

# ***Circumspector* Reads *Hominidae*, *Generatio* and *Sexus Nexus* and It Is About Incest Prohibition and Inbreeding Avoidance**

Circumspector 1

## **Introduction**

The *avatars debate* is a vast undertaking tackling the concept of kinship that is original in several ways. An international panel of scholars rallied around the team *Kinship* of the *Laboratoire d'Anthropologie Sociale* of Paris (France) set for itself the goal of examining kinship in its relationship to procreation, bringing together old as well as new conceptual developments and relying on a method with “controversy as a technique for collective thinking and publishing” (Pietra Peneque 2022). The method is aimed at anonymizing the entire process of thinking about and discussing what is meant by kinship. Groups of scholars were formed, each developing its own perspective on the subject matter, and *avatars* were established to embody each of these groups with a covering name that reflects the perspectives of that group. This process led to initial contributions by each group that were discussed in an “Atelier d'Analyse Anonyme,” organized by an independent griot who lent his voice to each of the Avatars and to an anonymous moderating Avatar, *Pietra Peneque*, embodying the whole team *Kinship* so as to facilitate conceptual exchanges during the intermediary stages of the controversy when amendments and changes to the initial contributions were made, resulting in the final papers (see details in the *Introduction to the avatars debate* by *Pietra Peneque*). This *debate* certainly represents, and reflects to some extent, the current state of discussion within kinship anthropology today and provides an important attempt to explore crucial kinship topics from different angles.

This contribution, it must be said from the outset, does not strive to review the *avatars debate* in its entirety, as its content and the range of issues it covers is far too wide for such a purpose. Accordingly, we will modestly try to formulate, as we understand them, several of the *avatar* arguments pertaining to a very old and still pretty much unresolved issue that runs across the entire debate; i.e., the issue of incest avoidance (and prohibitions), along with its likely counterparts in the animal realm, and the place of such mechanisms in anthropological studies in general and, for what concerns us directly here, in kinship studies. In order to achieve this goal, we sheltered ourselves under a new *avatar*, *Circumspector*. The name

speaks for itself, indicating that neither categoric judgements will be made, nor ukases issued. *Circumspector* is basically someone who looks at things with sustained curiosity. Our *circumspectio* will address the way that three of the avatars, namely *Hominidae*, *Generatio* and *Sexus Nexus* (in their order of occurrence) helped shed light on the crucial issue of incest avoidance. Nonetheless, more needs to come. Not only do the other *avatars* need to be accounted for, but we also need to consider the intermediary steps of the debate that lead to the final papers. Here we basically just account for the differences between two steps in the debate without considering what leads to these differences. We hope that this will allow us, in the end, to see if this collective process of thinking and managing ideas opens the way to new avenues for resolving kinship issues and that it allows us to see if there is a new consensual basis or it serves to form a new and brilliant scholastic dispute. Finally, since we will not reactivate the fascinating debate about the sex of angels, thereby transposing it into a way to inquire about the gender of our *avatars*, we will adopt the English non binary gender terminology; i.e., we will use the gender neutral pronoun *they* when necessary, which fits well because each avatar embodies several individuals, possibly of different sexes.

### ***Hominidae***

In his preliminary contribution, *Hominidae* assumes that only a “hybrid and systemic approach” is capable of shedding light on the specificity of kinship mechanisms. He sees that a comparison with other primate species is likely to identify a number of features specific to human kinship, such as stable bonds between males and females, bilateral parenthood, etc.

With regard to incest avoidance, *Hominidae* recalls that a large part of the traditional view on incest theory is based on 2 premises:

- a. only humans have this taboo, thus it is a social rule culturally transmitted, not a natural fact
- and
- b. on a Freudian basis, it is assumed that humans have a natural inclination towards incestuous relations that society has to prohibit using cultural rules.

*Hominidae* follows Chapais in arguing that, since the 1960s, primatology has demonstrated that these 2 postulates are false. Apes avoid sexual relations with congeners they recognise as being related to, and, because the degree of relatedness is bound with the degree of sustained familiarity, avoidance for this reason decreases with genealogical distance. Avoidance basically consists in either female or male dispersion at the time of sexual maturity, depending on the particular species. *Hominidae* assumes that there must be a connection between inbreeding avoidance among apes and incest avoidance among humans, but *they* argue that the prohibition cannot be accounted for only in biological terms, nor only in terms of conventional (social) rules, these being two reductionisms that are to be avoided.

