

## HeLa. Reconstructing an Immortal Bio

**Sara Casati, Stefano Crabu, Marialuisa Lavitrano, and Mauro Turrini**

**Abstract** Henrietta Lacks died of cervical cancer in 1951 at 31, but a cell line from her tissues is still alive and reproducing for scientific purposes. Her dramatic biography and her fundamental (although unwitting) contribution to the development of scientific knowledge went unnoticed until Rebecca Skloot's "The immortal life of Henrietta Lacks" [New York, Random House, 2010, 384 pp.] was published. The political, scientific, social and technological entanglement of Henrietta's account by Skloot is an original and vivid science narrative of clear relevance for Science and Technology Studies. Stemming from Henrietta's story and Skloot's book, Stefano Crabu, Mauro Turrini, Marialuisa Lavitrano and Sara Casati reflect and discuss on the relation between society and medical research, its ethical dilemmas, as well as on the way technoscientific processes can be accounted for.

**Keywords:** immortal cells; research ethics; medical science; bio-objects; science narratives.

## HeLa Cells: a Biomedicine Keystone and its Ethical Dilemmas

**Marialuisa Lavitrano and Sara Casati**

Scientists know her as HeLa but she was Henrietta Lacks. Mother of 5 children from a poor Afro-American family, she was 31 years old, when she discovered she had a malignant epidermoid carcinoma of the cervix (cervical cancer) from which she died some months later. During her radiation treatments, two samples of her cervix were removed — a healthy part and a cancerous part — without her consent, so that she never knew that her cells became a cell line that would be widely used in science. Then, as now, there was no requirement to inform a patient, or their relatives, about such matters because discarded material, or material obtained during surgery, diagnosis, or therapy, was the property of the physician and/or medical institution (currently this requires ethical approval and patient consent, at least in Italy).

The cells from Henrietta Lacks cervix were processed by a researcher, George Gey, who discovered that they were something extraordinary: they were different, they could be kept alive and grow. Before this, cells cultured from other cells would only survive for a few days. The cells from Henrietta's tumour reproduced an entire generation every 24 hours and never stopped. HeLa cells have an highly altered genetic asset, characterized by supernumerary and/or modified chromosomes (they have got a chromosome number of 82, with four copies of chromosome 12 and three copies of chromosomes 6, 8 and 17): this asset makes unique HeLa cells. These were the first human "immortal" cells ever grown in a laboratory: they do not die after a few cell divisions; they could be propagated indefinitely *in vitro*; they can divide an unlimited number of times in a laboratory cell culture plate as long as fundamental cell survival conditions are met; they were not subjected to senescence; they could be frozen and thawed and used in various ways. The infection with human papilloma virus 18 had modified an enzyme: this enzyme elongated the telomeres after chromosomes are copied, so the cells could multiply continuously. These cells would become the HeLa immortal cell line, a commonly used cell line in biomedical research. They proved to be an invaluable resource for scientific research.

George Gey distributed them to other scientists across the world to experiment. Gey freely donated both the cells and the tools and processes his lab developed to any scientist requesting them, simply for the benefit of science. By 1954, the HeLa strain of cells was being used by Jonas Salk to develop a polio vaccine. To test Salk's new vaccine, the cells were quickly put into mass production in the first-ever cell production factory. Demand for the HeLa cells, at this point, quickly grew. HeLa cells were sent to many scientists to perform research into cancer, AIDS, the effects of radiation and toxic substances. They also went up in the first space missions to see what would happen to cells in zero gravity. At the origin of the first cloning experiments and vitro-fertilization, the cells have furthered our understanding of cancer, HIV and cell physiopathology in general, and are still extensively used to grow viruses and to test anti-tumour medicines. For instance Tamoxifen, one of the first anticancer drugs, was based on them. The cells were later commercialized. It has been estimated that the total number of HeLa cells that have been propagated in cell culture far exceeds the total number of cells that were in Henrietta Lacks' body. Scientists have grown some 20 tons of her cells and at present more than 74.000 scientific papers have been published and there are almost 11.000 patents involving HeLa cells.

