



# On slaves and genes: “origins” and “processes” in genetic studies of the Brazilian population

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## Abstract

In this article I examine how contemporary geneticists investigating the history and configuration of the Brazilian population engage with other academic disciplines. To do so I use as a case study some articles published by geneticists researching the presence of hemoglobin S variants in Brazil, in which there is a clear pretension to contribute to the analysis of issues such as slavery or Brazil’s ethnic identity. By contrasting these studies with contemporary works from history and the social science, the explanatory centrality of “origin” in the genetic studies analyzed is problematized, as is the lack of interaction with the epistemological characteristics of other areas of knowledge.

Keywords: population genetics; hemoglobin S; history; social sciences; epistemology.

The central role of science in the quest for answers about the characteristics of the Brazilian population dates back to the country's independence, with its concerns about what impact the composition of the Brazilian population, characterized as "miscegenated," would have on the construction of the new nation. Throughout the nineteenth century, theories about the Brazilian population were not formulated within the context of a rigid separation between the natural and social sciences. The clearest example of this overlap is the meanings given to the concept of "race," especially after 1850, in debates conducted at the Brazilian Institute of History and Geography (Instituto Histórico e Geográfico Brasileiro), which incorporated issues relating both to physical differences and environmental adaptability and notions of moral and behavioral differences between the groups and individuals classified as belonging to them. All of these topics were considered pertinent to the planning of the country's future (Skidmore, 1994; Chalhoub, 1995; Carreta, 2006; Albuquerque, 2009). In these discussions, pursued in disciplines as varied as medicine, anthropology and the law, the issue was whether or not a nation with an envisioned European vocation could be constructed from a population of predominantly non-European or miscegenated origin. The "eugenic" capacity of the Brazilian people was analyzed and then evaluated as possible or impossible by authors such as Silvio Romero and Nina Rodrigues, who were in favor of encouraging more European migrants to the country, either to "whiten" the Brazilian population by successively breeding with the locals, or to progressively take the place of the existing population (Azevedo, 1987; Schwarcz, 1993; Silveira, 1999; Chalhoub, 2003; Costa, 2006).

Meanwhile, in the twentieth century, while science was still seen as having the capacity to provide answers about the origins and future of the country (Santos, 2002), there was a gradual separation of the "biological" and "social" spheres, especially after the circulation of theories that rejected the concept of "race" as a biological reality. The sphere of the "social" and the sciences thereof gradually took on the job of providing explanations and theoretical postulations for the characteristics of the Brazilian people and projects for the future of the nation (Bomfim, 1905; Freyre, 1933; Lima, Hochman, 1996). This trend became particularly pronounced after the institutional consolidation of the social sciences in Brazil in the 1950s (Maio, 1999), and continued on in the late twentieth and early twenty-first century, with studies in the social sciences and humanities into the emergence of what were now called new indigenous "ethnicities" and the strengthening of "black" identity (Oliveira, 1998; Agier, 2001; Sansone, 2004).

However this is not to say that within the field of biology interest in the origins of the Brazilian population waned completely. In the 1930s and 40s, some studies analyzed the frequency of blood groups in the country and their distribution in different "racial" groups, such as indigenous peoples (Cavalcanti, 2007; Cavalcanti, Maio, 2011). This interest on the part of genetics in the origins of the Brazilian population was reinforced in the late 1900s with the refinement of research techniques into genomic ancestry. Although these studies in the area of "new genetics" are not designed to cast any definitive light on the problems Brazil faces, as had the studies by scientists in the nineteenth century (Schwarcz, 1993; Silveira, 1999; Chalhoub, 2003), many of them have nonetheless contributed to discussions that have long been the almost exclusive remit of the social sciences and humanities, either in

the field of historiography, addressing the country's past, or in discussions about the future, such as public policies involving affirmative action (Pena, Bortolini, 2004).

