

## Beyond the fingerprints

### From biometric to genetics

Pier Giorgio SOLINAS

---

**ABSTRACT:** Aside to the demographic screening, a deeper biosocial interest in India can be observed on the scale of groups and subpopulations. Several agencies (university consortia, departments of human forensic genetics), are pursuing the inspection of population bio-history, and genotyping. Most of the results concern the genetic structure, and admixtures, in a phylogenetic net connecting clades and sub-clades. Two large ancestral stocks are supposed at the origin of the demographic mosaic. The first of these, *Ancestral North Indians* (ANI) had its centre in a western Euro-Asian area, and the Middle East. The second, called ASI, *Ancestral South Indians*, centred in the Andaman Islands, but prevalent in South India. Under this perspective, the authenticity is associated, with autochthony: the “true” Indians are those who first populated the territory. Thus, *adivasis* label (aboriginals) designates the “originals”. Their roots, both on the bio-genetic and cultural level, belong to the deepest layer of the variegated Pan-Indian scenario. This simplified version coexists with a divergent theory linked to modernized frames of the classic hierarchical background. In a seminal study M. Bamshad showed as the social pyramid corresponded to a distribution the Y chromosome heritage. The highest rate of markers of haplogroup R1a1 was found among the top castes, and lowest in the Shudras and outcastes. The supporters of Hindu supremacy wear the R1a1 brand as a symbol of identity that confirms the Vedic myth in which society is depicted as a body (where the limbs represent the different classes), supporting a renewed image of national solidarity.

**KEYWORDS:** BIOMETRICS; ETHNICITY; CASTE AND ANCESTRY; CENSUS OF INDIA.

---

This work is licensed under the Creative Commons © Pier Giorgio Solinas

*Beyond the fingerprints: From biometric to genetics*

2020 | ANUAC. VOL. 9, N° 2, DICEMBRE 2020: 121-139.

ISSN: 2239-625X – DOI: 10.7340/anuac2239-625X-3989



The Aadhaar program – a hi-tech register of the adult population of India that stocks in a central computerized database the essential personal numeric and biometric data for the residents in the Country – is now complete. Implemented by the Governmental Unique Identification Authority of India (from now on UIDAI) since 2009 it is conceived as a supreme source of a singular identity, to be assigned to each individual through some coded parameters of uniqueness: an exclusive identity digital code, along with some basic demographic and biometric details, photo, fingerprints, and iris scan.

It took almost ten years to accomplish this gigantic data repository, the largest in the world, hyper-connected in real-time through an electronic system of data sharing, matching control, and remote authentication (from the center to the periphery, from every single office, bank, shop selling subsidized goods to the national data center). A great invisible machine that scans, or should scan, the authentic identity of each cardholder, of every applicant who gets his Aadhaar card and number by the government UID and demands any service to agency, office, bank: borrowed money, basic necessities, a job, a grant, a pension a driving license, a reserved quota of service, ration card, assistance and facility. The slogan “Anytime, anywhere, anyhow” authentication (Noy 2014) clarifies the impetuous program that the inclusion strategy proposes in the social and symbolic space.

The present article does not directly address this imposing program of biometric filing, but approaches other, relatively distinct dimensions, which are nonetheless culturally and politically linked with the debate on “Indian identity” and on ethnic authenticity<sup>1</sup>.

\*\*\*\*\*

Within the demographic screening of the population database, beyond the level of the individual, a major, and deeper field of biosocial interest in India can be observed on the macroscopic scale of groups, classes, and sub-populations. A plethora of research teams, laboratories, demographic and

---

1. I would like to thank Bruce Lincoln, Giovanni Destro Bisol and *Anuac* anonymous reviewers for their patience and willingness to offer comments and suggestions on an earlier draft of this essay.

anthropologic agencies (University departments and consortia, anthropological surveys, forensic scientists, as well as private companies) are more and more investing their resources to bio-genetic enquiries on the phylogenetic structure of the present populations in the Country, the subcontinent and the whole south Asian area.

Undoubtedly, the purest scientific interest, and a rigorous methodological discipline appears to be assumed as a prerequisite that informs the research no less than the language and epistemic categories used in it. Most of the research reports, and studies published in a number of prestigious reviews, not only in India, but in international journals specify the experimental procedures, their samples' origins and statistical treatments, along with, of course, the specific laboratory tests, the DNA sequencing technologies, markers choice and chronology estimates linked to the phylogenetic dynamics regarding the clusters and demographic units considered: ethnic communities, linguistic areas and branches, status hierarchy degrees and so on.

All such diffused, engaging, and tenacious production of genetic screening, analyses and interpretations aim to shed light on the remotest history of migrations, segmentations, mixtures and genetic flows among different ancestral identities within the extremely complex mosaic of Indian populations. The crucial parameter of "distance" – genetic, structural, and classificatory distances in the genomic cartography – as well as the grades of "likeness" between the multitude of peoples, castes and tribes, resonates today as a silent criterion of identity. Like an intimate source of acknowledgment, a repository of truth authored by the natural code of life, the DNA genomic chart of the self, individual as well as collective, embodies the deepest memory of a long history of generations, admixtures, encounters, stratifications. Hence, a bio-history transcending personal consciousness, printed in the scripts of the bio-chemical genetic code, and connecting the "DNA-Lineages" saturates a dense network of global phylogenetics.