*Hominidae* assumes that the incest prohibition primarily bears on sexuality and *they* appeal to the Westermarck effect to explain the “absence” of sexual attraction between those living together from an early age. Let’s remark in passing that this mechanism appears to be at odds with the Freudian idea that close kin experience a naturally strong sexual attraction towards each other that society has to contain through morality under the control of the super-ego. If, however, co-residency reduces or suppresses mutual sexual attraction, or even transforms it into reluctance, then why should there be any avoidance rule? *Hominidae* then agrees that the Westermarck effect applies to primates in general, not only to humans, and *they* remark that indigenous theories of substance extend the principle of residential sexual avoid-

ance (the Westermarck effect) to genealogically tied, non co-residential individuals, with the definition of genealogy being socially very variable. Contrary to the Westermarck effect, the scope and the origin of which remains undetermined, this latter mechanism has its origin in human kinship as understood by the natives, and in kinship terminologies.

In his final paper, *Hominidae* digs deeper. *They* strive to resituate human kinship relationships in the perspective of other animal species and choose not to play again the game of nature vs culture that *they* believe is still at play in the contributions by the other avatars and appears to remain influential in France. *Hominidae* relies on Chapais (2008) and on recent advances in primatology to question the apparent discontinuity between primates and humans. Kinship can no be longer considered as being peculiar to humans. The distribution of incest, or inbreeding avoidance, in the animal realm casts doubts on its human founding character, as is now the case with many other social behaviors whose origins were traditionally attributed to mankind: adoption, alloparentality, etc. Chimpanzees, for example, may, at times, adopt and practice alloparenting. *Hominidae* thinks it is necessary to open kinship studies up to multi-species comparative studies.

*Hominidae* points out that the Westermarck hypothesis, as reformulated by Chapais (2008), assumes a partial innate basis for the universality of the incest taboo and other prohibitions among humans. But, in fact, it may have been Westermarck himself (1891: 320) who went in this direction, for he surely was not very clear in his own initial wording of the residential effect model. What he wrote is quoted by *Generatio*:

What I maintain is that there is an *innate* [our emphasis] aversion to sexual intercourse between people living very closely together from early youth, and that, as such persons are in most cases related, this *feeling* [our emphasis] displays itself chiefly as an horror of intercourse between near kin.

Indeed, how can “aversion to sexual intercourse” be “innate,” as he assumed it was, and at the same time result from proximity between individuals, most of the time close kin, “living very closely together.”

What makes *Hominidae* adhere to Chapais’s “reformulation” is that, although the application of incest prohibitions is subject to cultural variations, the fact that avoidance behaviors also prevail among closely residing non-human primates implies that its transmission cannot be *only* cultural. *Hominidae* opposes *their* “culturalist” contradictors who argue that since instances of incest behavior exist in all societies, its prohibition cannot have a biological basis by virtue of the contradiction between the universality of natural mechanisms vs the variability of cultural phenomena. In other words, incest prohibition likely does not rest upon a biological basis because it is not universally implemented in the same way. *Hominidae* overcomes this apparent contradiction by arguing that it is like saying because one may fast or abstain from sex at times, eating and mating do not constitute biological functions (these arguments may appear far-fetched). *Hominidae* also refers to the human inclinations that appear to have an innate basis resulting from evolution, like altruism, and which may not occur on many occasions. *Hominidae* suggests that it may be about time to make a break with a mechanistic conception of living that serves as a foil for social anthropologists. *They* also hold that anthropology should follow the ethologists that have given up on “instinct” since it suggests a mechanistic causality for “motivation” that embodies several causal biological, as well as cultural, parameters for a single phenomenon. This field of study is still like an open page.

### **Generatio initial contribution**

In *their* opening contribution, *Generatio* assumes that the history and the specificity of human kinship is to be apprehended by distinguishing two planes. The first plane includes the components that are shared among humans and other animal species. The second plane, which *Generatio* considers to be an “extension of the domain of kinship,” concerns how, starting from these shared components, mankind was able to build up sophisticated kinship systems by adding new, human specific categories incommensurate with animal proto-kinship. Here *Generatio* speaks about the phenomena of *cultural emergence*.