These studies' attempts to contribute to these debates about Brazil's history or ethnic identity constitute an interesting case for analyzing the "engagement" of geneticists in other areas of research. The purpose is not exhaustively to analyze everything contemporary genetics has produced about the Brazilian population to ascertain how much it interacts with other disciplines or to analyze collaborative projects between geneticists, social scientists and/or historians (Santos et al., 2009), but rather to explore some of the intellectual practices of geneticists which, outside these collaborative links, propose explicitly or implicitly to contribute to debates in other areas of knowledge, such as history or the social sciences. To do this, I take as case studies some research from the area of genetics about the presence of different genetic variants of hemoglobin S (or "haplotypes")<sup>1</sup> in Brazil and about the genomic ancestry of people with this hemoglobin variant. Some of the studies link the presence of different hemoglobin S haplotypes in different parts of Brazil to the human flows associated with the slave trade and subsequent internal migrations, with some geneticists explicitly claiming that their work could contribute to future research into slave trade routes in Brazil. Meanwhile, upon questioning the association between sickle-cell anemia and "Blackness," an association that has been made by medicine in general and by key leaders of the black movement in Brazil, studies into global genomic ancestry and the degree of miscegenation of carriers of hemoglobin S touch, albeit indirectly, on the debates about "black" identity in Brazil. Contrasting these studies with contemporary investigations of slavery and black identity in the fields of history and the social sciences is one way of problematizing the explanatory centrality of "origin" in these contemporary genetic studies, pointing to potential gaps in the arguments and knowledge production methods in different areas of study which aim, through approaches that foreground the analysis of "processes," to understand the constitution of and changes in Brazilian society.

## Hemoglobin S in Brazil

Hemoglobin S is a variant of hemoglobin that results from a recessive gene mutation. Individuals who inherit this mutation from both parents are called sickle cell carriers,<sup>2</sup> a hemoglobinopathy which, since its discovery, has been identified by biomedicine as a "Black disease" (Tapper, 1999; Fry, 2000; Wailoo, 2001). Sickle cell disease prevalence is relatively high in Brazil, and as such constitutes a public health issue. According to Brazilian Health Ministry data, "in the state of Bahia, the incidence of sickle cell disease is 1:650, while the incidence of sickle cell trait is 1:17 of live newborns. In Rio de Janeiro [the incidence is] 1:1200 for the disease and 1:21 for the trait. In Minas Gerais the proportion is 1:1400 for the disease and 1:23 for sickle cell trait" (Brasil, 2008).

Clinically speaking, hemoglobin S makes red blood cells rigid, giving them a sickle-like shape (hence the name of the disease) and preventing them from adequately oxygenating the body. Sickled blood cells are harder to circulate round the blood vessels and can block blood flow. Consequently, people with sickle cell anemia can suffer from a variety of symptoms and complications, such as severe pain, ischemia, necrosis, dysfunctions and irreversible damage

to tissues and organs, as well as increased susceptibility to infections and chronic anemia (Brasil, 2007). The clinical manifestations of the condition and the hematological alterations associated with it have been the focus of studies within the field of hematology, in which the range of symptoms presented by patients is explained through environmental factors, disease management factors (e.g. nutrition, exposure to the cold and stressful situations) and genetic issues related to the diversity of variants of hemoglobin S. Within these studies, an important research hypothesis has been the relationship between the severity of the condition and the different hemoglobin S haplotypes.

Initially believed to be a single mutation deriving from Africa, in the 1970s different origins of hemoglobin S mutation were discovered (Cabral, 2010). Subsequent genetic research identified five variants, named according to the region where the mutation is believed to originate: Senegal, Benin, Bantu (or CAR), Cameroon and Saudi Arabia/India. Interest in the different haplotypes is mainly to do with clinical applicability, with the central hypothesis of these studies linking the severity of clinical manifestations to the haplotype present in the patient<sup>3</sup> (Nagel, 1984). Although there are studies that do not corroborate this hypothesis (Fullwiley, 2011), research into the diversity of hemoglobin S haplotypes has been central in the field of genetics of hemoglobin S. There are also studies that seek to establish differentiations within haplotypes and other genetic factors in order to explain the differences in the severity of the symptoms (Lettre, 2008). As we shall see later, some of these studies have suggested that the Brazilian population could be promising for studying the genetic factors that influence the clinical manifestations of the disease due to its high degree of miscegenation (Silva et al., 2011).

### **Studies of the diversity of hemoglobin S haplotypes in Brazil**

The identification of hemoglobin S was reported for the first time in Brazil in the 1930s. It was also at this time that the association between sickle cell anemia and the “black race” also emerged, as did, in the 1940s, the questioning, originally raised in US literature, about the relationship between “miscegenation” and the presence of the disease (Tapper, 1997). In Brazil, under the influence of an intellectual climate that valued the nation’s miscegenation, in the midst of the studies that proposed measures for the “eugenic containment” of the disease (such as mandatory pre-nuptial examinations), there were some works that called for reducing the prevalence of the disease through miscegenation. Research done in the 1930s and 40s used the presence of hemoglobin S in conjunction with the frequency of blood groups to evaluate the degree of miscegenation and purity of different population groups, including indigenous groups (Cavalcanti, 2007; Cavalcanti, Maio, 2011). These studies could be seen as precursors of contemporary studies into the genetics of population groups that seek to identify the prevalence of different hemoglobin S haplotypes. The 1980s saw the first research of this type in different parts of Brazil, from the north to the south-east, including studies in three state capitals in the north-east. The main aim of most of these studies was simply to map out the presence of the different haplotypes, and in some cases to analyze their association with clinical manifestations. However, some of them engaged, to a greater or lesser extent, with historiography, making them useful cases for evaluating the interplay