The term so frequently adopted among scientists, "lineage" – genetic lineage, mitochondrial lineage, Y chromosome DNA lineages – requires some comment. As everybody knows, the same term, with its long career in anthropological studies, was strictly interwoven with the inner structure of social groups: as a corporate unity of genealogical solidarity, as a descent group, not less than socially shared principle of identity, the "lineage" principle, or logic, was assumed for long time as the paramount axiom of anthropological comprehension as well as an objective rule embedded in the very structure of traditional societies and cultures.

In India, the equivalent entity, the *gotra*, with its firm rules, its pervasive effects on ritual contexts, familial life, its extensive codes of obligations, solidarity, formal respect, and hierarchy, still maintains an explicit validity. Genealogical practices and know-how, formerly reserved to specialized communities like the *panjikars*, the *pandit* genealogists, are practiced at different levels: like a sort of domestic cult, an amateurs' and devoted practice of ancestral memory. Not only the classic written sources (mainly the *pandits* and brahmans' registers on *vamsa*, the descent chains of the families, the marriage records etc.), but also the modern tools of digital recording, informatic files and databases nourish the *gotras*' identity. Pedigrees and family trees are often present as a sort of symbolic heritage and a space of cult. A number of ritual occasions require the invocation of ancestors' names and symbolic homage to their memory, especially during the *shraddha* funerary ceremonies where purifications of the dead are performed and the whole kinship network (*sapinda*) gathers to celebrate their common devotion to the descent clusters.

As the status and prestige of a lineage increase, so does the intangible quantum of value that varies with the depth of its ancestral roots, especially in the case of the higher castes, brahmans and *kshatriyas*. One can easily understand, thus, how welcome "scientific" evidence would be that might confirm a lineage's longstanding position of superiority in the hierarchical play of Indian society.

Indeed, what was once a formal structure of deference, dependence, subjection, as in the traditional caste system, nowadays has ceased to impose its detestable rules and codes of conduct. Caste discrimination is now illegal and the custom itself is more and more disapproved and contended. Yet, some practices of value-oriented attitudes inherited by the ancient caste psychology continue to inspire cultural and social practices. Above all, the matrimonial market shows the prominent influence of social rank differences and pretensions. A deeply rooted ideal of value, of "purity", in the significance of unmixed, excellent and uncontaminated, directs the search for a partner, and consequently the strategies of reproduction. Nevertheless, the whole framework of the status hierarchy appears seriously weakened, not only under the pressure of a new democratic mentality, but by the ongoing evolution of professional statuses, with the emergence of middle classes and an urban way of life. Thus, although caste culture is not extinct, multiple factors make the contemporary criteria of ranked identities scanning more uncertain.

The essential and elementary questions: “Who are we?”, “What are we?”, as a collective subject that includes the past, present, and future in a persistent sameness, are looking for a renovated idiom, and a new screen, a public screen of expression.

To some extent, the single lineage, and lineage clusters of shared origins and historical autarchy (endogamy, inclusive cohesion, blood communion and even physical likeness...) supply a comfortable answer. And it gains a surplus of proficiency by opposition, in a negative dialectics, since our “us-identity” obtains much of its energy by its specular relation with the “non-us identities”. Nonetheless, neither the micro-scale of kinship area, nor the corporate communities of descent and affinity can embrace the range of the most inclusive macro-identities. It cannot satisfy the extended demand of an encompassing recognition, a collective reference to the super-personal “us”, to a collective ego, unless this is supplied by a sort of external authority, a supreme source of revelation, a scientific judge that has the ability to ascertain the intimate “true nature” of the people.

The naturalization of identity is an old, perverse attitude of a scientific approach that seeks to classify human “nature” through obsessive practices of measuring, typing, selecting that were regularly linked to census and surveys directed by governmental agencies (Trautmann 1997; Dirks 2001). Although the embarrassing heredity of such ethnographic naturalization has been soundly rejected, new spaces and methods have opened fresh perspectives of enquiry for demographic, ethno-demographic and physical anthropology as far as the picture of the “Indian People”, “Indian Nation” and their numerous articulations are concerned.

### *Ethnogenesis and molecular screening*

Ethnic divisions and origins, linguistic affiliations, local and regional differences, religious distances and ritual specificities still affect the social traffic of relations, as well as ranked classes and style of life, not to say professional affinities, client groups and networks. Does this intricate landscape of diverse humanities offer some useful foothold for the work of bio-anthropologists or a meaningful comparison between the socio-cultural and bio-genetic approaches?

