CULTURES des LAITS du MONDE

SESSION 1: THE ORIGINS OF MILK: MILK OF THE GODS, MILK OF HUMANS

QUESTIONS RESPONSES

with Jean-Denis Vigne

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1. Milk of gods, milk of humans: where did the history of milk start?

Milk is an essential foodstuff for humans, as infants, and as symbolic mediator between mother and child. It predates Man, as it already played this role for our ancestral primates and well before, for the mammals of the Secondary Period from which they were descended. Man has obviously always known milk. What people have discovered over the course of history are the many ways to live off it in the literal as well as figurative sense. In the literal sense, that means taking milk from other mammals, which is no easy task when the animals are wild. The history of milk as a foodstuff is therefore closely related to the domestication of mammals that can be milked: cows, sheep, goats, camels, donkeys and horses... However, it is possible that hunter-gatherers figuratively lived off milk, i.e. that milk had an important place in their imagination. As food for infants, it could have easily acquired a symbolic value of purity and hope, or on the contrary be rejected as an attribute of this "socially unfinished" being that is a baby. As a mediator between mother and infant, it is tempting to assimilate milk to a means of transmitting the lineage, as apparently some hunters-gatherers do today.

2. When did humans start to drink milk?

Hunter-gatherers certainly tasted the milk of other mammals on occasion (probably just after slaughter). But regular consumption of milk can hardly be prior to the first domestications 11,000 – 6,000 years ago, depending on the region of the world considered. The question is rather, first, to know if this consumption was established from the beginning, even if it was not one of the original reasons for domestications, and second, to assess the real importance that the use of milk and its by-products may have had in the food economy of the different agro-pastoralist societies since the beginning of the Neolithic. The research carried out in our laboratory on this theme is driven by these two questions.

3. What exactly do you mean by the invention of animal husbandry? By what criteria is animal husbandry defined in the beginning?

Good question! In a few words, one could define the invention of animal husbandry as the highest degree of intensification of the relationship between a human society and an animal population. Because domestication in an anthropological sense is certainly, for man, a functional socio-economic system, but in a historic sense, it is above all a growing process of interactions between humans and animals (or plants). The difficultly arises from the fact that the animal (or plant) only becomes domestic, i.e. biologically modified by this interaction, a long time after this intensification has started, and sometimes never (when the latter does not go beyond a certain point).

4. What material do researchers in archaeology have to work from, whether they are archaeozoologists like you, palaeogenetistics and archaeo-chemists?

In archaeology, we only have access to bones of animals rejected after their meat has been consumed. These bones can tell us both the degree of interaction between humans and animals and the level of biological modification of animals. The interaction can in effect be measured in the modification of demographic parameters (proportions of ages and sex) detectable thanks to bones, or the displacement of animals outside the area of natural distribution of the species, and to their acclimation. Increasingly sophisticated morphometric analysis of archaeological remains enables us to detect morphologic modifications between domesticated lineages and their wild ancestors. Paleogenetics, which studies degraded DNA sometimes conserved in the archaeological bones, in particular enables us to reconstruct the history of domesticate lineages.

The study of the history of milk exploitation involves other archaeozoological markers, but also archaeo-chemical techniques. This is a matter of detecting organic residues, particularly lipids, which are absorbed into archaeological ceramics and remain trapped until now and it is here where they look for signatures of milk or milk by-products. This technology has confirmed that the exploitation of milk was contemporary with the birth of the first ceramics in the East, which dates from 7,000 years BP.

5. There are various theories to explain why humans invented animal husbandry. What are these theories and what is your position in the debate?

There are in fact many possible scenarios, and researchers have long been seeking if not a single cause, at least a main cause. In this debate, two major schools are in confrontation. Caricaturally, on one side are the partisans of the major climatic cause, often led by a Darwinist or even socio-biological rationale: a major and sudden climate change (for some, the last glacial period dated to 11,000-10,000 BP; for others, the post-glacial warming, to 9,500 BP!) would have threatened human groups, who only escaped these constraints thanks to the invention of animal husbandry.