The third part of the opening contribution by *Generatio* deals with the prohibition of incest and its relation to procreation. *Generatio* tries to define incest using a line of reasoning which, I must confess, escapes me. *Generatio* recalls that the basic anthropological definition of the incest prohibition is about sexual relations between relatives, although he objects that one could very well posit that it is primarily and originally about preventing begetting with relatives. *Generatio* then goes on to say that the latter reason for the incest prohibition is unsatisfactory because it also applies to unfruitful relationships such as those between incestuous infertile spouses, or homosexual couples. These are rather uncommon situations, it must be said. The first could concern, for example, a couple consisting of a man and his sister who, biologically, cannot have children and the second could concern homosexual couples formed from two same-sex siblings, or two close same-sex cousins.

*Generatio* also questions the relationship between identity and incest, pointing out how a number of societies express the prohibition in terms of identity, with all of those prohibited for reasons having to do with incest being those who are conceptualized as being similar to ego for a variety of reasons.

### **Generatio final paper**

The second chapter of *Generatio*'s final paper, entitled, *Uniqueness and diversity of prohibition*, embodies a number of sub-chapters that are all dedicated to diverse aspects of what is generally considered as the hallmark of the separation between humans and non humans with regard to the kinship domain, among which is the incest prohibition.

*Generatio* assumes that the division first established by Lévi-Strauss between human incest prohibition and animal unruléd mating (culture vs nature) is no longer sustainable since recent studies have highlighted how inbreeding avoidance behaviors are commonly distributed into the non-human animal realm as well (see Note # 1 for chimpanzees). *Generatio* notes that geneticists and biologists generally motivate such behaviors by appealing to *inbreeding depression*; i. e., to negative consequences of having offspring with genetically close sexual partners, such as individuals born from consanguineous unions having low fitness. *Inbreeding depression* is, nevertheless, very variable according to the species and the situations in which it occurs. It seems that among animals subject to inbreeding, deleterious effects are lower. *Generatio* mentions Bateson's (1983) notion of *optimal outbreeding*, which is conceived of as an advantageous mating combination between *moderate inbreeding* and *moderate outbreeding*.

*Generatio* then asks the crucial question of knowing what really distinguishes human from animal behavior once we eliminate the presence or absence of inbreeding avoidance behaviors. *Generatio* posits a quantitative and qualitative gap between simple animal sexual avoidance behaviors and the complex world of human incest prohibition. Yet, *they* also argue that the proponents of naturalistic theories (sociobiologists, evolutionary anthropologists, etc.)

have been looking for a unified naturalistic explicative theory for prohibitions distributed among the entire animal realm and for this purpose have made use of what *Generatio* sees as a double strategy. The rest of the chapter is dedicated to discussing this idea.

The first strategy is to retain only the facts that support a presumed unified theory. The second one is to appeal to a common explicative model much like the Westermarckian theoretical framework that I have already discussed. The first strategy retains those behaviors common to mankind and animal species that are considered to form a “unitary base frame.” *Generatio* comments that Chapais follows this conceptual frame, though in a less mechanical manner. Chapais starts from the concept of homology which, in this context, is borrowed from evolutionary biology, to tackle the question of incest prohibition and animal inbreeding avoidance. Three layers of inhibitions are distinguished by Chapais. The first layer refers to *genitrix sexual avoidance* that is shared among the primates and has to do with *primitive homologies*. Next, there is the *genitor and sibling avoidance* layer which may be considered as an evolutionarily more recent homology shared between a few non-human primates and humans. The third, and last, layer concerns more recent human prohibitions: cousin/cousin, aunt/uncle and nephew/niece, which are variously distributed among human societies.