between genetics and other areas of knowledge. One interesting feature of these studies is how reflecting about the “origins” of the population is taken as being sufficiently explanatory of itself. Despite some of their implicit or explicit intentions – as we shall see from the more in-depth analyses later – to contribute towards building historical knowledge about slavery, they do not make any attempt to critically engage with the recent debates in history. For example, historical knowledge produced in recent decades about internal migrations and the inter-provincial slave trade (Neves, 2000; Slenes, 2004; Sampaio, 2011), which discusses the reconstitution of the identities of individuals and groups who moved between different parts of the country, is disregarded. These studies do not just consider these movements as physical flows of bodies; they show how the focus on the geographical origin of the slaves – i.e. the focus on their African origin – fails to take account of the full complexity of the relationships and practices recreated during the period of slave trade and slavery in Brazil.

The first work about the frequency of hemoglobin S haplotypes in Brazil was published in 1992. It associates the presence of the different haplotypes in the population of São Paulo with the different origins of the slaves shipped to the Americas, using a single work of history about the transatlantic slave trade dated from the 1960s as a reference. However, the authors do not claim to make any other kind of contribution to the study of this process (Zago, Figueiredo, Ogo, 1992). A similar approach is also seen in studies by Costa et al. (1994), Galiza Neto et al. (2005), Pante-de-Sousa et al. (1998) and Lemos Cardoso and Guerreiro (2006). Costa et al. (1994) mention that it is likely that the results of their work, comparing the prevalence of haplotypes in São Paulo and Salvador, reflect the African ancestry of the individuals they studied. They further argue that contingents of slaves were sent to Brazil from Angola, Congo or Mozambique, where the CAR haplotype is the most common, but that the slaves sent to Bahia originally came from Nigeria, Ghana or Benin. The patterns of prevalence of hemoglobin S haplotypes are, according to the authors, related both to the origins and to the miscegenation processes in the Brazilian population. Meanwhile, Galiza Neto et al. (2005) make a brief correlation (parallel to the main focus of their study, which is to contribute to knowledge about the disease and the treatment of its carriers) between the data found in their research involving carriers of hemoglobin S in the city of Fortaleza and the confirmation of information obtained from “historical documents about our ethnic origins” (p.320). However, they make this correlation without specifying what documents they are referring to and what they mean by the term “ethnic.” In the article’s bibliography, they list just one historiographical source, published originally in the 1950s. Meanwhile, in the articles by Pante-de-Sousa et al. (1998) and Lemos Cardoso and Guerreiro (2006) on studies done in Belém, northern Brazil, which corroborate historical sources about the flow of slaves to the region and subsequent internal migrations, there is an attempt to engage, however superficially, with historiographical studies about the African slave trade between different regions and later migrations into the region.

There are several other studies on the prevalence of hemoglobin S haplotypes in Brazil which make explicit their involvement with history beyond mere references to historical sources and studies. The ones I will analyze here are by Gonçalves et al. (2003), Adorno et al. (2004), Silva, Gonçalves and Rabenhorst (2009) and Fleury (2000, 2007).

Gonçalves et al.'s study (2003), conducted in the city of Salvador, clearly focuses on analyzing how certain haplotypes are associated with the clinical manifestations of sickle cell disease. The authors state that their results are "relevant to the study of slave traffic routes in Brazil and of the African origins of the Bahian population." They also point to the identity of one carrier of the Senegal haplotype, which may "suggest that Bahia State also had a gene flow from Atlantic West Africa." Meanwhile, they disregard the possibility that the presence of this haplotype may have resulted from internal migratory flows, judging it to be "unlikely since the patient's ancestors were from Salvador." However, they leave open the possibility that the presence of the Senegal haplotype in this individual was a mutation of recent origin<sup>4</sup> (Gonçalves et al., 2003, p.1287).