In the other camp are situated anthropologists who highlight the dynamism peculiar to societies: in answer to the complexity of socio-economic relations, especially that which concerns the management of resources, or indeed because of a profound change in the perception of man's role in the universe (birth of the gods), or yet again as a response to demographic growth, societies allegedly implemented pre-existing technical knowledge on a large-scale in order to keep animals in captivity.

These debates are not settled. For my part, as well as a growing number of my colleagues, I believe that the birth of animal husbandry and agriculture is a multifactor process that is numerous environmental and social parameters interacted to provoke a snowball effect ending in radical change of lifestyle, from hunter-gatherer to livestock farming-agricultural: climate, biodiversity, environment, demographic, socio-economic traditions, technical knowledge...

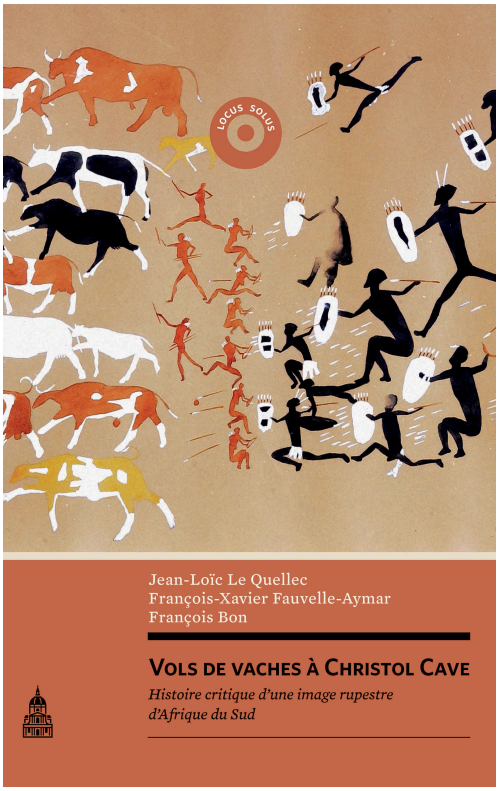
6. Lactase, this enzyme that helps digest lactose, the milk sugar present in mother's milk as well as in animal milk all over the world, decreases naturally after weaning. But in certain populations, which have developed dairy farming, the persistence of high lactase activity after weaning is also developed; this permits the consumption of milk into adult age. For you, as for many other researchers, the ability to consume milk into adulthood has constituted an adaptive advantage for human species. Why?

This genetic capacity to preserve in adulthood the means to digest milk probably increased with time, at least in certain regions of the world like Northern Europe or certain zones of Africa. That is why we think that it presented an adaptive advantage, or else there would be no reason why it would have increased. It remains to be understood how it was able to establish an adaptive advantage. It is a question that I believe has yet to be resolved. We can naturally imagine common sense answers: milk is a source of animal protein and fats easily available for stock herders; those who are capable of consuming it thus have a food supplement and can also exploit their herd by reducing the numbers of animals killed, which gives them an advantage with regard to those who do not drink milk. But this argument is too simple to satisfy us. Indeed, it would have been enough for Neolithic stock herders not have at their disposal the physiological possibilities to consume milk processed into yoghurt and cheese (which they would have known how to do) to have at their disposal the same possibilities and remain in competition with their neighbors. To handle this question, we absolutely need to know the milk production capacities of the first stock herders, as well as their knowledge and know-how in the domain of milk processing. It is especially necessary for us not to look for a solution that would be applicable everywhere, but rather for particular answers for every region and every period. It is what archaeology tries to do, to answer the questions posed by biological anthropology.

7. Full lactase activity in adulthood varies throughout the world. On the whole, it is more frequent in northern countries and less frequent in southern countries. But the reality it not that simple. What are the results of genetic research, especially that conducted by Evelyne Heyer in Central Asia?