As we shall see, the state agencies, from the *Anthropologic Survey of India*<sup>2</sup> to inter-university consortiums and departments interested in human genetic variation, from forensic genetic database to *The Indian Genome*

---

2. See DNA Polymorphism in Contemporary Indian Population and Ancient Skeletal Remains, *Anthropological Survey of India*, Ministry of Culture, Government of India, <https://ansi.gov.in/dna-polymorphism-in-contemporary-indian-population-and-ancient-skeletal-remains/>, accessed on 17/08/2020.

*Variation Consortium* and its *Indian Genome Variation database (IGVdb)*<sup>3</sup>, to mention only some of the principal poles of research and recording in the field, are actively pursuing the systematic inspection of population characteristics, demographic vital statistics and genotyping. More than extemporaneous programs of data collection: bio-molecular tests and analyses of genetic flows among single demographic unities that identify similarities and clines of genomic differentiations are ongoing over a large scale of areal distributions.

Most of the results that emerge from the research concern the genetic structure, stratifications and admixtures, which are frequently represented as a phylogenetic texture connecting the populations and sub-populations in a given area. In that way, the inclusive network takes the shape of a genetic tree, a sort of universal, or pan-Indian genealogy of peoples and groups, where the ethnic segments are the branches, and sub-branches. Often, the scale is extended to the sub-continental level and the super-tree of connected identities suggesting the idea of a totally connected ancestral coalescence, an original “sameness” encompassing different degrees of cohesive likeness within different phases of segmentation, scission, convergences, immigration over the millennia.

Some crucial points must be recalled before entering the crowded field of phylogenetics (or even “phylogenethics”) in contemporary Indian bio-molecular typing and classifying.

First: two main genetic markers are used for lineage definition: the mitochondrial DNA heritage, and the YDNA heritage, female-and male-transmitted, respectively (although a small portion of Y, the pseudo-autosomal region, may recombine with X chromosome). Based on some small, almost insignificant variations on some specific locus of the genomic sequence, it is possible to follow a specific trait, either along the maternal descent, or the paternal. The selected markers, as peculiar signs of ancestral identity, non-combining and sex-specific, thus become infallible detectors of distinct clusters of ancestral groups. The modal haplotype of a deeply rooted tree of descent, or “haplogroup”, designates what the biologists call a DNA lineage.

Second, the chronology of a specific haplogroup, its “age”, can be determined (an estimated date of origin, based on the frequency of the characteristic mutation linked to its profile). Consequently, the inaugural ancestor of the assumed genealogical cluster (MRCA) may be set in a retrospective chronology, so that all descendants of the hypothetical founder are accorded a distinct space in the global catalogue of genetic lineages.

---

3. See the *Consortium* homepage, [www.igvdb.res.in](http://www.igvdb.res.in), accessed on 01/12/2020

Within the last two decades of paleo-genetic and micro-biological researches on extant and extinct groups, a general scheme of demographic and ethnic stratigraphy has been established, a comprehensive landscape of the main components of the Indian mosaic based on a dual ancestral polarity.

Two large stocks of ancestral populations are now said to be at the origin of the entire demographic mosaic of the subcontinent. The first of these original strains, *Ancestral North Indians* (ANI) had its center of diffusion in a western Euro-Asian area, and the Middle East. The second, now called ASI by convention, *Ancestral South Indians*, would be reflected in the Andaman Islands, but is prevalently found in South India (Moorjani *et alii* 2013).

There would be nothing new, at first sight, in the image of the two layers of population and culture. The two great linguistic families, Indo-European in the North, Dravidian in the South, in which the numerous languages spoken in the Subcontinent are still usually classified, at least most of them, constitute a sort of elementary atlas of ethno-cultural order, often implicit, but widespread among scholars. In this overall geography, the disciplinary boundaries move congruous elasticity. Since its appearance, in the late-eighteenth century, the theory of the Arya invasion (Indo-Europeans versus pre-Arya natives or Paleo-Indians) prospered alongside and due to the hypothesis of a common origin of Sanskrit, Greek, Latin and many other Eurasian languages. Peoples were soon associated with languages, and races with peoples. The language tree had to correspond to a homologous phylogenetic network of cultures, and the cultures, with the languages and the people who incorporated their inheritance, were one with the physical characters, with the inheritance of blood that conveyed them continuity up to our time.

### *Bio-historical appraisals*

The “representants” of the first populations, as the extant witnesses of a purportedly primordial cultural stage and original carriers of the most archaic identity, are supposed to have preserved and transmitted a primeval genetic heritage under the multiple strata of historically successive migration waves, conquests, colonizations, demographic flows that saturated the peninsula. That’s why generally the researchers assemble in a sort of primordial gallery a cluster of three pre-Arya components located on the marginal areas of more recent hinduisation of the continent. First, the “tribal” groups of the south, on the bottom of the peninsula farthest from the source of Vedic culture and Indo-European hegemony (and more obscure, for the skin of its inhabitants, and for the esoteric, “animistic”

character of its cults). And once more, the linguistic families irreducible to the Indo-European and Sanskritic heritage: Austrasiatic, Dravidian. The conclusions of a paradigmatic article (not only for what it says, but for those who say it, a large group of researchers who report to the Anthropologic Survey of India) summarize this point:

Our results suggest that tribes of southern and eastern region along with Dravidian and Austro-Asiatic speakers of central India are the modern representatives of earliest settlers of subcontinent. The Last Glacial Maximum aridity and post LGM population growth mechanised some sort of homogeneity and redistribution of earliest settlers' component in India. The demic diffusion of agriculture and associated technologies around 3 kyBP, which might have marginalized hunter-gatherer, is coincidental with the decline of earliest settlers' population during this period (Kumar *et alii* 2008).