In their study of data from the same city of Salvador, Adorno et al. (2004) stress the fact that the results of the prevalence of hemoglobin S haplotypes in the population under study diverge from the findings of studies in other states in Brazil, "demonstrating the heterogeneity of the African slave trade brought to the country." They go on to claim that their results

indicate a contribution of Africans from Congo, Mozambique and Angola, where the CAR haplotype is predominant, that received ships from Bahia with tobacco and returned with slaves; this slave trade was intensified between 1815 and 1824. Nevertheless, there is evidence that the northeastern region of Brazil, mainly Bahia State, received Africans from Central West Africa (...), justifying the frequencies of CAR and Benin haplotypes found in this population (Adorno et al., 2004, p.269).

The authors end the article with the hope that they have contributed to "the investigation of slave trade routes in Brazil and African origins of the Bahian population that seems to be quite different to other Brazilian states" (Adorno et al., 2004, p.269). The same argument about the importance of studying hemoglobin S haplotypes to find out more about slave trade routes and the ethnic origins of the Brazilian population is found in the work by Silva, Gonçalves and Rabenhorst (2009), who analyze data from the city of Fortaleza, Ceará state.

Belief in the capacity of population genetics to contribute to studies into slavery is even more evident in the work of Fleury (2000, 2007). Analyzing data obtained in Rio de Janeiro, he argues that genetic studies can be aligned with the history of Brazilian colonization to identify the origins of the slaves brought to the country. According to Fleury (2007, p.90), slavery turned Brazil into an

immense black continent outside Africa, influencing, with its culture, the genetic and cultural development of our people. The trade could therefore have resulted in a mixture of uses and customs that were completely different from one another. But rather, the commercial dealings established precise relations between customers and suppliers on both sides of the Atlantic, and therefore the regrouping of blacks from certain African 'nations' was achieved in some regions of the New World. The blacks from the Bight of Benin were mostly sent to Bahia, while the Bantu slaves, from Congo and Angola, were more frequent in the rest of Brazil. Basically, one can conclude that Brazil mainly received elements from the Sudanese and Bantu cultures. The Sudanese, with a higher culture and originally from the coast of Guinea, spread throughout the Bahian coast and neighboring parts. Meanwhile, the Bantu, with a more rudimentary culture, originally from the Congo (Zaire), Angola and Mozambique, spread throughout Maranhão, the coastal areas in the north-east of the country, Minas Gerais, Rio de Janeiro and São Paulo.

Here, I feel it is important to state that the article this citation is taken from has a bibliography of 37 items. Thirty-three of them are from periodicals from the area of hematology, three are from history, and one is an account by a nineteenth century traveler. None of the references is from the area of anthropology. The scantiness of the bibliography from the humanities and social sciences does not prevent the author from making pronouncements on the cultural practices resulting from the slave trade in Brazil, or the supposed superiority or inferiority of one culture or another. Fleury completely ignores more than three decades of historical debates about slavery and slave identity in his affirmation of the non-existence of any “mixing” in the uses and customs of slaves from different geographical origins and his use of the term “nations” to refer to autonomous units that are stable over time with a defined affinity between their members. Further, he ignores the criticisms levelled by anthropology against the putative superiority of the Nago and inferiority of the Bantu (Dantas, 1988), as well as the historiographical production about the strong presence of the Bantu (“Angolans”) in Bahia (Reginaldo, 2011).

The studies that contradict Fleury's claim that there was no “mixing” include one by Mintz and Price (1976), who discuss the supposed “permanence” of African cultural traits in the Americas based on the concept of “creolization.” They argue that when the cultural systems from the regions where the slaves were originally from were experienced in the context of the relationships established inside the slavocracy, they underwent a cultural transformation. This resulted in new cultural configurations and new ways of life, which were not experienced in exactly the same way in the Americas as they had been in Africa. For Mintz and Price, culture is not a fixed entity, but something in constant flux and reformulation, and is influenced by its broader social context, in a theoretical formulation that incorporates the agency of the subjects in this new context. This new culture, it should be added, encompasses both slaves and non-slaves, because the latter should also be regarded as members of the cultural reconfiguration, which should not, in these authors' view, be restricted just to Africans and their descendants.

Meanwhile, historians Robert Slenes (1995) and João José Reis (2003) stress potential links between slaves from different ethnic groups. Reis shows how the short-lived slave uprising of 1835, led by Islamized slaves in Salvador, had the power to mobilize captives from different ethnic backgrounds. In Slenes' analysis of data from the south-east of Brazil, he shows how the experience of slavery could create new cultural institutions and links. He translates the term “*malungo*” as “crossing companion” on the way to a “new life.” The experiences shared on the voyage from Africa to the Americas resigified the lives of the captives, creating bonds and practices that crossed the ethnic divides that predated the experience of captivity.