Until a few years ago no one knew the history of Henrietta; Rebecca Skloot investigated and told it to us. Before, the Lacks family never understood how the cells would be used and that was not explained to them. This led to a lot of anxiety and strain on the family: Henrietta's son were subjected to long observations and analysis from scientists

They were exposed to unwanted intrusion and attention, they were under the eyes of all without knowing it and without being able to choose.

Behind a human cells line there is an individual with his/her story, with his/her family and the future generations: the process of naming cell lines has changed

since the 1950s to prevent people finding out who cells come from. Today, cell lines are anonymized so they can't be traced back to a named person. But the Lacks' family were harmed by the use of their mother's tissue for research and much is made about the fact that neither Henrietta Lacks or her family was asked for permission to use her tissue in research.

Lack of informed, explicit consent and confidentiality can generate important consequences on people involved and Lacks' story shows that in no circumstance it might be ethically admissible to use residual tissue (collected for other clinical purposes) in research without asking permission: it makes more vulnerable individuals at stake, it would harm them. This is due to the nature of the samples, and their "relational" nature as we said before. This starts up a second set of bioethical and public policy questions, and not just about the kind of consent required (from patient, from family, from both?).

The big question is: do the tissues belong to someone? And related: to whom do the financial benefits generated from research belong?

The Lacks family were unable to afford healthcare in the USA. Henrietta Lacks, as she was African American, had to travel miles to a segregated hospital to be treated. And racial discrimination and the resulting partial access to care deserve a separate discussion.

George Gey did not profit from the cells when he sent them to other scientists. Yet, some pharmaceutical businesses cultured HeLa cells and have profited by their manufacture and continue to make lots of money. At the same time, Lacks family has remained profoundly poor.

Many researchers, institutions, and companies have benefited from the HeLa cells, but the family did not receive anything in return for their "donation". This was and continues to be the norm in research in the USA (a precedent set in case law by Moore *versus* Regents of University of California that research subjects do not have property interests in their body parts and are not owed any compensation). This model has influenced also the European perspective.

We could have a society in which people freely "donate" their tissue to research without expectation of compensation because of an understanding that the treatments and cures that result will benefit us all. We can share that we are together in the development of science and committed to the common good. But it is also clear to us that for it to work, it needs to be fair. We should imagine circumstances where benefit sharing might be an obligation and compensation goes back to collectivity at least: we need an open conversation on this.

*Post scriptum: one of the things we do not want people to take from the story of HeLa cells is the idea that tissue sampling and cell culture are bad. So much of medicine today depends on this. Instead of saying we do not want that to happen, we just need to look at how it can happen in a way that everyone is confident with.*

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## **Immortal Cells and a Dead Woman. On attempting to bridge the gap between medical sciences and society**

**Mauro Turrini**

Rebekka Skloot's *The Immortal Life of Henrietta Lacks* is much more than a well-documented and captivating reconstruction of one of the most prominent achievements of the 20th century life sciences: the creation of the first immortal human cell line ever grown outside of an organism. The attempt to cross the enormous gap between the two main (human and "non-human") actors of this scientific event makes this a poignant work for the STS audience.

The scientific saga begins with a cervical cancer biopsy, whose cells proliferated with "a mythological intensity" in the artificial environment created in the laboratory. But this story has also another protagonist, Henrietta Lacks, a cancer patient who died eight months after some doctors snipped a piece of tissue from her cervix in the Johns Hopkins hospital ward for "coloured" people, without her knowledge or consent. The official storyline tells the remarkable success of this clinic in establishing a human immortal cell line *in vitro*, whose role in the life sciences of the 20th century cannot be overemphasized. The other less known storyline introduces us to a vivacious 31 years-old Afro-American woman, who left a tobacco farm to move to a poor area on the outskirts of Baltimore, where she lived with her five children. On the one hand, a living technology known, bought, sold and shipped to labs all around the world. On the other, the sudden, precocious death of a woman who, due to the suspect of being a victim of sorcery, did not receive a proper burial rite and was forgotten by her true relatives.

Skloot tries to unveil the human costs hidden in this story. This leads the reader to discover unexpected ramifications of science in social arenas, such as those of economically disadvantaged African-American communities. The relevance of political questions, such as racism and human tissue ownership, is one of the driving forces of this gripping non-fiction science narrative. Undoubtedly, Skloot succeeds in raising important questions for a larger public audience. However, her story has many pitfalls, regarding both her relationship with the victims whom she intends to reward, and the ways in which the debated questions are framed. She intends to compensate for the systematic misconduct of science, but her attempt to bridge or at least reduce the enormous gulf between medical research and society is lacking.