Only the first two layers reflect the various “degrees of inclusion of the social unitary base frame” that is shared with humans and apes, whereas the third layer is cultural (human-specific) and we cannot find an explanation for it within a unitary theoretical frame of incest prohibition. At this point, it is perhaps time to make an additional remark about *Generatio's* criticism of Chapais’s phylogenetic theoretical framework concerning humans and chimpanzees – I shall just mention our closest “cousin” here. His framework primarily consists in finding behavioral homologies or homologous traits between humans and chimpanzees. Thus, inbreeding avoidance, female dispersal, male philopatry among chimpanzees and incest prohibition, exogamy, and patrilocal residence among humans are considered as homologous features whose origin is supposed to lie within our last common ancestor (LCA).<sup>1</sup> That is, inbreeding avoidance and sex biased dispersal were, in all probability, behaviors present among the LCA. But in what form? What would certainly be misleading, though, is to extrapolate that the ancestral form of these homologous behaviors was simply chimpanzee-like, under the assumption that chimpanzee behaviors (inbreeding avoidance, male philopatry and female dispersal) are primitive vs human prohibitions with rules being evolved, and that chimpanzees may serve as a faithful and mechanical model for human behavior, past or present. In fact, we do not know what the ancestral form of inbreeding behavior among the LCA was like, and perhaps we will never know. This model, called the chimpanzee referential model, assumes then, more or less overtly, that behaviorally and anatomically the common ancestors of apes and humans were pretty much like modern chimpanzees and almost no changes are supposed to have occurred between the LCA and extant chimpanzees. It might well turn out, we must say, that this ape-like model applied to kinship is seriously misleading just the way that the ape-like anatomical and general behavioral referential model appears to be (Lovejoy 2010;

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<sup>1</sup> A study of two eastern communities of chimpanzees from the Gombe National Park in Tanzania by Walker et al. (2017) has provided strong evidence for inbreeding avoidance behavior. Here I quote their conclusion: “In conclusion, we provide evidence that chimpanzees breed with genetically dissimilar mates and that inbreeding is uncommon even where opposite adult relatives reside together *when some females do not disperse* [my emphasis]. Chimpanzees are probably sensitive to genetic distance in choosing a mate, although post copulatory processes may also contribute to observed patterns of outbreeding. Such mechanisms should optimize genetic diversity in the resultant offspring and increase their fitness.”

Sayers et al. 2012; Macho 2018).<sup>2</sup> Finally, the main criticism that *Generatio* levels against Chapais is that, in the end, like the other evolutionary anthropologists, he only accounts for facts supporting an *a priori* theory. This, *Generatio* says is not epistemologically acceptable. *Generatio* should demonstrate this.

*Generatio* also raises some doubt as to the merits of the second strategy developed by ethologists, primatologists, psychologists and evolutionary anthropologists willing to maintain a unified theory of inbreeding avoidance. This strategy basically accounts for all inbreeding avoidance, either human or animal, in terms of a unitary explicative model, or more precisely to extend to humans the explanatory model generally used to account for animal sexual behavior. The latter is the neo-Westermarckian model that ethologists, primatologists and evolutionary anthropologists currently use to explain outbreeding behaviors in the animal realm. *Generatio* has correctly noticed that the Westermarckian model was initially aimed at only explaining human behavior. Thus, his model may actually be about extending the anthropological model from human to animal behavior. *Generatio* goes back to humans first and explains how the neo-Westermarckian model differs from the original Westermarckian model. Basically, the new model for the Westermarck effect is not confined, as it was originally conceived, to the psychological side of avoidance; that is, people living closely together from an early age (due to being close kin or for other reasons) experience reluctance or “horror” at seeing sexual relationships between closely related coresidents, thus see genetic and kinship ties as the primary fuels for sexual reluctance or repulsion. As I remarked earlier, Westermarck (1891) himself was not very clear in his own wording.

In the initial formulation of incest avoidance, the stress is on the psychological consequences of promiscuity, thus sustained proximity entails the reluctance (horror) of potential sexual relations, with biological ties having almost no place in this process. In contrast, the neo-Westermarckian rewording assumes a genetic origin – though not demonstrated, *Generatio* says – for the effect and sees kin ties as the cause and co-residency as the symptom. Note that this conceptual shift is already implanted in Westermarck’s original definition. *Generatio* points out that what is implicit is that the whole mechanism globally aims at including all incestuous harmful unions. *Generatio* formulates the neo-Westermarck effect as the fact that all human societies experience this process of loss of sexual desire linked with promiscuity and common education the *ultima ratio* of which, the fruit of natural selection, is inbreeding avoidance. In other words, natural selection is seen as the basis for the whole process of sexual reluctance stemming from young persons living together, no matter what mutual kinship ties they may have, if any.