Likewise, the term “nations” that Fleury equates with “culture, uses and customs” has been reinterpreted in the light of the notion of the term “culture” as being permanently in flux (Barth, 1989). Luís Nicolau Parés (2006) shows how “nation,” as it was used in the seventeenth and eighteenth century by the slave traffickers, missionaries and colonial officials, was permeated by European notions of collective identity prevalent in the monarchic states that dominated the slave trade. Although there did exist notions of collective belonging under a chief or monarch, collective identity in Africa was not restricted to this kind of belonging; it was multi-dimensional and articulated around other spheres, such as religion, kinship,

territory, dwelling place, and language. These collective identities were subject to change through alliances, wars, migrations, merging lineages, political changes, or the incorporation of different forms of worship from other regions. The name that designated a collective could also have been coined by someone from outside it, such as a neighboring group. These new names could then have been accepted and taken on board by the collective itself, or imposed by force in a process that grouped peoples that previously went by different names under the same name. The “nations” of slaves, although in some cases coinciding with existing collectivities, did not necessarily refer to pre-existing political or ethnic groups in Africa, but may have been distinctions created to serve the purposes of the slave trade.<sup>5</sup>

By giving precedence to an account by a nineteenth century English traveler, Henry Koster, Fleury ignores not just the historiographical studies on the subject, but also the debates within the field of anthropology, and especially the discussions about the impossibility of “hierarchizing” cultures and labelling them “rudimentary” or “superior” (Lévi-Strauss, 1952). The claim that the Nago were superior to the Bantu, which could have been picked up from Nina Rodrigues’s writings from the nineteenth century, which were later corroborated by authors such as Gilberto Freyre (1933, p.382), has been criticized by anthropologists such as Beatriz Góis Dantas (1988), who indicates legitimacy-building processes within and between Candomblé religious communities in Bahia as one of the factors that helped spread the discourse of the superiority of the Nago.

It could be argued that these issues are a secondary part of Fleury’s work, and that a professional from the field of genetics could not be expected to have any great familiarity with the literature on the subject from the humanities, which in itself is already questionable. However, if we consider that one of the author’s explicit goals is to make “a number of considerations of interest about the origin and internal migrations of slaves in Brazil,” it becomes entirely unacceptable for him to fail to interact with the specialized literature on the subject. Even more so if we look at the article’s conclusion, which contains this paragraph:

Analyzing the bibliographical references relating to the colonial period, a great dearth of data about slavery in Brazil can be seen, especially concerning the nineteenth century. Many of the documents about the slave issue and the slave trade were destroyed in 1891, after the abolition of slavery. This ‘abolitionist’ act attributed to Ruy Barbosa, the then Minister of Finance, is controversial and questionable. We therefore believe that the determination of the beta-globin gene ‘cluster’ haplotypes is of great importance not just for the identification and prognosis of sickle cell anemia patients, but also as a tool for anthropology studies, helping to shed light on the origin of the Africans who have contributed so much to the ethnological, economic, cultural and social formation of Brazil (Fleury, 2007).<sup>6</sup>

Only by overlooking all the contemporary research by historians into slavery and social dynamics in the nineteenth century can one state that there is a “dearth of data about slavery in the nineteenth century.”<sup>7</sup> The type of data Fleury laments not having is the kind that would state by what ports of origin and entry the African slaves came to Brazil, ignoring the work done in the field of history that draws on other sources to build up its analyses, such as criminal proceedings.



However, I do not believe this lack of attention to works of history or anthropology on Fleury's part is only a reflection of an unwillingness or lack of interest on his part in engaging with the literature of these disciplines. Rather, it seems to me that there may be another question at play, which could arguably be extended to the other articles mentioned here: the differences between the epistemological approaches taken by these authors and used in the studies from the field of history and the social sciences. At the heart of these differences lies the emphasis given to notions of "origin" in the genetic studies analyzed, as compared with the focus on "processes" in history and the social sciences. I will return to this issue in the final section of the article, in which I will discuss the importance of looking at how knowledge is produced, and how the type of question asked and answers sought change in different fields of knowledge.

However, before I turn to this discussion about epistemology, I would like to introduce the second case study from the field of genetics about hemoglobin S haplotypes, which investigates the association between genomic ancestry and the severity of the clinical manifestations of sickle cell disease. The aim in studying this second case is to show that genetic production has grown to the point of making pronouncements on matters relating to identity, social mobilization and public policies.