1. There is no available information about Henrietta Lacks, apart from one black and white picture, which usually appears in biology textbook captioned just with her name (which is sometimes the wrong one). As a college student in

biology, Skloot perceives this puzzling empty space in the story of such an important medical achievement. Once become a science journalist, this indifference leads her to an indefatigable ten-years quest for the hidden story of “the woman in the photograph”. Since Henrietta Lacks did not leave many traces behind, Skloot decides to turn to her husband and descendants. In a brilliant example of extra-academic, creative use of ethnography, Skloot gains the trust of this family and, particularly, of Deborah, Henrietta’s daughter. Along with her, Skloot identifies the social environment where Henrietta Lacks and her family had lived growing up. The reader is brought through a weird and fascinating journey made up of ex-slaves, semi-abandoned villages of tobacco farmers in Virginia, poor industrial African American neighbourhoods, old asylums for black people, and top class hospitals and laboratories. Deborah’s and the Lacks’ memories, opinions and beliefs are used to provide an evocative perspective through which one can reconsider biomedicine and scientific research.

From the Lacks’ point of view, the HeLa story is presented as a scientific and medical crime. At its core lies the social, economic and cultural distance between medical researchers and patients and their relatives, who in this case have been persistently and deliberately kept away from this story. In this regard, it is very interesting to note that George Gey – considered “the father” of HeLa (in the traditional version of this story) – did plot to keep the identity of the donor as secret. When the cells met with success, he decided not only to release an invented name to the press, Helen Lane, but also demanded that his colleagues and collaborators use the fake. Only after his death was permission given to his assistant to release Henrietta’s real name, but she never did. Neither of them had economic interests in the HeLa cells, since they had never been patented. However, they actively wanted to keep the family away from them. The Lacks became acquainted with HeLa twenty years after Henrietta’s death, due to the initiative of a young reporter in search of a scoop. Some years later, Johns Hopkins laboratory researchers contacted the Lacks, but not to provide information about their relative. They wanted blood samples of Henrietta Lacks’ children. In that period the contamination of hundreds of HeLa cell lines around the world was discovered, and so a more detailed genetic characterization of the HeLa cells was required to determine exactly which cells were contaminated. During this operation, the Lacks family was provided with no information regarding Henrietta Lacks, HeLa cells or the purpose of the tests they were doing. Moreover, the Lacks’ genetic profiles were later published in scientific journals without any consent.

Skloot does intend not only to criticize the deliberate strategy of Johns Hopkins to breach any bound of fairness and even respect. She also tries to provide relief for the recurrent violations and persistent exploitation that the troubled family had undergone for half a century. In the final chapters of the book, the two different stories of HeLa and the Lacks seem to merge together. Thanks to Skloot’s dedication, Deborah and her brother Zakaryia are invited by a prominent biologist to visit the HeLa cells in the Johns Hopkins laboratory. They saw “their mother’s cells” at work, and were given a suggestive picture of them as a compensatory gift,

which they preserve with care and pride. This episode is an emotionally intense passage. At the same time, it evokes a pacification and a new understanding between Johns Hopkins and the Lacks which could be metaphorically expanded to the relationship between biomedicine and society. However, some of the political indications it offers are at best ambiguous.

2. Even if the Lacks are at the core of the narrative, the politics implied by scientific practice makes this book much more than a portrait of the emotional ordeals of the Lacks family. I think that both the richness and the limits of this book can be found in the ways in which these issues are approached. The relevance of racism is contextualized as a general issue of U.S. medical research in the decades after the World War II. Until fifty years ago many American hospitals did not accept African Americans, and others, such as Johns Hopkins, did so only in special wards for “coloured”. In the same period, there were several cases of exploitation of black people as experimental subjects, including cruel clinical experimentation whose meaninglessness recalled Nazi experiments on Jews.