Among the best known, and perhaps the most authoritative researches we can mention is an essay by Toomas Kivisild and many others (Kivisild *et alii* 2003), but among the authors figure names of weight, first of all Luigi Luca Cavalli Sforza, and Peter Underhill. A research that dates back fifteen years, which most recent studies have expanded, and in many ways exceeded, but remains exemplary for its approach, a reading of the origins founded on genetic profiles presumed to be latent in the most isolated indigenous communities, like precious deposits in the residual niches of the oldest population.

The central object of the investigation was two marginal groups, officially labeled as tribal, which inhabited two rather isolated areas of Andhra Pradesh. Different in their demographic consistency, the two populations, the Chenchu and the Koyas (respectively about seventeen thousand the first, more than three hundred thousand the second), had all the requirements to appear on the list of *adivasi* communities, still recognized in the official censuses as non-Hindu ethnic minorities. As in many *adivasi* communities, especially in the remote regions, largely covered by tropical forest, their economy was based on subsistence agriculture, at least traditionally, if not on itinerant agriculture, as well as (especially the Chenchu) on hunting and gathering. Of Dravidian language, polytheistic-animist religion (a rather stale but still current term), and "Australoid" morphology (another pearl of the colonial period vocabulary, "Chenchu are described as an Australoid population, when physical anthropological features are used as criteria"): in short, a concentrated living ideal of primitiveness offered for biogenetic inspection. And then, duly accompanied by the informed consent forms, eighteen hundred samples of DNA arrive in the laboratory, in the form of blood samples taken from as many donors, all in good health and declaring



to be unrelated to each other. To this database are then added other stocks of samples: from donors of different caste in West Bengal, from Brahmins of Bombay (at the time not yet completely Mumbai), from Gujarat, from Punjab, to Sri Lanka: A wide variety of mitochondrial haplotypes that helps to compare and possibly connect the ramifications in the mosaic of the genotypic identities that cross the two tribal groups. At the end of the work, six main lines emerge from the mass of comparisons, six mitochondrial lineages that make up a sort of constellation of elements, all connected to each other, partly of exclusively indigenous origin, in part propagations of large lineages extended between Asia and Europe. The first, the most branched one, is the “M” lineage, well known to paleogenetic scholars. It is a species of great *primigenium* trunk: if not its first progenitor, a very deep-rooted stem, close to the great passage from Africa to Asia. In prehistoric India, this primary vector is a crucial step, an irradiation node from which stem secondary segments of M that detach themselves from the matrix lineage during the long phylogenetic history.

Kivisild and his collaborators estimate a coalescence time for this zero node around sixty-two thousand years, plus or minus twelve thousand. This does not mean, of course, that the two ethnic groups, the Koyas and the Chenchus, exist as such as observed today since that date, or that their genetic complexion has remained unchanged for the tens of millennia that separate us from the Pleistocene, while around them other flows of people colonized the physical and demographic space. What comes to light, rather, is a densely branched tree of genetic marks (secondary mutations) that are transmitted from one generation to another, from mother to daughter, and which continue to cover the biological fabric of the tribal population, splitting and giving origin to new sub-clades (sub-lineages), in turn designated with specific abbreviations (the M2, M3, M6, M2a, M2b). The temporal span that can be read in this long process of mitochondrial branching crosses the entire South Asian prehistory. Between forty and twenty thousand years ago, across the upper Paleolithic, and the Mesolithic, new cladistic segments appear (the haplogroups N, R, and others derived from the first M), reflecting perhaps an accelerated demographic rise that accompanied the development of the first societies and the “economies of the stone age”, up to the spread of agriculture, whose outposts began to appear in the Indus valley around the ninth millennium BC.

This first reference axis, which we will designate (with some hesitation) as ethnicity, or rather of ethnic depth, relies on the relationship between the phases of demographic evolution and bio-genetic inheritance. It is on this assumption that the definition of *adivasis* (aboriginals) is intended to expand

its meaning to include both bio-genetic and cultural factors. According to this perspective, the chrism of authenticity may be associated, if not identified, with autochthony: the “true” Indians are those who first populated the territory, those who have their roots in the deepest common layer of the variegated Pan-Indian scenario.

Yet, as we shall see soon, the connection between antecedence of settlement and identity supremacy does not get the role of a cardinal principle, neither on the level of cultural competition, nor on that of genetic “legitimacy”. *Adivasis*’ DNA can certainly be the oldest, the most original, but it is not construed as the repository of the most genuine Indian identity. Rather, its traces are theorized only as residual veins in the extraordinary amalgam of ethnic variety that the Indian nation exhibits.

