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Remaking Local Biologies in an Epigenetic Time

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By Maurizio Meloni

Premise and Summary

This is a very provisional text,^[1] part of a broader book-length research (forthcoming from Palgrave in 2015) on '**political epistemology**', a construct I use to investigate the coproduction of epistemological facts and socio-political values in the history of the life-sciences (e.g.: how certain views of heredity, development, nature/nurture potentially favor certain political values and conversely, how socio-political contexts/pressures have shaped the epistemic construction of key notions in biology such as the gene, the brain, human nature, and so on).

In the spirit of a (developing) political epistemology analysis, this paper aims to problematize the socio-political implications of a return to a neo-Lamarckian framework and to examine a possible unforeseen aspect of the notion of local biologies in policy/public health discourses as a consequence of the recent rise of epigenetic research. Epigenetics, as is well known, is a burgeoning discipline in molecular biology that investigates changes in gene expression that do not imply alterations of DNA sequences. These changes (for instance, methylation) are often driven by environmental inputs (included social interactions for the human species) and are believed to be in some cases stable enough to be transmitted trans-generationally even in higher organisms, humans included.

Epigenetics can be considered the most advanced example of the new postgenomic and context-dependent view of the gene that is making its way into contemporary biology (Stotz, 2008; Griffiths and Stotz, 2013; Keller, 2012, 2014; Meloni, 2013b; 2014a, b; Meloni & Testa, 2014).

In this piece, I ask whether the social, environmental, and contextual shaping of genetic expression which is implied by epigenetics may give rise, in the wider society, to a public rhetoric that identifies local groups/populations with different epigenetic marks (reflecting for instance their disadvantageous conditions over history) and how these potentially vulnerable/risky sub-populations may become the target of a new (postgenomic) biopolitical intervention.

I ask (rather provocatively, I can see that): 1) whether there are any dark unforeseen implications of epigenetics remaking the notion of local biologies and 2) what emancipatory potential (if any) was implied in the notions of universal human nature and universalistic biology that were elaborated after 1945, and have been progressively destabilized since the 1990s.

The fortunes of local biologies and their epigenetic remaking today

The concept of 'local biologies' has enjoyed a deserved success since it was coined in the early 1990s by [Margaret Lock](#) (1993), as a very healthy antidote to the abstract body of genetics and biomedicine, on one hand, and the disembodied body of social constructionism, on the other. When Lock first wrote about local biologies, the wave of epigenetics studies was still to come and her concept was *a result of anthropological observations, not biological measurement*, of the continuous exchange between the social and the biological in the production and reproduction of bodies in situated socio-cultural contexts (Lock, 2012)[\[2\]](#).

"Recognition of the embodiment of an historicized biology" (Lock, 2001) suggested a more sophisticated conceptual move than the actual realization, which took place only after the 2000s, that biological signatures of socio-environmental exposures can literally leave marks on the genome, acting as a sort of bio-markers of social position and local contexts.

It is far from me to claim that the current explosion of epigenetics studies of social position is a mere actualization, for the molecular age, of the notion of local biologies. I am aware that Lock has expressed skepticism at the reductionist implications of epigenetics (2005, 2013). Nonetheless, as Jörg Niewöhner has pointed out (2011), it seems fair to recognize that researchers in epigenetics are the first ones who see their research as being practiced under some sort of local biology paradigm[\[3\]](#). After all, what they are trying to achieve, as Niewöhner claims, is to explore the hypothesis that "gene expression may be connected in significant ways to local cultural practices" (2011).

The point I am trying to make is that epigenetics asks questions which are in a sense possible only in a genuine local biologies approach and which, when the concept was first coined by Lock in the early 1990s, were rather taboo, or even impossible to imagine. These are questions such as: do manual workers have different gene expression compared to non-manual ones? Do the poor have different patterns of methylation than the rich? Are distinct patterns visible across other differences: The psychologically

traumatized versus the simply melancholic? The Black versus the White?
The obese versus the slim?