Another means used to articulate the issue of racism is the parallel between Henrietta and her family. Their opinions, beliefs and practices in daily life offer a unique perspective on American biomedicine that Skloot describes vividly with all of their contradictions. For example, Skloot recalls a recurrent tale in black oral history that she overhears in a family conversation, which tells of black people kidnapped by “night doctors” for research. Another racial familiar episode that the Lacks experienced regards the asylum where Henrietta Lacks’ eldest daughter lived and died, called tellingly “the hospital for the negro insane”. The author also decides to visit this ex-clinic (currently abandoned) along with Deborah.

The evocative conflation of Henrietta Lacks and her family history leads Skloot not only to denounce the systematic racism in biomedicine, but also to discover an authentic, intimate description of Henrietta Lacks. The HeLa cells story is presented not only as a scientific crime, but also as the personification/animation of Henrietta Lacks. HeLa cells are considered as an inestimable, although involuntary, gift to science, which confers Henrietta Lacks immortality. In an attempt at authenticity, Skloot is particularly concerned with the Lacks’ deviations – sex abuse, drug, prison, illness, and eating disorders. Unfortunately, relating these dysfunctions to Henrietta Lacks’ exploitation, Skloot loses tracks of Henrietta and her relatives as full human beings. At one and the same time, the personification of the cells as an immortal entity has obscured Henrietta Lacks, as Landecker (2000) points out, as well as, we can add, her family. If the characters within the family are not fabricated, they are surely “made up” (Littlefield and Pollock 2011), in that they are entirely functional to Skloot’s narrative framework.

Even if in the course of the book the author describes well the contradictory and multifaceted feelings, emotions and judgements of the Lacks, at the end and at the beginning she mentions these opinions which completely agree and support her journalistic, scientific mission. In a fine example of bad ethnography, in the final words of the book, the voice of Sonny, one of Henrietta’s children, is literary ventriloquized.

“I don’t want to cause problems for science”, Sonny told me as the book went to press. “Dale wouldn’t want that. And besides, I’m proud of my mother and what she done for science. I just hope Hopkins and some of the other folks who benefited off her cells will do something to honour her and make right with the family” (Skloot 2010, 328).

Finally, Skloot’s personal perseverance, which led her heroically through the poor, uneducated and even threatening black side of America, has been finally rewarded. She is able to bring conclusion to her initial goal: to redeem the racial violence of medical research, by honouring Henrietta Lacks and making right with the family. Publicizing an “otherwise-hidden-and-lost” story of racism seems to work as a way to make the family understand the scientific importance of their mother, and to withdraw their aversion to medical science and especially to Johns Hopkins. However, in its concern to hail the benefits of science (and scientific journalism), the book turns out to contribute to Henrietta Lacks’ and her family’s invisibility and, so, to dismiss the contemporary relevance of racism. It is striking, for example, that Skloot does not mention those Americans who earn a life by volunteering as an experimental subject moving from clinic to clinic. Moreover, racism is now become a globalized phenomenon in medical research. The outsourcing of services to off-shore locations regards also clinical trials, which are used by developing countries such as India as a major avenue to become a global player in medical biotechnologies (Sunder Rajan 2006).

3. The second issue raised by Skloot deals with the economic dimension of Henrietta Lacks’ unwitting donation. Skloot presents the situation as an ironic contradiction between the scientific and economic relevance of both Johns Hopkins and the HeLa cells, and a family living poverty. As Deborah Lacks-Pullum (quoted in Skloot 2010, 9) puts it:

I always have thought it was strange, if our mother cells done so much for medicine, how come her family can’t afford to see no doctors? Don’t make sense. People got rich off my mother without us even known about them taking [sic] her cells, now we don’t get a dime.

As opposed to how she deals with racism, which she discards as a rather obsolete problem, Skloot frames tissue ownership and patentability as a growing contemporary issue, where human tissues have become the raw material in the expanding industry of medical biotechnologies. In particular, she uses the *Afterword* to explain why the issue of property and patentability of human tissue does not regard uniquely the Lacks family, but has become an urgent, general question within the fast-pace development of biotechnologies. In the course of the book, she also describes the landmark case of John Moore, a patient with leukaemia whose cancer was developed into a cell line that was patented and commercialized. John Moore took legal action against the Medical Centre where he was treated, but the Supreme Court of California rejected any claim of extending any propriety rights on human tissue for the fear of hampering medical research. Commenting on this sentence, Skloot underlines that the expropriation of human tissue is not just about scientific and medical progress, but also interests the profits of private companies. Pharmaceutical and biotech firms regularly