As everyone knows, in fact, the “genuine” Indian identity, the one that claims to incorporate ethnic groups, castes, communities, as well as the traditional customs and law (*dharma*), like a basic ethos infused into a cohesive body of belonging, claims its roots in a ritual fabric of customs and characters, in a civilization complex which is called “Hinduism”. The Brahmanic dominance over this immense heritage of “origins” obviously pushes its roots in religion and ideology, but in parallel, a specific genomic dimension has come to be seen as intertwined with the social, ritual and demographic history of caste hegemony, a centuries-old hegemony and, according to the self-image it produced, utterly full and pervasive. But, unavoidably, such a compact cohesion as the dharmic order imposes on its subjects, demands a connective, a glue that does not tie together the various parts of the social body by a reciprocal integration between equally valued components; it is rather the body metaphor, with its organic hierarchy of roles and functions that dictates the whole framework.

### *Genethnics*

A third axis of reference, therefore, the status hierarchy, appears in our review, also on two levels (or two registers): that of social value and that of genomic distinction. This intersection, it should be pointed out, demands particularly subtle attention, because it raises two crucial questions. The first concerns the biological nature of the distinction: in particular, the inheritance of special qualities that it is customary to attribute (or rather to self-attribute) to higher castes. Can we identify markers in the DNA pool of this or that category or class that are exclusively transmitted within its ancestral chain? The question is strengthened, even in the eyes of researchers, by the fact that caste endogamy seems to have ensured for many

generations a sort of eugenic selection, an identity self-sufficiency that tends to avoid any mixing between heterogeneous lineages. Here, the moral and spiritual “purity” merges with the purity of blood: the similar reproduces itself with the similar and tends to resist allogenic interference.

The second question, even more troubling, concerns the possible social origin of selection: can we look at Hindu India as a great genetic laboratory in which a rigorous system of control over mating produced (or stiffened) a number of “natural” classes of identity, so that, in short, the social hierarchy has generated a genetic hierarchy?

Nothing allows us to imagine that a perspective of this kind is the order of the day, but significant research conducted over many years, shows important correlations between the genetic typology and the hierarchical structure inherited from the caste system. Twenty years have passed since Michael Bamshad published a team study in which he showed with abundant bio-statistic surveys that the status curve in the Indian social pyramid corresponded to a precisely graduated distribution of some markers of the Y chromosome. In a nutshell, from the observation of Y-chromosomal DNA samples in a remarkable collection of records, showing that the highest concentration of markers typical of haplogroup R1a1 was found in the samples collected among the top castes (brahmans and *kshatriya*), while it was much less present among the outcastes and the Shudras. Since then supporters of Hindu supremacy and uniqueness have rallied around the R1a1 bio-molecular brand as a symbol of identity that confirms the Vedic origin myth in which society is depicted as a body (where the arms, legs, chest, head represented the different classes and different “natures”, *jati*), supporting a renewed language of national solidarity and hierarchy.

The correlation between status hierarchy and genetic distinction did not stop at the markers in the DNA of the Y chromosome. The data that Bamshad reported brought to light other aspects, no less relevant. First, the profound similarity between the most frequent genetic profiles in high castes and those characteristic of lineages in the West, in Europe. Second, but in close connection, the different distribution between the mitochondrial inheritance and the Y one; in simpler words, the divergent impact of maternal and paternal contributions in the composition of the genetic identity of the Indian population.

These two aspects deserve a slightly more careful comment. We must start by saying that the markers the scientists deal with when they identify a “genetic lineage” have nothing to do with substantial aspects: they are not genes that synthesize proteins or command phenotypic characters, physical or psychic. They are minuscule variants that are completely irrelevant and

generally confused in a mass of residual nucleotide sequences. But since they function as markers of continuity from one generation to another and do not recombine in unilinear polymorphisms of mtDNA and Y chromosome, they serve perfectly to trace identity lines through many, many generations.

These two traits, parallel and complementary, gave the biogenetic history of Indian demography, and even more, the ethnic or *genethic* map, if the neologism is allowed, a rather precise configuration. The upper classes, social and biological elites at the same time, appeared mainly based on a patrilineal hegemony (“male driven” according the formula coined by molecular biologists), tendentially allochthonous and extremely closed. The lower classes, on the contrary, were more anchored to the native origins, subordinate, or genetically colonized by the more powerful and “noble” part of the population. The mitochondrial component, however, had to be considered as the fecund and generalized humus that lay at the base of all or almost all parts of the population. The profile defined by the mitochondrial, maternal markers, the haplotype “M” observed in all the samples, appeared from one end of the scale to the other, albeit in different proportions, and inverse with respect to the hierarchical gradient. Simplifying the framework, and reducing it to a perhaps too elementary scheme, the result would be more or less this: the entire demographic “body” of the Indian population is like a large cone, at the base of which are social and genetic categories, inferior carriers of the most ancient, indigenous and tributary mitochondrial inheritance (maternal). At the top, on the other hand, was the dynamic, fertilizing component of “Indo-European” origin, the bearer of highly selected genetic pools protected by an intransigent endogamic strategy.