### **On genomic ancestry, hemoglobin S and "ethnic" diseases**

Genetic interest in hemoglobin S is not limited to studies of haplotypes. A new field of studies has developed recently which is the connection, through comparing the genomes of carriers of sickle cell disease with individuals without the disease, between the characteristics of the genome and the severity of the manifestations of the disease. One such study is by Silva et al. (2011), who conducted a comparative analysis of genomic markers of ancestry in a group of carriers of sickle cell disease and a control group of blood donors, both from Minas Gerais state. The study warns of the risk of this kind of research not including in its analysis data on genomic ancestry markers, of particular relevance in the case of studies done of carriers of hemoglobin S in Latin American countries, where there is a high degree of miscegenation. Analyzing the data into the genomic markers of ancestry, the authors highlight the need, given the highly heterogeneous ancestry of the group under study,<sup>8</sup> to include this type of population group in future studies that employ global genome comparisons. They also warn that labeling sickle cell anemia a "racial/ethnic" disease is inappropriate in the case under study, despite the association between hemoglobin S and African ancestry.

This warning pertains not only to the discussions within medicine, but also to the broader debates involving genetics and the social sciences. In Brazil, these broader debates gained ground in the last decade of the twentieth century and beginning of the twenty-first century, with discussions about the implementation of race-based affirmative action policies in the country.<sup>9</sup> These discussions tended to focus on introducing such policies in the sphere of education, and only secondarily analyzed their introduction in the field of health (Oliveira, 2003, 2004; Fry, 2005; Maio, Monteiro, 2005). The issues raised centered around the "racial" inequalities found in statistical studies, how best to reduce such inequalities, the role of

miscegenation in the country's history, and the difficulty of establishing clear race/color categories for use in such affirmative action policies.

The position of some leading geneticists in this debate may be summed up in the conclusions of an article entitled "Can genetics define who should benefit from university quotas and other affirmative actions?" (Pena, Bortolini, 2004), a question the authors answer with a resounding "no."<sup>10</sup> They base their argument on genetic data that show the high degree of heterogeneity in the genomic ancestry of the Brazilian population, the outcome of historical miscegenation processes, and the lack of correlation between genomic ancestry and the race/color classification of many Brazilians because the racial classification in the system gives precedence to appearance over ancestry (Nogueira, 1955). Despite the emphatic nature of this "no," the authors do not rule out the role of genetics in the debates about affirmative action. As such, despite arguing that genetics cannot have a prescriptive role, for which reason this area of knowledge cannot define individually who should benefit from this kind of policy, the authors state they believe that "modern genetics can offer inputs for political decision-making and that the genetic profile of the Brazilian population should certainly be taken into account in policy decisions" (Pena, Bortolini, 2004). Genetics and the data it supplies therefore still have contributions to make to the debates about such policies, and more generally about the nation's identity. However, as I will discuss in the next section, if this contribution is to avoid getting stuck in an analysis centered around "origins," it must interact with the work of other areas, engaging with other methods of knowledge production.

### **What genes fail to explain: origin and process in the epistemology of genetics, history and the social sciences**

Throughout this article I have shown some attempts by scholars from the field of genetics to contribute to the body of knowledge about the history and characteristics of the Brazilian population, either concerning the slave trade or in contemporary discussions about the identity of the country and its future. My purpose here is not to judge the merit of such works or the incorporation of their data in general, non-academic discussions about the country. Rather, my aim is to think about the contribution genetics can make to academic research in areas that have traditionally been the target of the humanities and social sciences. The main issues include how the emphasis given to "origins" in these works impinges on questions related to knowledge production in different scientific areas, and to the fact that no epistemological differentiation is made between the natural sciences and social sciences, taking science as a single entity. The explicit intentions in some of these works to contribute to the study of slavery, for instance, without necessarily engaging with the literature produced by historians, is enabled by the assumption that the epistemological processes, objectives and conclusions of a natural science can be transposed to the humanities and social sciences. This discussion about such epistemological differences dates back to the nineteenth and early twentieth century, and still deserves attention because of the misled ideas and confusions it engenders about the capacity of the natural sciences to make claims about the objects of the humanities.

The epistemological difference between the natural sciences (or “nomothetical sciences”) and the social sciences (or “idiographic sciences”), first formulated by neo-Kantians Windelband and Rickert, was refined by Wilhelm Dilthey, one of the authors who most contributed to the debate about the characterization of epistemes at the time when the social sciences were being consolidated as an independent area of knowledge, and later incorporated into the epistemological reflections of Max Weber (1992).