patent, buy, and sell cell lines as well as other human bodily parts. Tissue collections, once treated as special waste, are nowadays an extremely profitable source in biomedical industry and research. Thus, Skloot recognizes the contradiction implied in the two opposing economic regimes that govern the exchange of human bodily parts either as gifts or as commodities. However, her emotional, sensationalistic approach to the HeLa ends up narrowing her perspective based on the (improbable) claim of economic rewards for Henrietta Lacks' descendants. Actually, as shown clearly by Catherine Waldby and Robert Mitchell (2006), in contemporary ownership the double movement of public expropriation and private appropriation of human tissue (organs, blood, cells, and even DNA fragments) is continually subject to the regulation of biomedical research and health service. The extension of patentability to engineered human tissue has to be understood as part and parcel of a more general extension of intellectual property rights to an ever-increasing number of objects, including human tissue.

We do not intend here to defend the sentence against John Moore, but rather to reconsider this unwitting donation as part of a more general interchange between medicine and society. It seems to me more interesting to understand the relentless request for patients' bodily parts as health-related information as a new form of labour, a "clinical labour" (e.g. Turrini 2011), which is as necessary for the bio-economy as workers' activities are for the manufacturing industry. Insisting on economic compensation for the Lacks' family seems to me a rather blind perspective, especially after John Moore's case. It is not by accident that the character who originally endorsed it, was a fake lawyer who dogged the Lacks family for several years and who is harshly criticized as a recidivist cheater. Skloot herself does not seem to really believe that the Lacks should be economically rewarded by Johns Hopkins. In general, her criticism works well as a literary strategy that highlights the ironic parallel between biomedical grand achievements and socially disadvantaged people. However, it does not respond adequately to the political issues indicated at the start of the book.

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## **We are so crafty: we make bio(s) immortal! Or the emergence of an STS Novel.**

**Stefano Crabu**

*Doctors took her cells without asking. Those cells never died. They launched a medical revolution and a multimillion-dollar industry. More than twenty years later, her children found out. Their lives would never be the same* (The Immortal Life of Henrietta Lacks, by Rebecca Skloot).

*Luisa is a junior researcher. She works as a contract employee for an Italian public institute, which is leader in the research and treatment of neoplasia. Together with three colleagues, Luisa is setting up a new laboratory of molecular biology. Luisa's glowing face bursts into the room that houses the experimental bio-analytical activities. She turns to Gina, who is a laboratory technician well respected by the colleagues: "We have got our line immortalized: the flasks are full and the little cells look indeed beautiful to me. Do I put away a part of HeLa to test the carbon nanotubes?". Gina smiles, she nods a "yes" and puts back into the fridge her DNA samples* (Author's fieldnotes).

Nothing seems more uprooted from the technoscientific repertoire than the concept of immortality, which is often considered a characteristic *topos* of the mythological and romantic fictions and it is usually evoked and related to diabolic pacts (i.e. Dorian Gray and Devil) and divination activities (i.e. the meeting between Ulysses and Circe). This *topos*, which uses either the grammars of superstition, of alchemy, or of paganism and religion, is able to confer an endless vital feature to biological substances and bodies that would be exposed to the time, contamination, disease and death. However, immortality was not only narrated. In fact, alchemy – whose proto-scientific experimental grammar founded modern Chemistry – has been cultivating without success the project of materialization of immortality. According to some legend, the Philosopher's Stone has been considered along the ages to have the property to revive eternal youth to body's erosion (Tenney, 1934). Therefore, it should be noted that these grammars do not properly fit with what Ludwik Fleck has defined as scientific practice of "thought-style" (Fleck, 1979).

However, in 1951 something relevant happened: science, and in particular biomedicine and life sciences, began to address the concept of immortality, or better to say of "immortalization". As Rebecca Skloot – who is specialized in the field of science narrative writing – reported in her novel *The Immortal Life of Henrietta Lacks* (2010), what really happened during the 1950's was certainly not a pact with the devil. It was, rather, a successful innovation that even today, as it emerges from the opening fieldnotes, still affects the life of thousand of laboratories in a remarkable way; for instance, inside a cutting edge research

centres which clinically experiments the most innovative possibilities offered by biotechnologies for treating neoplastic pathologies. The emblematic story, which is narrated in Rebecca Skloot's novel, belongs to the not so distant 1951, when in the United States of America the racial segregation and the Ku Klux Klan had a significant impact on the political and the social arenas. During those post war years, the Rockefeller Foundation lavished massive financial investments in the dawning molecular biology, which supported the American research program from 1932 to 1959 with 25 million dollars.