This would be the official part of the story, however. The less official one, in a certain sense removed, leaves many pores open in the osmotic barrier between high and low castes: the very fact that the maternal part of native origin is widely diffused also towards the upper castes indicates that in the long history of the population a constant flow of hypergamy, women moving from bottom to top, silently accompanied the reproduction of the entire system.

The contradiction between the reproductive closure of the Hindu elite and indigenous hypergamy is not easy to resolve. Nevertheless, much evidence supports the hypothesis that, together with the exclusive continuity of a genetic inheritance linked to the most illustrious Brahmanic lineages (R1a1), a flow of fertile women from below available as secondary partners has constantly supplied the system of reproductive energies. In essence, we would thus have a complex of antinomies: autochthonous/ allochthonous;

status superiority/inferiority; patri-linear/matri-linear inheritance, functional antinomies that integrate each other to give life to a cohesive, vertical body, a well-ordered, selective “organism” based on a double hegemony, social- and sex-oriented.

In recent years, however, the hypothesis of the allochthonia has faded away, to the advantage of a theory that attributes the origin of the Vedic-Hindu roots, of the most distant founding lineages, to native sources (Sharma *et alii* 2009). The great controversy surrounding the question of the “Arya Invasion” also passes through these complicated alternatives involving not only historical research, comparative linguistics, prehistory, but, as we can see, the exploration of biogenetic traces in the deepest recesses of the ancestral inheritance. Such drastic alternatives are more concerned with the question of the primacy and authenticity or, to be clearer, the monopoly of the “Hindu” brand, *hindutva*, than of the historical precedence, of the roots. Just think of the cases of some illustrious and powerful Brahmanic descent corporations, now enlarged as great communities, extended and branched, like that of the Chitpavans. This famous cluster of lineages, which was able to influence the history of the country like few others, and to occupy a decisive hegemonic role in political and social life, is proud of its genomic identity, given that it can boast its complex of markers R1a1 ... almost like an archetype of deep Indianness.

Certainly, neither Bamshad nor other authors of ethno-genetic inquiries would accept the reading that we, rather boldly, have proposed. The interest of bio-cellular, genetic-molecular reviews does not go beyond statistical recognitions and diachronic reconstructions of large flows. For the scholars, what is of interest is to investigate the times of coalescence, the phylogenetic networks in which the large population groups are distributed, the migrations. There is no essentialist implication in these programs. The fact remains that around their discoveries, and the hypotheses that derive from it, a complex of currents and passions is stirred up.

### *Yper-biometrics... towards the columns of Hercules*

The research landscape we have briefly mentioned is certainly much more extensive and richer in interest. We must, however, stop the review here, necessarily, because in the space that remains available, we will devote our attention to other areas of study and programs. Programs that are closer to the field of sample databases, almost typological censuses, promoted by Indian institutes and consortia that have produced and recorded relevant collections of biological materials in recent years, including numerous panels of DNA samples that they make available to laboratories and research

centers. The existence of these data repositories gives us the opportunity to look, so to speak, at the borders of the Aadhaar operation, given that, since the initial stages of the UIDAI program, the issue of collecting genetic profiles has been ventilated, and feared, from many parts.

A precise indication in this sense is captured, very explicitly, in the words of Pam Dixon (2017):

Biometric data in The Aadhaar Act is defined as: *'biometric information' means photograph, fingerprint, Iris scan, or such other biological attributes of an individual as may be specified by regulations.* Should the government of India decide in the future to begin linking DNA information to the Aadhaar system under The Aadhaar Act, the language of this definition would allow for it under the phrase *Other bio-logical attributes.* Given the broad access of the government to the Aadhaar database, including for law enforcement purposes, and the ability of the Indian government to link DNA data to the card at a future date, combined with the lack of privacy protections in The Aadhaar Act, it is regrettable that the National Identification Authority of India Bill 2010 – which contained privacy provisions – was quietly withdrawn from Parliament after the passage of The Aadhaar Act, thus making it even more difficult for the Indian government to debate and pass a privacy bill for Aadhaar.

The fear of this militant author, known in the United States for her campaigns in defense of the protection of privacy and against the exploitation of personal biometric data, does not seem unfounded when one looks at the recent positions taken by the judiciary in India, which, in fact, several times wondered about the limits of protection for bio-genetic information and the risk that the various databases, the completed Aadhaar, and the biodata collected from research institutes or medical files, can communicate with each other. More still, if the law that establishes and regulates the collection of biometric data for the Aadhaar card, does not leave an explicit gap open to the acquisition of information on the subjects' DNA<sup>4</sup>.