The three most quoted examples that are presented in support of this theory are common education of children in Kibbutz in Israel, Sim-Pua marriage in Taiwan, and sustained co-residency of siblings in California. I don’t see, except for the third one, how these examples illustrate the neo-Westermarck effect. The Kibbutz example is about the education and

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<sup>2</sup> A recent study by Lovejoy (2009) on *Ardipithecus ramidus*, an early hominid fossil from Ethiopia dated ca. 4.4 My BP, has revealed that derived hominid characters like bipedalism and canine reduction probably appeared shortly after the pan/hominid divergence (which is generally dated ca. 6.5 to 7.5 My BP). Here is what Sayers et al. 2012 posit in their abstract: “*Ardipithecus* now provide abundant information that the LCA differed substantially from chimpanzees (as well as bonobos and gorillas), both anatomically and behaviorally, and exhibited many characters that are more similar to those of modern humans than to any living ape. This major extension of the hominoid fossil record contravenes strict referential modeling based on the extant chimpanzee and greatly improves our ability to reconstruct the LCA more accurately, but only when viewed within the broader context of evolutionary ecology.”

cohabitation of peer groups constituted of children who are not necessarily related to one another. The second example concerns the failure of intra-familial Sim-Pua marriages between an adopted girl and a son, which is explained by co-residency between the two of them from a young age. The third one is a psychological study done in a Californian university about the degree of sexual reluctance between siblings in relation to the time they had lived closely together. Only this latter example is directly concerned with the potential deleterious consequences that may affect the offspring born from their potential sexual relations.

*Generatio* notes there are innumerable counter-examples contravening the supposed Westermarckian mechanism: Fula and Arab marriages, preferential mating between children of two brothers, Achuar marriage, marriage in Ancient Egypt, etc. In any event, *Generatio* justly points out that a reconsideration of the three examples mentioned above has shown that common education and promiscuity were not primarily responsible for sexual avoidance between individuals not initially related, but was due to the fact that they mutually use sibling kin terms entailing that they are like brothers and sisters to each other, and thus sexual avoidance occurred due to acting in accord with primordial sexual prohibitions concerning siblings. Finally *Generatio* concludes that incestuous prohibitions among humans cannot be correctly interpreted in terms of a neo-Westermarckian (or Westermarckian) model any more than can the Chapais “common base frame” be so interpreted. But is this because the Westermarckian frame is simply misleading? That is an issue on which *Generatio* does not state a position clearly. Or is it because human incest prohibitions are one of the rare domains where a fragile but real anthropological singularity still expresses itself?

*Generatio* does not develop any further the validity of the neo-Westermarckian model among animals (see Note #1 for chimpanzees), but *they* definitely concludes that the “unitary base frame,” a concept that *they* retains, cannot be accounted for in terms of some “simple” Westermarck effect and *they* assumes that human incestuous prohibitions still stands. Perhaps better explicative models should be provided for one of the “rare domains” where an “anthropological singularity” is present.

### ***Sexus Nexus* final contribution**

*Sexus Nexus* ambitions to contribute overcoming the dichotomy between two traditional approaches to kinship, a naturalistic approach which underlines continuity of behaviors and kinship organisation between hominids and a cultural approach that posits a discontinuity between human kinship and other hominids’s kinship. The matter is not here to account for *Sexus Nexus*’s entire development regarding the hominization process that covers several parts of the main paper, but to focus our attention on how primate behavioral phylogeny is incorporated into their argument.

In the third paragraph of the first part, *Sexus Nexus* points out how naturalistic approaches to kinship rely heavily on Chapais 2008 (my translation from French):

The evolution of species driven by natural selection and kin selection offers the frame in which a certain phylogenetic continuity of behaviors and of relationships between primates & humans is to be thought about (Chapais 2008): the goal being to explain how the hominids went from incest avoidance to incest prohibition, from dispersal to exogamy, from philopatry to post-marital residence.