We have known for a few years now that the peoples of Europe and the people of Africa and the Middle East, who have in common a high frequency of lactase persistence into adulthood, owe this particularity to different genetic mutations that have thus occurred independently in the human lineages. The genetic mutation in Central Asia is the same as in Europe. Evelyne Heyer and her team have compared two different groups: one, the Kazakhs, traditionally breeders; the other, Uzbek-Tajiks, traditionally farmers. Lactase persistence into adulthood was measured by three criteria: exhaled hydrogen test, glycemic monitoring, expressed symptoms. In terms of genotype associated with lacto-persistence, the two groups only differ slightly and the frequency is low compared to breeders in Europe. It may be that the breeders of Central Asia consume milk in fermented form in which lactose is predigested by lactic bacteria, and so lactase activity is not solicited. According to Evelyne Heyer, who is also an anthropologist and deputy director of the Man, Nature and Society Department at the Museum of Natural History, what is important to understand is that there is an interaction between genetic processes and cultural processes.

8. It has long been said time that in the beginning there were hunter-gatherers and then came pastoralists and farmers. Jean-Loïc Le Quellec, prehistorian, is an expert on rock art in particular in Africa. This rock art, practiced since prehistory until now, constitutes an excellent documentary resource and has been used to argue or illustrate many theories, in particular on the theme of the passage from hunting to breeding. We notice today that these theories are neither as accurate nor as definitive as we once believed?



Indeed, a new interpretation of this research has given rise to a brand new book by Jean-Loïc Le Quellec and two other prehistorians, published in early 2010 by Publications de la Sorbonne.[1] Jean-Loïc Le Quellec shows that these analyses resulted from the application of a single conception of evolution of world cultures on documents that had not been examined closely enough. This conception held that cultures always and everywhere went through the same stages, hunters *necessarily* preceding pastoralists. To try illustrating this outmoded – and disputed – universal conception of evolution by picking images here and there – that were often misdated – as "proof", was to forget that showing does not mean demonstrating, and that one could very well be a hunter and a pastoralist, and that, sometimes, pastoralists are not the ones we think.

J.-L. Le Quellec's remarkable work also offers a fine illustration of a society's capacity to choose or abandon a farmer's lifestyle depending on whether it provides it with the best conditions of survival and expression of its socio-cultural traditions. It is this same non-linear view of the evolution of societies that we are gradually discovering as well for the early Neolithic in the Near East. In Cyprus, particularly, it took the form of a rapid return of domestic herds to the wild (feralization) then, some centuries much later they were re-domesticated.

9. In short, we are coming out of the apparently rather naive view of an ideal prehistoric diet that would have existed before the invention of agriculture and breeding?

One thing should be made clear: in dealing with the birth of breeding or the history of milk in diets, the human groups in question are neither Australopithecus nor Pithecanthropus, nor even Neanderthal, but *Homo sapiens* like you and me. Their intelligence and their cognitive capacities are identical to ours and their technical knowledge individually is not inferior to ours; it is simply different. It is actually prehistory in the sense where these societies do not possess writing, but the human groups of the beginning of the Neolithic were engaged in an intense and rapid process of social complexification, to the point that it would be preferable to say 'early proto-history', as it has been proposed recently by Jean Guilaine, professor at the College de France, rather than prehistory.

10. What else do we know for certain about what our prehistoric ancestors ate?

The bones and seeds or fruit that we find in archaeological sites give us a valuable picture of the diet of early proto-historic societies. But this image concerns only waste from meals able to survive destruction over time. It is therefore important to round out this picture with other techniques of analysis. The analysis of stable isotopes incorporated in the bone and teeth of humans themselves justifies this crossover approach. Indeed, the level of carbon, oxygen and nitrogen isotopes as well as other elementary markers are all signatures of food, by which it is possible to specify, for example, the portion of foods from vegetable and animal origins, or the relative share of fish and meat, as well their seasonal variations.

11. Let us go forward a few millenniums in human history to arrive at Hinduism, chosen to illustrate the milk of gods. Ysé Tardan-Masquelier, a PhD in religious sciences, shows how Hinduism expresses fundamental elements of its vision of the world through the myths and rituals involving cows, milk and dairy products. What strikes you about this?