Rebecca Skloot's novel is focused on Mrs. Henrietta Lacks, a poor Afro-American farmer who worked in the tobacco fields like her enslaved ancestors and then died at the Johns Hopkins Hospital of Baltimore, in Maryland, because of an aggressive cervical cancer. The Johns Hopkins Hospital, which was founded in 1889 as a charity hospital for the caring of indigent people, was ranked one of the best hospitals in the United States of America. This prestigious institution was located just a few kilometres from Henrietta's house; besides, it was the only institute within a hundred kilometres radius that accepted Afro-American patients.

At that time it was not common to speak openly about cancer, even if fifteen thousands American women died every year because of the same disease that tormented Henrietta. For many years biomedical scientists had been trying to test samples of malignant cells in order to monitor their growth *in vitro*, that is outside the human body, with the aim to give a valuable contribution to the research on the oncogenesis and cancer treatment. In carrying out this task, they attempted to discover a procedure which allowed the human cells to become immortal, to continuously reproduce themselves and never die. George Gey, director of the cell culture laboratory at the Johns Hopkins Hospital – who loved to define himself as “the world's most famous vulture, feeding on human specimens almost constantly” (Lacks, p. 46) – had been trying to grow some cells thirty years, but all of his attempts systematically failed.

Just before Henrietta died, a doctor named Richard Wesley TeLinde – who in 1951 was involved in a heated controversy regarding the treatments of uterine tumours at the Hopkins Centre – took, without any authorization, a sample of tumorous tissue from her uterine cervix in order to give it to George Gey's wife; then, that sample was put on culture inside a Petri capsule containing some chicken blood. This praxis became routine and it was repeated several times either without success or the donor's consensus. One day an extraordinary event occurred, Henrietta Lacks' cells began to multiply, showing an unprecedented resistance to contaminations; these outcomes not only demonstrated that Henrietta's tumorous tissue could become immortal, but also contributed to transform and innovate the procedures through which the biosciences have been conducting clinical experimentations and researches.

Thanks to research work which lasted 10 years, Rebecca Skloot has reconstructed the genealogy of the first and most important immortal human cells, namely “HeLa”, which are the initial letters of Henrietta Lack's first name and surname. Surprisingly, the author of this novel is not a STS scholar, as currently intended in the academic world. Arguably she might be described as a “STS

spontaneous scholar” for the way in which she was able to restore the linkages between the cultural, social and technoscientific dimensions which have allowed HeLa to become a fundamental technological infrastructure within the biotechnological field. The HeLa cells, due to the centrality in biomedical laboratory experiments, have acquired the features of a situated technology. In fact, the HeLa cell line represents a relational infrastructure that supports the work of biologists, clinicians and researchers. Such an infrastructure is the "biotechnological background" and "pathological model" par *excellence* in which cancer research is articulated even today, structuring the experimental activities of bioresearches and enclosing laboratory routines (Star, 1999).

It is worth noting that HeLa cells represent one of the main progresses of biomedicine, such as the detection of the polio vaccine, the definition of the new chemotherapy regimens, the cloning and the mapping of the human genome, the *in vitro* fertilization as well as the venturing into outer space to study behaviour of human cells in the absence of gravity. Those same “immortal” cells have travelled from 1951 to the XXI century crossing laboratories and research centres throughout the continents, as well as the most recent convergence with nanotechnologies, which are considered the last frontier in the fight against cancer.

Skloot’s book is a complex “novel” where the author – mirroring the fashion in which Michel Foucault described the history of insanity in the age of reason (Foucault, 1961) – never uses the concept of “immortalized cancer cell lines” as a category of intelligibility. This is a style of investigation that eschews the banal historical reductionism, which consists in studying social phenomena with universal categories that are often taken for granted, and not put in question in their historical process.