For technological and conceptual reasons, all of these questions are now becoming possible to ask and are actually on the rise in the burgeoning field of social epigenetics. Is this a molecular translation of local biologies? Or is this a development to which the notion of local biologies may actually bring a serious critique?[4]

Taking just one example of the recent wave of social epigenetics research, [a study by Dagmara McGuinness and colleagues](#) (2012), addresses the correlation between socio-economic status (SES) and methylation patterns in socio-economically deprived and affluent areas of the Scottish city of Glasgow. McGuinness and her colleagues found aberrant levels of methylation in “the most deprived group of participants, when compared with the least deprived” (2012: 157). Manual workers have also been found to have “24% lower DNA methylation content than non-manual”. What seems to emerge from this study is a sort of new social cartography of the city of Glasgow, one based on (dichotomous) differences in the biology of its members (affluent vs. deprived; manual vs. non-manual workers). Epigenetic marks, in this case methylation patterns, act as a sort of “bio-dosimeter” (ibid., 157) assessing the impact of social adversity (past and present) on lifestyle and disease susceptibility (see for a broader reflection: Landecker and Panofsky, 2013).

To the extent that it is not only present social hardship which social epigenetics associates with aberrant patterns of methylation, but also, it is claimed, the transgenerational inheritance of unfavorable environments (“you are what your grandma ate,” as the new epigenetic slogan says), epigenetics is increasingly identified as the missing mechanism to explain niches of neglect and social hardship within specific populations/areas/social classes. And the city of Glasgow of course was an excellent target for such a preliminary exploration given its quite exceptional level “of health inequality not fully explained by conventional risk factors for disease” (McGuinness *et al.*, 2012).

In other words, what emerges with epigenetic research is that my parents or grandparents didn't only pass on to me a bunch of genes, but also their various misbehaviors (the negative effects of smoking for instance, see Pembrey *et al.*, 2006) or misfortunes. And notice that the distinction between misbehaviors and misfortunes become increasingly blurred in an epigenetic framework (Loi *et al.*, 2013). For instance, they passed on their own exposure to poor nutrition (Heijmans *et al.*, 2008), or, as in the works of [Michael Meaney's group](#) on rats, even the effects of inadequate mothering (see Weaver *et al.*, 2004). Marx's dictum that “the tradition of all dead generations weighs like a nightmare on the brains of the living”

may find a novel epigenetic incarnation in scenarios like the Dutch Hunger Famine or [Marcus Pembrey's studies](#) on transgenerational effects of food availability in North Sweden.

In sum, specific social-environmental experiences become transgenerationally imprinted and embedded in locally defined populations. A certain sort of “inertia” is inscribed and reproduced amongst certain social groups.[\[5\]](#)

How far are we here from the Lamarckian notion of ‘race memory’ that Boasian anthropology fought against? Are we witnessing the beginning of a postgenomic form of classification of ‘kinds of people’ based on novel (non-genetic) biological grounds? What if the emphasis is mostly placed on the perpetuation of harmful environments from generation after generation in specific groups?

To sum up once again: epigenetics, along with related discoveries in molecular biology, may certainly contribute to “undermin[ing] the notion of biology as a universal standard against which human difference may be adequately accounted for” (Lock & Nguyen, 2010: 109). In promoting a view of the “embedded body” (Niewöhner, 2011), epigenetics can be considered an ally (with due anthropological corrections) of the local biologies construct.

However, these findings may also be taken up and circulated in the broader society in a way which differs fundamentally from the original notion of local biologies. Evidence for the existence of social groups with different biological signatures may have more unpredictable effects than merely critiquing the persistent belief in the “universal applicability of biomedical knowledge and technologies” (Lock & Nguyen, 2010: 361). It is the same idea of a universal human biology/human nature that might be challenged by this return to the idea of some sort of Lamarckian inheritance and transgenerational transmission of “local exposures”. And, it has to be remembered, this idea of a universal human biology/human nature was developed after 1945 for well-defined political reasons.

Why a notion of universal human nature was constructed after 1945

After the trauma of eugenics and Nazism at the end of WWII, biological explanations in the social arena were totally discredited. In the period immediately after 1945, public writings by evolutionists on the social implications of biology tended to be rather moderate (or self-restrained): the place of culture and society had to be entirely recognized, no invasion of fields was possible, boundaries between biology and human behaviours

were respected (see Dobzhansky & Montagu, 1947: “man has escaped from the bondage of the physical and the biological”).