Hinduism goes back to the dynamism of a culture, the Aryans, tribes of Indo-European origin that came from around the Caspian Sea across the Iranian plateau to the Indus, which continued during the second millennium BC towards the Ganges. In their travels, the Aryans left neither temples nor palaces nor divine images but only the Veda, a magnificent work of both metaphysics and poetry. This religion had a particular fondness for liquids, such as milk and clarified butter. These liquids, Ysé Tardan-Masquelier tells us, heal and cleanse, restore, transform or associate. Milk is also essential to the only mandatory ritual that defines

[1] Vols de vaches à Christol Cave. Histoire critique d'une image rupestre d'Afrique du Sud, *by Jean-Loïc Le Quellec, François-Xavier Fauvelle-Aymar and François Bon, Sorbonne publications*

a Hindu, the sacrifice to Agni, the god of fire: *agnihotra*. For this special and daily meeting of a Hindu with his gods, which is to be performed at dawn, a little milk was poured into the fire accompanied with this invocation "Agni, the coachmen of the sky, is alight (....) The hot and cooked milk, we milk it to feed you. Agni is alight (....) the warm milk for you is cooked: come!" From the myth of churning an ocean of milk to Surabhi, the cow of abundance, it's hard to say what is most striking. Perhaps the joyful side of myths around Krishna, described as a facetious holy child, taken in and protected from the murderous fury of his uncle by pastoralists living in a clearing where the "clip-clap of the butter churns" can be heard as well as the "splashing of whey," where "the entire earth is damp with water from yogurt," where the air "smells of melted butter." In short, a real paradise where cows are jolly and where Khrishna stuffs himself with precious substances, making the milkmaids lament: "I have not a drop of milk left, no whey, no melted butter, no yogurt!"

12. To continue in the long history of milk, Janick Auberger, a historian specialized in Ancient Greece, has revealed that ewes and goats seem, in more or less of the texts, "Starved of affection from nursemaids". While we know that their milk was consumed and precious?

Ancient Greece brings indeed a magnificent counterpoint to the culture of the Aryans. The juxtaposition of the two presentations illustrates the contradictory symbolic values of milk that I mentioned earlier. The typical Mediterranean trilogy over the centuries is Demeter's cereals, Dionysus' wine and Athena's olive oil, which the Greeks praise in their texts. For Janick Auberger, these songs of praises – written by aristocrats – create an illusion, because they lead us to believe that all Greeks had unlimited access to such foods, while actually the Greeks lived easily as much from stock breeding, which is logical with a soil and climate not conducive to growing wheat but well adapted for breeding sheep and goats to produce milk and dairy products, like many civilizations around them, those 'barbarians' from whom aristocrat writers wanted to distance themselves. For the Greeks, barbarian stockherders remained in the 'infancy' of nomadic humanity, making milk ambiguous: good for children and certain medical uses, but not for adults. The Greeks' vision of milk in fact expresses two of their major myths. Milk, tied in with the myth of the Golden Age, or as nourishment for infants by which the "virtues of *genos*, the ancestral blood" can be transmitted, milk has very positive connotations. Linked to the myth of Prometheus, milk is seen as an element of a society that remained on the sidelines of development, unworthy of the Hellenic ideal.

Photo : P. Bourgault/Cniel

13. On the other hand, the Greeks valued cheese: an illustration of the promotion of skill in line with the myth of Prometheus?

Cheese-making is an essential means of preserving milk given the climate in Greece. Janick Auberger directly tells us that it was eaten dry, even very dry, thus usually grated, to the point where a cheese grater was part of a campaigning soldier's kit. As for soft white cheese, it was highly valuable, she tells us, exactly because it did not keep long in Greece's warm climate, and in certain poems it a true gift of love.

Through this example of Ancient Greece, Janick Auberger offers us a fine illustration of what I mentioned before in answer to one of your questions: this ability of societies that do not have high lactase persistence into adulthood nevertheless to base much of their diet (and their food-producing economy) on milk, by developing skills and a socio-economic organization enabling milk to be processed into yoghurt (as is the case in certain regions of the Middle East or Central Asia, for example) or into cheese, two easily digestible products even in the absence of full lactase persistence.