This argument is not rejected by *Sexus Nexus* as it is incorporated in their own development on how the apparent contradiction between the two approaches may be overcome (see notably part three: *Les logiques d’apparementement au prisme de l’évolution des hominidés*), in which

the Canadian author is once again called to the rescue. *Sexus Nexus* points out after Chapais (my translation from French) that

... most behaviors necessary to implement reciprocal exogamy are found among hominids and have a distinct phylogenetic evolution among the different primate species (Chapais 2017 [2008]: 156);

thus, the stable reproductive link between a male and a female, the matrification, the incest avoidance, the philopatry and the exoreproduction, or even the multi-male and multi-female composition of a number of simian groups are all behavioral traits differently distributed, which one may find grouped together and developed under a new form among *Homo sapiens* because of their mutual re-arrangement by means of articulate language and new cognitive skills.

The idea being sketched here, if we reduce its scope to the chimpanzee and human phylogenetic lines, is that one can establish homologies between their mutual kinship behavioral traits, like male philopatry vs patrilocal residence, adult female dispersal vs exogamy, incest avoidance vs incest prohibition.<sup>3</sup> The reason for these homologies is then assumed to originate in the behavior of our last common ancestor (LCA). Then comes the next step, which, notably in the first quote, is to assume, most of the time implicitly, the primitive character of behaviors of modern chimpanzees, characterized by male philopatry, female dispersal etc., vs the evolved character of human kinship. This means that primitive characters were present early in the hominid phylogenetic history and that hominins during their own evolution reshaped this whole pre-existing set of behaviors into a new humanized set that includes incest prohibitions, patrilocal residence, etc. As I pointed out earlier, the strict application to humans of a chimpanzee-like referential model to human sexual and mating behaviors, which is implicit here, might be problematic and misleading, just the way that the ape-like anatomical model is probably misleading (Lovejoy 2010; Sayers et al. 2012; Macho 2012, 2018).

*Sexus Nexus* makes an interesting point, though. On the evolutionary level, *they* assumes that Dravidian-like terminologies, consistent with restricted or even generalized exchange, and organized around the brother/sister relation – and, I would add more precisely, (bilateral) cross-cousin marriage – were possibly among the first forms of “reciprocal exogamy” that was ancestral among human hunter-gatherers. Like many of the *avatars*, *Sexus Nexus* follows Chapais in positing that all behaviors necessary to implement reciprocal exogamy were already present and variously distributed among hominids following distinct phylogenetic lines. Let’s list, among many, stable bonds between males and females, matrification, inbreeding avoidance, male philopatry, etc., that were reorganized into human social behaviors as articulate language and new cognitive faculties developed. These proposals, again, should be deeply discussed at a theoretical level, including comparing them with proposals by evolutionary ecologists, paleontologists, and climatologists, all of whom are concerned with primate evolution.

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<sup>3</sup> Based on recent studies, Chapais (2017: 191-195) admits that bilocality or even matrilocality prevail among modern HG worldwide, a fact that puts his hypothesis of an original LCA philopatry founded on an homology between chimpanzee’s philopatry and a supposed dominant patrilocality among hunter-gatherers, in jeopardy. One of the arguments why Chapais still maintains it, is due to attaching multilocality to a mode of subsistence based on hunting that appeared on the hominins phylogenetic line long after the split *Homo/Pan*; i.e. ca. 2.5 Mya among *Australopithecus garhi* in Ethiopia.

### Intermediary remark

When the controversy comes to the origins of human prohibitions, and more precisely to incest prohibition, our three *avatars* have all referred to Bernard Chapais, notably to his book issued in 2008. Chapais is one of the rare primatologists who has dedicated a considerable amount of time building a bridge between ape behavioral studies and human kinship studies. On this basis, he has worked on, and transposed, the concept of homologies, or homologous features, from anatomical phylogeny to human behavior and kinship phylogeny, thereby trying to open a window on several ancestral aspects of our own species. The reception to his endeavor by social anthropologists has been very significant, as the debate testifies, and by now his conceptual framework looks like a cornerstone which almost every *avatar* refers to. As I already mentioned, *Hominidae* relies heavily on his evolutionary frame and pleads for interdisciplinarity. So does *Sexus Nexus*, while *Generatio* raises methodological issues. But Chapais is perhaps not the final twist to the story as there exists, indisputably, new scientific naturalistic approaches that (kinship) anthropology must evaluate and take into account quickly, thereby helping kinship anthropology escape from sterile debates, allow new insights and viewpoints, and help solve unresolved issues. One of them, certainly, is human genetics, and I should immediately add, genetics as a whole, that now has the capacity to sequence genomes of species living as long ago as 200,000 years. This is a crucial step for what concerns us, as we will now see.