Biological speculations on the “inequality of men” (Haldane, 1932), which had been rather common even amongst leftist biologists before 1945, were now increasingly silenced. It is not difficult to see why biology in human affairs had such a bad name after 1945 and why biology was used in such a cautious way in public affairs immediately after WWII. In the aftermath of the Nazi catastrophe (Nazism is ‘applied biology’ was after all a very sad *leitmotiv* of the German regime), the complicity of American as well as European eugenicists, not only in sterilization policies in their own countries, but also in building the Nazi’s murderous program, were evident and scandalous. The explosive effects of biology in the public arena were to be neutralized and its bad name cleaned.

The efforts of people like Ashley Montagu in writing the [UNESCO statement on race](#) (published as *The Race Question* in 1950) were to deflate and de-emphasize the role of biology in defining race. *The Race Question* emphasizes the universality and the “likeness” of human beings as much more important than their supposed differences. Confucius’ dictum that “Men’s nature are alike; it is their habits that carry them far apart” is quoted in point 9. Biological studies are said in the statement to “lend support to the ethic of universal brotherhood” (UNESCO, 1950, 14).

There were only two possible ways of making sense of post-1945 biology in public affairs. 1) One was to deny that biology had anything to do with human affairs in any specific way. This was the road taken by culturalism, which remained mainstream until the 1970s. 2) The second was to claim that biology had much to do with human affairs, but in the same measure for everyone and everywhere, black-boxing any local differences.

After the emergence of sociobiology in 1975 the latter approach was taken by evolutionary psychologists and the proponents of many varieties of universal nativism (ranging from Steven Pinker to Marc Hauser) which gained ascendancy in the 1980s and 1990s in studies of language or morality. These studies argued that *there is a universal human nature hardwired in our biology or our brain* that constrains the limits of its (superficial) cultural variation (see for a critique, Meloni, 2013a).

Many discoveries contributed to this universalistic trend, although it is impossible to tell the whole history here. These range from paleoanthropology (the “Out of Africa” theory), to Crick’s dogma of molecular biology (1958) which undermined any possible influence of the environment on genetic information, reinforcing that “encapsulation” of the genetic material (Gottlieb, 2000) already anticipated in August Weismann’s separation of the germline from the soma.

Emphasizing strongly that biology is about a *universal human nature* shared by all human beings which has remained unchanged since the Pleistocene (as later evolutionary psychologists would claim) was the best insurance policy against the possible resurgence of dangerous ideas in biology. As Tim Ingold writes: “the appeal to an essentialist [and universalist] concept of human nature” was the only way to reconcile evolution with “the new-found commitment to universal human rights” (2006).

I can see the paradox in my claim that sociobiology and evolutionary psychologists partly played a role on the egalitarian side of post-1945 biology. Politics and epistemology are often in a complex relationship, which is never a one-to-one connection. For instance, if one looks at a broader historical context, the associations between Lamarckism and racism are evident (Stocking, 1968; Bowler, 1983), while the links between classic gene-centrism/Neo-Darwinism and egalitarianism are less rare than one might think.

In this sense, the case of Soviet eugenics and the writings of now forgotten Soviet geneticist Yuri Filipchenko are very telling (Graham, 1978). Filipchenko attacked Lamarckism in the name of the Soviet Revolution claiming that if Lamarckism not Mendelism was true “all socially or physically deprived groups, races, and classes of people—such as the proletariat and peasantry and the nonwhite races—*would have inherited the debilitating effects of having lived for centuries under deprived conditions*. Far from promising rapid social reform, the inheritance of acquired characteristics would mean that *the upper classes are not only socially and economically advantaged, but genetically privileged as well, a result of centuries of living in a beneficial environment*” (Graham, 1978, my italics).

As we know, this argument was to be dramatically defeated in the Lysenkoist USSR. Nonetheless, to the extent that epigenetics is a sort of return to Lamarckian research, Filipchenko’s argument might deserve a second look in our postgenomic age.

Remaking social classes in the postgenomic era

Social historians like [Michael Katz](#) have recently warned that we must pay attention to the present resurgence of biological definitions of the poor (2013) fearing a return to a biologically-based class racism. As Katz claims, “in the late eighteenth and early nineteenth centuries, a harsh new idea of poverty and poor people as different and inferior” took place, what he calls “[The Biological Inferiority of the Undeserving Poor](#)”, part of a

broader process that made the poor a separate and dangerous kind.