---

4. However, a decree of the High Court, pronounced in a session in April 2018, by a five-judge constitution bench headed by Chief Justice Dipak Misra, opens an unequivocal legal passage to the acquisition of bio-genetic data ("biological attributes"): "The bench meanwhile has said 'biological attributes' are open-ended and the authorities may expand and include some more biometric features in the Aadhaar scheme in future and asked whether it would not amount to 'excessive delegation of powers' by Parliament. Blood, urine, DNA may be added, but that will be subject to examination by the courts, just like right now the court is examining whether collection of fingerprints and Iris scans are a violation of privacy [...] The power of UIDAI to decide what is 'biological attributes' and the method of collecting it has to meet the test of proportionality, the bench said". See *The New Indian Express*, 4 April 2018, [www.newindianexpress.com/nation/2018/apr/04/possibility-of-aadhaar-getting-more-biometric-features-like-dna-would-give-excessive-power-to-parlia-1797003.html](http://www.newindianexpress.com/nation/2018/apr/04/possibility-of-aadhaar-getting-more-biometric-features-like-dna-would-give-excessive-power-to-parlia-1797003.html), accessed on 17/08/2020.

An exhaustive review of the many databases of a genetic nature, collected today by researchers, or by screening agencies, not to mention the archives of DNA samples controlled by forensic or police institutes, on sub-populations, on location or other parameters, would certainly show a dense patchwork of filing cabinets, inventories, and bio-molecular catalogues. In most cases, the identity of the donors is, or should be, protected by anonymity, but this certainly does not guarantee perfect protection. More important, however, is the fact that the plans on which these researches are developed and the one on which the completed UIDAI repertoire extends are very different and very difficult to communicate. A few references to the more properly scientific methods and programs will help to better define these two different realities.

The IGV (*Indian Genome Variation Consortium*) classifies the populations of the subcontinent, or better, of the country, according to the four usual memberships for linguistic family: Indo-European, Dravidic, Tibeto-Burmese, Austrasiatic. Complementary to the distribution by language, a second system of classification orders the Indian population on the basis of a rough “morphological” typology:

All the four major morphological types – Caucasoid, Mongoloid, Australoid and Negrito, are present in the Indian population (Malhotra 1978). The “Caucasoid” and “Mongoloid” populations are mainly concentrated in the north and northeastern parts of the country. The “Australoids” are mostly confined to the central, western and southern India, while the “Negritos” are restricted to the Andaman Islands (IGVC 2005: 3).

Apparently the typology makes reference to racial criteria that today have very little anthropological value, positing a correspondence to linguistic categories (Caucasoids>>Indo-Europeans; Australoids>>Dravidians...), and geographical loci: Caucasoids in the North and North-west, Australoid-Dravidian in the South and Southeast, Mongoloids in the North-east. The objectives that the project IGVdb (*Genomic Map of India Database*) aims to pursue are mainly of a medical and epidemiological order: to identify a series of polymorphisms and to elaborate a database of amplitude extended to the whole of India, to build haplotype maps based on multi-generational family and parental complexes. With the aim of acquiring the profiles of fifteen thousand individuals, perhaps in the wake of what the international HapMap project launched in the early 2000s, the *Consortium* essentially proposes to trace the genetic profile of the whole nation, extracting from its survey the characteristic genotypes for every single group, caste or ethnicity. A project that, at the time the program was launched, saw the participation of research centers, laboratories and government institutions in every part of the country. A vast platform of records opens to consultation, offered and

still offers the possibility of inserting samples and observing on chromosome maps, allelic variants contained in the database and exploring mutations related to pathological, pharmacological, metabolic, etc. characters.

It is not the only, nor the most challenging of the extensive screening programs that exist in India. We have mentioned in a previous note the program of the Anthropological Survey of India, a government institution of ancient presence and diverse activities throughout the country. Several cultural commitments characterize this complex of research centers: ethnography, paleo-ethnology, statistical studies, event promotion, etc. Its *DNA Polymorphism program in Contemporary Indian Population and Skeletal Remains* represents today, at least in its intentions, another line of exploration in what the specialists call “Molecular anthropology”. The Survey, according to the initial platform of its research project, “begins to develop a resource cell lines and DNA samples to study DNA sequences in contemporary Indian Populations”, to define the “phylogenetic architecture” and the population’s genomic diversity in the lines traced through both the mitochondrial and Y-DNA markers<sup>5</sup>. An ambitious program, which, among other things, was projected onto an extended diachronic distance: the vast osteological collection deposited at the Institute allows the comparison of current DNA samples (acquired in large numbers by living donors, in the form of blood samples) with the most ancient genomic profiles in a sort of time travel through the phylogenetic history of Indian identity. An open and searchable, centralized database would have allowed the scientific community to access India’s most important bio-repository.

