting season (during which they emit an offensive odor), and gestation takes twelve months. Neither camel meat nor camel milk could ever have constituted a significant portion of the ancient Israelites' food supply. Those few Israelites such as Abraham and Joseph who owned camels would have used them strictly as a means of transport for crossing the desert.

This interpretation gains strength from the Moslem acceptance of camel meat. In the Koran, pork is specifically prohibited while camel flesh is specifically allowed. The whole way of life of Mohammed's desert-dwelling, pastoral Bedouin followers was based on the camel. The camel was their main source of transport and their main source of animal food, primarily in the form of camel milk. While camel meat was not daily fare, the Bedouin were often forced to slaughter pack animals during their desert journeys as emergency rations when their regular supplies of food were depleted. An Islam that banned camel flesh would never have become a great world religion. It would have been unable to conquer the Arabian heartlands, to launch its attack against the Byzantine and Persian empires, and to cross the Sahara to the Sahel and West Africa.

If the Levite priests were trying to rationalize and codify dietary laws, most of which had a basis in preexisting popular belief and practice, they needed a taxonomic principle which connected the existing patterns of preference and avoidance into a comprehensive cognitive and theological system. The preexisting ban on camel meat made it impossible to use cud-chewing as the sole taxonomic principle for identifying land vertebrates that were good to eat. They needed another criterion to exclude camels. And this was how "split hooves" got into the picture. Camels have conspicuously different feet from cattle, sheep, or goats. They have split toes instead of split hooves. So the priests of Leviticus added "parts the hoof" to "chews the cud" to make camels bad to eat. The misclassification of the hare and *shāphān* suggest that these animals were not well known to the codifiers. The authors of Leviticus were right about the feet—hares have paws and *Hyrax* (and *Procavia*) have tiny hooves, three on the front leg and five on the rear leg. But they were wrong about the cud-chewing—perhaps because hares and shāphān have their mouths in constant motion.

Once the principle of using feet to distinguish between edible and inedible flesh was established, the pig could not be banned simply by pointing to its nonruminant nature. Both its cud-chewing status and the anatomy of its feet had to be considered, even though the pig's failure to chew the cud was its decisive defect.

This, then, is my theory of why the formula for forbidden vertebrate land animals was elaborated beyond the mere absence of cud-chewing. It is a difficult theory to prove because no one knows who the authors of Leviticus were or what was really going on inside their heads. But regardless of whether or not the good-to-eat formula originated in the way I have described, the fact remains that the application of the expanded formula to hare and *shāphān* (as well as to pig and camel) did not result in any dietary restrictions that adversely affected the balance of nutritional or ecological costs and benefits. Hare and *shāphān* are wild species; it would have been a waste of time to hunt them instead of concentrating on raising far more productive ruminants.

To recall momentarily the case of the Brahman protectors of the cow, I do not doubt the ability of a literate priesthood to codify, build onto, and reshape popular foodways. But I doubt whether such "top-down" codifications generally result in adverse nutritional or ecological consequences or are made with blithe disregard of such consequences. More important than all the zoological errors and flights of taxonomic fancy is that Leviticus correctly identifies the classic domesticated ruminants as the most efficient source of milk and meats for the ancient Israelites. To the extent that abstract theological principles result in flamboyant lists of interdicted species, the results are trivial if not beneficial from a nutritional and ecological viewpoint. Among birds, for example, Leviticus bans the flesh of the eagle, ossifrage, osprey, ostrich, kite, falcon, raven, nighthawk, sea gull, hawk, cormorant, ibis, waterhen, pelican, vulture, stork, hoopoe, and bat (not a bird of course). I suspect but again cannot prove that this list was primarily the result of a priestly attempt to enlarge on a smaller set of prohibited flying creatures. Many of the "birds," especially the sea birds like pelicans and cormorants, would rarely be seen inland. Also, the list seems to be based on a taxonomic principle that has been somewhat overextended: most of the creatures on it are carnivores and "birds of prey." Perhaps the list was generated from this principle applied first to common local "birds" and then extended to the exotic sea birds as a validation of the codifiers' claim to special knowledge of the natural and supernatural worlds. But in any event, the list renders no disservice. Unless they were close to starvation and nothing else was available, the Israelites were well advised not to waste their time trying to catch eagles, ospreys, sea gulls, and the like, supposing they were inclined to dine on creatures that consist of little more than skin, feathers, and well-nigh indestructible gizzards in the first place. Similar remarks are appropriate vis-à-vis the prohibition of such unlikely sources of food for the inland-dwelling Israelites as clams and oysters. And if Jonah is an example of what happened when they took to the sea, the Israelites were well advised not to try to satisfy their meat hunger by hunting whales.