Dilthey’s work is structured around the contrast between “life” as a constantly changing, forever incomplete human experience, and “inert matter.” This contrast is also found in the oppositions he raises for the study of phenomena. Thus, his thinking presents an opposition between the “historical world,” articulated by man, and “nature,” not created by him. Phenomena related to “nature,” made up of “inert matter,” are subject to the “study of segments” isolated from reality by natural scientists. Meanwhile, in the case of phenomena from the “historical world” created by man, these studies are based on an internal “comprehension,” the “integrating apprehension” of the lived experiences that characterize the “sciences of the spirit.” The link between comprehension and the “sciences of the spirit” (Dilthey’s term for the social sciences) is related to its very object of study. Dilthey is interested not simply in the generic notion of “life,” but in its constitutive unity, “lived experience.” All human experience is made up of lived experiences, and this experience is intrinsically historical in nature. Its study will therefore also be of an intrinsically historical nature and therefore have a historically dated validity. To understand the phenomenon of “lived experience” is to take account of the cultural meanings of an object. Instead of analyzing a field constituted of given “objects,” as the natural sciences do, the analysis conducted in the social sciences centers around problematizing the process by which the world and experiences are constituted as such (Cohn, 1979).

A similar movement may be found in history, specifically in the texts of the Annales School and its notion of historiography. For the members of this school, like Marc Bloch (2001), the notion of “comprehension” was central to the historian’s craft, for which “in history, as elsewhere, the causes cannot be assumed. They are to be looked for.” In parallel to Dilthey’s theorizations, Bloch did not see the “historian’s craft,” the title of a work he wrote months before his death in 1944, as being the gathering of documents that “speak for themselves,” as positivist history argued. Rather, such documents, if no question were formulated for them, would be incapable of supplying any historical “truth.” Bloch criticized what he called an obsession with “embryogenesis”, the notion that an origin was “a beginning which explains. Worse still, a beginning which is a complete explanation.” The formulation of the questions “asked” to documents, and not the documents themselves, was what structured a historian’s analyses. These analyses were influenced by the time in which the historian, as a cultural being, lived. Each time had its own concerns, which were reflected in the topics and questions of history asked at that time.

These discussions about the epistemology of history and the social sciences can help us understand both the motives for the lukewarm reception given to the genetic studies analyzed here in the field of the history of slavery in Brazil, and the controversies between social scientists and geneticists in the debates about affirmative action regarding whether the concept of “race” can still be used as a category to express the social experience of Brazilians.

As such, what is at stake is a problematization of what questions should be asked and what disciplines can produce the answers to these questions. One example of the confusion between the type of questions and methodology found in different disciplines can be seen in a text by a Bahian geneticist, Eliane Azevedo (1980), published in a leading international periodical in the area of anthropology. In this article, Azevedo analyzes the association between surnames of a religious nature and the presence of the “negroid” phenotype in the state of Bahia.<sup>11</sup> For this author, writing in 1980, cultural anthropology was undergoing a crisis in its working methods and results. This crisis was due to the difficulty of producing reliable variables from research materials about culture and behavior. The problem was, according to Azevedo, that in anthropology there were no standard definitions for “aggression, responsibility, religiosity, mysticism, and so on.” As a consequence, its appraisals and interpretations would always be liable to criticism about their “validity and reliability.” Meanwhile, in the area of population genetics, the situation was quite different, because despite its being a discipline close to cultural anthropology, population genetics worked with

variables that, as a rule, allow concise definition, rigorous measurement, and adequate statistical analysis. Cultural anthropology, on the other hand, works with variables that are poorly defined, difficult to measure, and highly susceptible to error. Therefore the identification of reliable variables seems to me to be the anthropologists’ most urgent task. I would like to define a kind of variable for cultural anthropological studies that I shall call a universal variable—one that (a) needs no definition by the investigator, because there is universal consensus as to what it means, (b) is not artificially produced by the investigator, and (c) is naturally present in every population. The methodological value of a universal variable lies in its suitability for cross-cultural studies, its freedom from investigator bias, and its informational richness. One universal variable is family names (Azevedo, 1980, p.360).