The current state of the stock of bio-genetic samples and cellular records dispersed in a myriad of centers and laboratories, not to mention the clinical institutions or archives of forensic medicine, cannot be traced through a banal review of places and agencies. The Icelandic model is perhaps far away, and it cannot be said that it can ever be applied. A complete cataloging model of the entire population, its family genealogies and related genomic profiles, on which important pharmaceutical companies have invested capital and experimental activities (Pálsson 2007). Nonetheless, the potentially available space for the flow of bio-data now open in a country of

---

5. “Currently, Anthropological survey of India has studied 75 communities comprising 7,807 blood samples from different parts of the country under this project”, see *DNA Polymorphism in Contemporary Indian Population and Ancient Skeletal Remains*, *Anthropological Survey of India*, Ministry of Culture, Government of India, <https://ansi.gov.in/dna-polymorphism-in-contemporary-indian-population-and-ancient-skeletal-remains/> (accessed on 17/08/2020).



one billion and two hundred million inhabitants, is so boundless that it certainly cannot escape the market and research actors. Imagining this as a “resource”, as an extraordinary source of biological capital, and of scientific investment is something that is part of the globalized game of competition, health policies, scientific progress. To quote an incisive critical commentary by Yulia Egorova (2013: 298):

As Sunder Rajan has observed, various Indian actors, such as clinical research organisations (CROs), the pharmaceutical industry and various regulatory and educational agents envisage India as a major experimental site in international clinical trials and welcome more and more global clinical trial activity into the country (2010). [...] The story of clinical trials in India is thus much more complicated than that of Western entrepreneurs exploiting Indian populations, and requires analyzing the efforts that the Indian state itself makes to turn the country into a global experimental site. However, as Sunder Rajan has demonstrated, though Indian actors strive to surround clinical research with capacity-building initiatives and ethical safeguards, their efforts fail to mitigate the structural violence that clinical trials involve in Third World contexts, where due to structural inequalities, there are more ‘bioavailable’ (Cohen 2001, 2005) bodies ready to act as experimental subjects (Sunder Rajan 2010).

No one can say today that the Aadhaar program, the latest and most sophisticated expression of the centuries-old history of censuses and classifications that India has known, is predisposed to merge with the scattered networks of biogenetic information. Indeed, both the law and technology applied in the formation of the UIDAI database seem prepared to avert these risks. Nevertheless, the intrinsic strength of the communicative machine, as well as the inexorable logic of the systems of conservation, expansion and control of databases, are not such as to allow themselves to be contained, or to be governed by the ethical management clauses that governments, judges or ethics of the scientists right now want to publicly ensure.

**REFERENCES**

- Dirks, Nicholas B., 2001, *Castes of Mind: Colonialism and the Making of Modern India*, Princeton NJ, Princeton University Press.
- Dixon, Pam, 2017, A Failure to “Do No Harm” – India’s Aadhaar Biometric ID Program and its inability to protect privacy in relation to measures in Europe and the U.S., *Health Technology*, 7, 4: 539-567.
- Egorova, Yulia, 2013, The substance that empowers? DNA in South Asia, *Contemporary South Asia*, 21, 3: 291-303.
- IGVC 2005, The Indian Genome Variation Consortium, The Indian Genome Variation database (IGVdb): a project overview, *Human Genetics*, 118: 1-11.
- Kivisild, Toomas *et alii*, 2003, The Genetic Heritage of the Earliest Settlers Persists Both in Indian Tribal and Caste Populations, *The American Journal of Human Genetics*, 72, 2: 313-332.
- Kumar, Satish *et alii*, 2008, The earliest settlers’ antiquity and evolutionary history of Indian populations: Evidence from M2 mtDNA lineage, *BMC Evolutionary Biology*, 8, 230.
- Moorjani, Priya *et alii*, 2013, Genetic Evidence for Recent Population Mixture in India, *The American Journal of Human Genetics*, 93, 3: 422-438.
- Noy, Itay, 2014, State and society reimagined: India’s novel Unique Identification Scheme as a State hi-tech fantasy, *The South Asianist Journal*, 3, 1: 102-119.
- Pálsson, Gísli, 2007, *Anthropology and the New Genetics*, Cambridge, Cambridge University Press.
- Sharma, Swarkar *et alii*, 2009, The Indian origin of paternal haplogroup R1a1\* substantiates the autochthonous origin of Brahmins and the caste system, *Journal of Human Genetics*, 54, 1: 47-55.
- Trautmann, Thomas, 1997, *Aryans and British India*, Berkeley, University of California Press.

**Pier Giorgio SOLINAS** has taught Cultural Anthropology and Ethnology for many years at the University of Siena, and in several universities abroad. He has carried out ethnographic fieldwork in Italy and India focusing on issues related to kinship, social structures, demography, and cultural identities. Among his recent publications are: *Spazi di alleanza. Aree di matrimonialità nella Toscana meridionale* (with Simonetta Grilli, CISU, 2002), *L'acqua strania. Il declino della parentela nella società complessa* (Angeli, 2004), *La famiglia. Un'antropologia delle relazioni primarie* (Carocci, 2010), *Ancestry. Parentele elettroniche e lignaggi genetici* (Ed.it press, 2015), *Lettere dagli antenati. Famiglie, genti, identità* (Rosenberg & Sellier, 2020) and several journal articles and chapters in books.

[piergiosolinas@gmail.com](mailto:piergiosolinas@gmail.com)

---

This work is licensed under the Creative Commons © Pier Giorgio Solinas

*Beyond the fingerprints: From biometric to genetics*

2020 | ANUAC. VOL. 9, N° 2, DICEMBRE 2020: 121-139.

ISSN: 2239-625X – DOI: 10.7340/anuac2239-625X-3989