But let me return to the pig. If the Israelites had been alone in their interdictions of pork, I would find it more difficult to choose among alternative explanations of the pig taboo. The recurrence of pig aversions in several different Middle Eastern cultures strongly supports the view that the Israelite ban was a response to recurrent practical conditions rather than to a set of beliefs peculiar to one religion's notions about clean and unclean animals. At least three other important Middle Eastern civilizations—the Phoenicians, Egyptians, and Babylonians—were as disturbed by pigs as were the Israelites. Incidentally, this disposes of the notion that the Israelites banned the pig to "set themselves off from their neighbors," especially their unfriendly neighbors. (Of course, after the Jews dispersed throughout pork-eating Christendom, their abomination of the pig became an ethnic "marker." There was no compelling reason for them to give up their ancient contempt for pork. Prevented from owning land, the basis for their livelihood in Europe had to be crafts and commerce rather than agriculture. Hence there were no ecological or economic penalties associated with their rejection of pork while there were plenty of other sources of animal foods.)

In each of the additional cases, pork had been freely consumed during an earlier epoch. In Egypt, for example, tomb paintings and inscriptions indicate that pigs were the object of increasingly severe opprobrium and religious interdiction during the New Kingdom (1567–1085 B.C.). Toward the end of late dynastic times (1088–332 B.C.) Herodotus

visited Egypt and reported that "the pig is regarded among them as an unclean animal so much so that if a man in passing accidentally touches a pig, he instantly hurries to the river and plunges in with all his clothes on." As in Roman Palestine when Jesus drove the Garadine swine into Lake Galilee, some Egyptians continued to raise pigs. Herodotus described these swineherds as an in-marrying pariah caste who were forbidden to set foot in any of the temples.

One interpretation of the Egyptian pig taboo is that it reflects the conquest of the northern pork-eating followers of the god Seth by the southern pork-abstaining followers of the god Osiris and the imposition of southern Egyptian food preferences on the northerners. The trouble with this explanation is that if such a conquest occurred at all, it took place at the very beginning of the dynastic era and therefore does not account for the evidence that the pig taboo got stronger in late dynastic times.

My own interpretation of the Egyptian pig taboo is that it reflected a basic conflict between the dense human population crowded into the treeless Nile Valley and the demands made by the pig for the plant foods that humans could consume. A text from the Old Kingdom clearly shows how during hard times humans and swine competed for subsistence: " . . . food is robbed from the mouth of the swine, without it being said, as before 'this is better for thee than for me,' for men are so hungry." What kinds of foods were robbed from the swine's mouth? Another text from the Second Intermediate period, boasting of a king's power over the lands, suggests it was grains fit for human consumption: "The finest of their fields are ploughed for us, our oxen are in the Delta, wheat is sent for our swine." And the Roman historian, Pliny, mentions the use of dates as a food used to fatten Egyptian pigs. The kind of preferential treatment needed to raise pigs in Egypt must have engendered strong feelings of antagonism between poor peasants who could not afford pork and the swineherds who catered to the tastes of rich and powerful nobles.

In Mesopotamia, as in Egypt, the pig fell from grace after a long period of popularity. Archaeologists have found clay models of domesticated pigs in the earliest settlements along the lower Tigris and Euphrates rivers. About 30 percent of the animal bones excavated from Tell Asmar (2800–2700 B.C.) came from pigs. Pork was eaten at Ur in predynastic times, and in the earliest Sumerian dynasties there were swineherds and butchers who specialized in pig slaughter. The pig seems to have fallen from favor when the Sumerians' irrigated fields became contaminated with salt, and barley, a salt-tolerant but relatively low-yielding plant, had to be substituted for wheat. These agricultural problems are implicated in the collapse of the Sumerian Empire and the shift after 2000 B.C. of the center of power upstream to Babylon. While pigs continued to be raised during Hammurabi's reign (about 1900 B.C.), they virtually disappear from Mesopotamia's archaeological and historical record thereafter.