It is too early to say if epigenetic studies of different methylation patterns between poorest and richest areas will be used to offer a revival to such ideas, as Katz himself and many other in social policy fear, and as Filipchenko thought in the 1930s. However, fracturing the universal view of human nature into potentially differentiated sub-groups of risky and vulnerable populations identifiable by different epigenetic biomarkers, because of their persisting exposure to bad environments, may open a Pandora's box whose political consequences (such as new stigmas associated with race and class) will not necessarily be in the hands of scientists.

This box was thought to have been firmly closed decades ago by biology (with hard-heredity) and anthropology by severing any *equivocal* link between biological and socio-cultural processes, (Kroeber 1917, see Stocking 1968). But the new epigenetic configuration will be again a moment of *equi-vocity*, where the different voices of biological and socio-cultural disciplines will become more and more indistinguishable (as in the Latin root of *aequivocus*). This undoubtedly presents new challenges for the social sciences. In hindsight, the challenges posed by the notion of local biologies may look like just the beginning of a more profound paradigm-change.

[Maurizio Meloni](#) is a social theorist working on the history and political implications of the life-sciences, neuroscience and epigenetics in particular. He has published in journals such as *Frontiers in Human Neuroscience*, *Sociology, Economy and Society*, *The Sociological Review*, *Subjectivity*, *Telos*, *History of the Human Sciences*, *BioSocieties*, in the edited volume [Neurocultures](#) (2011) and in a collection on neuroscience and political theory (Routledge, 2012). He is currently preparing a book on biology and social theory in a postgenomic age. After two consecutive Marie Curie Fellowships at the University of Nottingham, he is now affiliated (as Honorary Senior Lecturer) with the College of Social Sciences and International Studies (Egenis), University of Exeter, UK. For 2014-2015 he is a Member of the Institute for Advanced Study (School of Social Science), Princeton, USA, where he has been awarded a fellowship for his research on sociology and epigenetics. Please send correspondence to: m.meloni@exeter.ac.uk

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[1] This is a slightly revised version of a text presented at the workshop “Embodied Being, Envrioning World: Local Biologies and Local Ecologies in Global Health”, organized by Alex Nading, Vinh-Kim Nguyen, and Nathanaël Cretin and supported by the *Chair in Anthropology and Global Health* in the *Collège d'études mondiales* and the *Fondation Maison des sciences de l'homme*, Paris, France on June 5 and 6, 2014. The text has been mostly left as originally presented, and therefore reflects an oral style of presentation, with no ambition of peer-reviewed accuracy. Thanks to Des Fitzgerald for kindly commenting on a first iteration of this text.

[2] As Lock (2012) writes: “my conclusion after several years of fieldwork, that biological difference *must* be implicated in the menopausal transition, was inferred from a robust statistical study fully complemented by intense qualitative research, based on symptom reporting of middle-aged women. The idea of local biologies was the result of intense, informant-centered research about subjectively experienced bodily happenings. It was not possible for me to measure biological difference, nor did I seriously entertain the idea, although this has since been carried out”.

[3] As Niewöhner claims: “the researchers in Szyf’s lab have been the first group of molecular biologists that I have encountered who appreciated the point of the notion of local biology. Trying to incorporate ‘social life’ into molecular analyses makes immediately plausible that even something seemingly hard-wired such as gene expression may be connected in significant ways to local cultural practices”.

[4] A further intermediate point between (environmental) epigenetics and local biologies is introduced by Niewöhner with his idea of a “customary biology, that is, a biology that is based on custom understood as time-honored, habituated forms of living everyday life situated in a specific environment.... a biology based on patterns of practice and regularities rather than ‘natural’ laws” (2011)

[5] The anthropologist [Chris Kuzawa](#) (2005) often uses the notion of “[intergenerational phenotypic inertia](#)” in his brilliant epigenetic/developmentalist studies on health inequalities, and while he means something more specific, there is clearly a nexus between an epigenetic paradigm and certain ideas about the persistence and continuous movement of past experiences.

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