### Inbreeding and recent developments in human genetics

Recent genome sequencing makes it clear that Neandertal, in the same way as is the case with other Pleistocene, archaic humans, has a long history of inbreeding (Ríos et al. 2019). Research on human genomes that will be alluded to here, as far as Neandertalians are concerned, include a woman from a Denisova cave in the mountains of Altai (Prüfer et al. 2014), a Neandertal child from a Mezmaiskaya cave in the Caucasus, another Neandertal female from Vindija cave in Croatia (Prüfer et al. 2017), 13 Neandertal individuals from the El Sidrón site in Spain (Ríos et al. 2019), respectively dated from 122,000, 70-60,000, 52,000 and 49,000 BP (Prüfer et al. 2017: 2 ; Ríos et al. 2019). These individuals have supplied crucial information as well as allowing for inferences concerning the degrees of consanguinity existing between the genitors of some of the individuals concerned.<sup>4</sup> DNA sequencing of the Altai woman (Prüfer et al. 2014: 45) has revealed a consanguineous proximity between genitors consistent with that existing between half siblings (i.e., between a man and his sister, each having a different parent). But several other scenarii also match the inferred parental proximity by also showing an inbreeding coefficient close to 1/8 (0.125): union between double cousins (cousins resulting from a union between two brother and their sisters), union between a grandparent and his/her grandchild, or union between an uncle and his niece. There is no indi-

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<sup>4</sup> The team that published on El Sidron Neandertal remains has focused on pathologies apparent on the bones from 13 individuals, whose mitochondrial as well as nuclear DNA revealed a very close parental bond, likely consistent to that between members of a family group (Ríos et al. 2019: 2). The anatomical study of their skeletons has revealed a number of congenital abnormalities (17 altogether). These are pathologies which, for the most part, can be attributed to consanguineous sexual relations between their direct ascendants. In the case of El Sidron, one can infer intra-familial consanguineous relationships. The exact nature of these intra-familial consanguineous relationships – either promiscuity, mating between brothers and sisters, double cousins, parents and children, etc. – cannot be specified at this stage. The authors (Ríos et al. 2018: 2) have stressed that studies focusing on homozygosity among Neandertalians have all shown a long history of consanguinity among a number of their populations, which is notably highlighted by one individual from El Sidron and by the Neandertal woman from the Altai. The authors hasten to make it clear that this does not seem to be the case at Vindija.

cation that any of the unions were closer than this, such as full brother and sister or parent and child mating. Furthermore, it must be observed, that all of these mating patterns, except those involving half siblings (considered as an incestuous relation between brother and sister according to rules consistent with classificatory kinship terminologies), are routinely carried out in the universe of today's hunter-gatherers or hunter-horticulturalists notably from South America and Australia. The marriage canonical form, supposedly very ancient that is in structural consistency with the Dravidian kinship terminological system, also supposedly very ancient, is the marriage between bilateral cross-cousins. This type of union *stricto sensu* also gives rise to a coefficient of consanguinity of 1/8 (0.125). It is equivalent to a double cousin marriage, and is as consanguineous as all of the forms mentioned above even though it seldom occurs nowadays. Another crucial point that Prüfer et al. (2017) develop, based on the whole Neanderthal genomes studied so far, has to do with the demographic history of Neanderthal where the population size is associated with the level of heterozygosity. The genomic sequencing from a Neanderthal female from the Vindija cave and dated to ca. 49,000 BP has revealed a low heterozygosity comparable to that found among Sunghir Pleistocene modern *sapiens* individuals (see below) and Neanderthals in general (Prüfer et al. 2014). The authors (Prüfer et al. 2017; see also Rios et al. 2019) suggest that low heterozygosity is probably ...[a] feature typical of archaic hominins suggesting that they lived in small and isolated populations with an effective population size of around 3,000 individuals.