The most important recurrence of the pig taboo is that of Islam. To repeat, pork is Allah's only explicitly forbidden flesh. Mohammed's Bedouin followers shared an aversion to pig found everywhere among arid-land nomadic pastoralists. As Islam spread westward from the Arabian Peninsula to the Atlantic, it found its greatest strength among North African peoples for whom pig raising was also a minor or entirely absent component of agriculture and for whom the Koranic ban on pork did not represent a significant dietary or economic deprivation. To the east, Islam again found its greatest strength in the belt of the semiarid lands that stretch from the Mediterranean Sea through Iran,

Afghanistan, and Pakistan to India. I don't mean to say that none of the people who adopted Islam had previously relished pork. But for the great mass of early converts, becoming a Moslem did not involve any great upending of dietary or subsistence practices because from Morocco to India people had come to depend primarily on cattle, sheep, and goats for their animal products long before the Koran was written. Where local ecological conditions here and there strongly favored pig raising within the Islamic heartland, pork continued to be produced. Carlton Coon described one such pork-tolerant enclave—a village of Berbers in the oak forests of the Atlas Mountains in Morocco. Although nominally Moslems, the villagers kept pigs which they let loose in the forest during the day and brought home at night. The villagers denied that they raised pigs, never took them to market, and hid them from visitors. These and other examples of pig-tolerant Moslems suggest that one should not overestimate the ability of Islam to stamp out pig eating by religious precept alone if conditions are favorable for pig husbandry.

Wherever Islam has penetrated to regions in which pig raising was a mainstay of the traditional farming systems, it has failed to win over substantial portions of the population. Regions such as Malaysia, Indonesia, the Philippines, and Africa south of the Sahara, parts of which are ecologically well suited for pig raising, constitute the outer limits of the active spread of Islam. All along this frontier the resistance of pig-eating Christians has prevented Islam from becoming the dominant religion. In China, one of the world centers of pig production, Islam has made small inroads and is confined largely to the arid and semiarid western provinces. Islam, in other words, to this very day has a geographical limit which coincides with the ecological zones of transition between forested regions well suited for pig husbandry and regions where too much sun and dry heat make pig husbandry a risky and expensive practice.

While I contend that ecological factors underlie religious definitions of clean and unclean foods, I also hold that the effects do not all flow in a single direction. Religiously sanctioned foodways that have become established as the mark of conversion and as a measure of piety can also exert a force of their own back upon the ecological and economic conditions which gave rise to them. In the case of the Islamic pork taboos, the feedback between religious belief and the practical exigencies of animal husbandry has led to a kind of undeclared ecological war between Christians and Moslems in several parts of the Mediterranean shores of southern Europe. In rejecting the pig, Moslem farmers automatically downgrade the importance of preserving woodlands suitable for pig production. Their secret weapon is the goat, a great devourer of forests, which readily climbs trees to get at a meal of leaves and twigs. By giving the goat free reign, Islam to some degree spread the conditions of its own success. It enlarged the ecological zones ill suited to pig husbandry and removed one of the chief obstacles to the acceptance of the words of the Prophet. Deforestation is particularly noticeable in the Islamic regions of the Mediterranean. Albania, for example, is divided between distinct Christian pig-keeping and Moslem pig-abominating zones, and as one passes from the Moslem to the Christian sectors, the amount of woodland immediately increases.

It would be wrong to conclude that the Islamic taboo on the pig caused the deforestation wrought by the goat. After all, a preference for cattle, sheep, and goats and the rejection of pigs in the Middle East long antedated the birth of Islam. This preference was based on the cost/benefit advantages of ruminants over other domestic animals as

sources of milk, meat, traction, and other services and products in hot, arid climates. It represents an unassailably "correct" ecological and economic decision embodying thousands of years of collective wisdom and practical experience. But as I have already pointed out in relation to the sacred cow, no system is perfect. Just as the combination of population growth and political exploitation led to a deterioration of agriculture in India, so too population growth and political exploitation took their toll in Islamic lands. If the response to demographic and political pressures had been to raise more pigs rather than goats, the adverse effects on living standards would have been even more severe and would have occurred at a much lower level of population density.

All of this is not to say that a proseletyzing religion such as Islam is incapable of getting people to change their foodways purely out of obedience to divine commandments. Priests, monks, and saints do often refuse delectable and nutritious foods out of piety rather than practical necessity. But I have yet to encounter a flourishing religion whose food taboos make it more difficult for ordinary people to be well nourished. On the contrary, in solving the riddle of the sacred cow and abominable pig, I have already shown that the most important food aversions and preferences of four major religions—Hinduism, Buddhism, Judaism, and Islam—are on balance favorable to the nutritional and ecological welfare of their followers.

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