It is interesting that after almost a decade of debates about the need for relativism in dealing with cultural questions (Boas, 1911; Benedict, 1934; Kroeber, 1948; Kluckhohn, 1949; Herskovits, 1972; Geertz, 1984), the supposed methodological crisis of anthropology could be resolved by “universal variables.” Is the notion of a “surname” actually a universal notion? The anthropology of kinship has long emphasized the fact that kinship is not “natural,” but culturally constituted (Schneider, 1980; Daniel, 1984; Strathern, 1992; Carsten, 1995, 2000). Does cultural anthropology work with “variables?” Or is it closer to an epistemology based on “understanding” and therefore works with “concepts?” The very notion of “origins” and its importance in our midst cannot lead us to think that it is actually a “universal.” The “truth” that genomic ancestry tests bring us has to be considered as a “document”, in Bloch’s conception of the term, to which questions should be addressed, which will vary from one time to another. Otherwise, what should we do in the case of peoples whose oral histories and origin myths are “disproved” by genomic ancestry tests? Now, more than ever, there is a pressing need to resume the discussion about different epistemologies and how knowledge is produced about the different subjects associated with particular disciplines. As Bloch himself said,

Human actions are essentially very delicate phenomena, many aspects of which elude mathematical measurement. Properly to translate them into words and, hence, to

fathom them rightly (for can one perfectly understand what he does not know how to express?), great delicacy of language and precise shadings of verbal tone are necessary. Where calculation is impossible we are obliged to employ suggestion. Between the expression of physical and of human realities there is as much difference as between the task of a drill operator and that of a lutemaker: both work down to the last millimeter, but the driller uses precision tools, while the lutemaker is guided primarily by his sensitivity to sound and touch. It would be unwise either for the driller to adopt the empirical methods of the lutemaker or for the lutemaker to imitate the driller. Will anyone deny that one may not feel with words as well as with fingers? (Bloch, 2001, p.55).

It remains for us to hope for dialog between lutemakers and drill operators.

## NOTES

<sup>1</sup> Haplotype is a term used to designate the polymorphic combinations of adjacent DNA sequences that are transmitted together.

<sup>2</sup> “Sickle cell disease” is employed to refer to both these cases and their combination with other hemoglobin variants (e.g. hemoglobin C or thalassemia). Meanwhile, “sickle cell trace” is used to designate heterozygotic carriers, who inherit hemoglobin S from one parent and hemoglobin A (standard hemoglobin) from the other (Brasil, 2008).

<sup>3</sup> The difference in the severity of the clinical manifestations is linked to the lower or higher production of fetal hemoglobin and the impact that the presence of this hemoglobin has on the patient’s condition (Fleury, 2007).

<sup>4</sup> It is unclear how these data on the patient’s ancestors were collected, although it can be assumed that the patient provided them. Considering that this patient could be anything from 1 to 51 years of age, according to the data supplied in the article, it could be argued that it would be necessary to know the precise origins of the eight great grandparents born in the mid-nineteenth century and the 16 great grandparents born in the first half of the nineteenth century.

<sup>5</sup> Proof of this relationship between the term “nation” and slavery is its use in some documents to refer to the “creoles” descended from African slaves born in Brazil (Parés, 2006, p.24).

<sup>6</sup> Fleury (2001, p.58) ends the abstract of his doctoral thesis, defended in 2000, with an exhortation similar to the one written in this last sentence, in which he states he is confident that “the data presented can be useful ... in the development of more consistent studies about the slaves’ origin that influenced deeply the Brazilian culture”.

<sup>7</sup> The extent of Ruy Barbosa’s order was already questioned in the 1940s. For more on this discussion and an analysis of the alternatives available, such as registry and judiciary archives, see Slenes, 1983.

<sup>8</sup> In average terms, the values of the blood donor group are 33.8% African origin, 57.7% European and 3.5% Amerindian. The same data for the carriers of hemoglobin S are 47.3% African origin, 39.7% European and 13% Amerindian. Meanwhile, in terms of individual ancestry, only 11% of the carriers of hemoglobin S had more than 85% of African ancestry markers, 73% had intermediate levels, and 13.8% had a predominance of markers of European ancestry (more than 85%).

<sup>9</sup> The different positions in these debates can be found in the articles in the special edition of *Horizontes Antropológicos* (v.11, n.23, 2005) on the subject.

<sup>10</sup> A similar line of reasoning is presented by Pena (2005) with regard to the use of “race” in medical practice in Brazil.

<sup>11</sup> Azevedo’s (1980) text is problematic in more ways than one, not only regarding the methodological “lessons” the geneticists seems to want to give the cultural anthropologists, but also in the notions of “race” she uses, which we can see, for instance, in the statement of being able to show that “through several generations of racial intercrosses a Black male may accumulate enough White genes to be phenotypically classified as White” (p.360), a statement that ignores everything that has been produced in the area of race relations about race classification systems in Brazil.

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