Other genomic segments characteristic of the Sunghir individuals associated with inbreeding were absent from the Vindija genome and makes the authors suggest that inbreeding was perhaps not ubiquitous among Neanderthal populations. This woman, however was the carrier of extended homozygous segments comparable to those found among a number of isolated contemporaneous Native American populations.<sup>5</sup> The die has not yet been cast. Upcoming genetic research will probably determine whether one can take systemic inbreeding practices among Neanderthals for granted. Perhaps it will allow us to either posit the recurrence of endogamous specific mating patterns or to assume the occurrence of unruléd promiscuous mating.

Now let us compare these Neanderthal samples with some anatomically modern individuals from the Upper Paleolithic, from shortly after Neanderthal's disappearance. This comparison notably concerns 4 more or less contemporaneous burials from Sunghir (east of the Moscow region) dated ca. 34,000 BP (Sikora et al. 2017).

First, it needs to be mentioned that metopism and other

... signs of possible congenital pathologies (in Sunghir III) have been interpreted as evidence of inbreeding. (Sikora et al. 2017: 659)

A comparison made by the same authors with other anatomically modern European remains from Barma Grande (Italy) and Dolni Věstonice (Czech Republic) (22,000-29,000 BP) shows

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<sup>5</sup> I borrow the definitions of heterozygosity and homozygosity from Wikipedia (French version). "An organism is said to be heterozygous for a gene when it possesses two different alleles for this gene on the same locus for each of its homologous chromosomes .... Being heterozygous diminishes the risk of expressing deleterious recessive alleles and allows having two different versions of the same gene, which can appear as a guarantee of adaptability in view of changing environmental conditions." Conversely "homozygosity" refers to a gene that, in an individual, either animal or vegetal, will be represented by two identical alleles on the same locus. "Homozygosity results from a loss in genetic diversity and generally from a strong consanguinity." In addition, "[a] strong homozygosity, often resulting from inbreeding, raises the risk of developing genetic pathologies, not by increasing the number of dangerous mutations, but by increasing the risk of revealing pre-existing recessive mutations."

comparable likely degenerative and congenital pathologies, making geneticists suppose that Upper Paleolithic groups were small and likely inbreeding to a degree possibly comparable to what has been found in the Altai Neandertal, although they say its precise level is at present impossible to establish.

Yet the same study offers tantalizing insights resulting from the comparison of homozygosity by descent (HBD) among archaic *sapiens* (Neandertal and Denisova) and anatomically modern humans on a larger European scale, although the amount of evidence still remains small. The difference of level between the former and the latter is interpreted as indicating

... small effective population size and/or recent inbreeding in archaic individuals particularly the Altai Neandertal (Sikora *et al.* 2017: 659-660)

while

... patterns of HBD among the Upper Paleolithic individuals are consistent with randomly mating populations of moderate effective size ... which suggests that close consanguineous mating was avoided (Sikora *et al.* 2017: 661).

The authors (Sikora *et al.* 2017: 662) also point out that some modern human populations

... exhibit increased levels of inbreeding, including populations where consanguineous marriage practices are encouraged or geographically HG [hunter-gatherers, my clarification] such as those from the Amazon rain forest region.

Their general results make them suggest

[a] social and population network of HG demes, that preferentially mated within subgroups, with exogamy and regular exchanges between demes (Sikora *et al.* 2017: 661).

This leaves an open space for interpretation, questioning and perplexity that the next quote (Sikora *et al.* 2017: 662) does not entirely deflect:

HG social structure of low levels of within-band relatedness, complex family residence patterns, relatively high individual mobility, and multilevel social networks were already in place among Upper Paleolithic societies 34,000 years ago.

Again, is the die already cast? Shall we conclude that Neandertal was a promiscuous or an inbreeding-like sub-*Homo* species versus an exogamous Pleistocene modern sub-*Homo* species governed by inbreeding prohibitions, definite marriage rules and social organization? This is a step that no one has yet taken. All of these studies, as promising as they seem to be at first glance, still cover a limited amount of analyzed or sequenced material. This is not to say that the first conclusions are false or even misleading, but we need more patience. Human genetics is moving forward at a rapid pace and a number of answers will be probably be given soon that will perhaps make all of us reconsider some past or recent theoretical assumptions.

***To be continued***

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