In this way, Rebecca Skloot has observed the biographies, the life stories and the biotechnological objects (medical records, biopsies, cells, test tube, chemical reagents, etc.) in order to track a common technoscientific subtext, which is tagged as HeLa only at the end of a long stabilization process. Thus, it emerges a precise theoretical and methodological statement – peculiar to Foucault’s genealogical approach (Foucault, 2004) – which consists in assuming that there are no universal categories taken for granted (the disease, oncologist, patients with cancer, cells, DNA, etc.), which the traditional sociological analysis, like the historical one, usually adopts to account the processes of technological innovation. On the contrary, in the text historical sources and data are examined to identify whether these, in their process and historical convergence, return something that might be definable as "immortal human cells". In other words, the genealogy of situated practices is preferred as a lens to interpret the process of biotechnology innovation, instead of using universal categories such as grids of intelligibility required to deduce some concrete phenomena.

Rebecca Skloot's text works both on the analytical or the narrative level, and these two dimensions which apparently seem to be distant surprisingly here are masterly interwoven. In fact, the plot manages to link together two different biographical levels: on the one hand, there is Henrietta Lacks’ biography, and on the other, one can find closely interwoven the biography of a biological object,

which is characterized by an ineffable epistemological statute. The final result emerges from an implosion of nature/culture (Haraway, 1997), as a sort of “cyborgbiography” of the first immortal human cells. This biography, where the biological element is constantly compared and entangled with the technological object, is constructed through a symmetrical and relational narrative style that goes beyond technicalities and focuses also on social dimensions. Therefore, this type of biotech object, named HeLa, may be interpreted and imagined as an invisible infrastructure that interweaves sociotechnical connections, and at the same time it is able to involve human actors and technological objects as well. In this sense, Rebecca Skloot seems to have assumed in her rhetoric the theoretical challenges set by biotechnologies and elected as fieldworks by the Science and Technology Studies.

The author, in little less than a four hundred page novel, tells us about her “vagrancy” across mental asylums, hospitals, clinical case histories, biopsies, research laboratories and Nobel prizes, swindlers, criminals and small shops, salesclerks. This type of research reminds us of what in the literature has been defined as multi-sited ethnography (Marcus, 1995) or, in more evocative terms, “vagrant ethnography” (Bruni, 2008); a vagrancy of ten years that has permitted the author to collect more than one thousand hours of conversation in order to provide an account which can make the “global and the cellular” communicate (Franklin and Lock, 2003). It should be noted that Skloot's study intersects the dimensions of gender, class and race. She deeply analyses the ways in which some white clinicians of the John Hopkins Centre dispossessed the body of a poor black woman, without informing her family – who discovered the fact after twenty-five years of experimentations on Henrietta's cells – and without asking for any kind of authorization. Therefore, one could argue that this dispossession of a portion of human tissue has been incredibly profitable in the production of biocapital from which where Henrietta's family has been excluded.

The perspective which is used by the author – without succumbing to the rhetorical expedient of the inventor hero that characterizes the popular narrative about science and technology – confers rigour and profundity to the narrative structure; moreover, the author masterly put together the alignment processes and the relational ecology that characterize a particularly ‘technoscientific story’. Skloot's novel pays great attention to the definition of those asymmetrical powers that the North American culture and society harboured during the 1950's. The text reports an unusual story of a successful innovation by tracking the genealogical features and knots of the networks which have brought stabilization to a new biological object named HeLa.

The author has chosen a rhetoric that might be comparable to what Latour defines as ‘infra-language’ (Latour, 2005). In this specific case, it is a description – using typical “coloured” words of the Afro-American vocabulary – which makes connections between knots and actors, and allows the reader to place him/herself within the processes and the activities of the construction of the network – that is from the cellular to the global.

Skloot, by tracing the connections ranging from the cellular to the global, draws

a multiform biopolitical geography where the reader can explore the mutual reshaping between human subjectivity, institutional arrangements and processes by which individuals and technologies assemble each other in technologically dense environments. The emerging outcome is a thick description of the connections and the development of an unknown phenomenon (immortalization of human bios) which in the STS debate is also defined as an "emergent form of life". According to Fischer, this concept identifies the cultural and symbolic morphology assumed by the social representations of life *tout court* (1999, 2003). In the end, the reader can grasp: firstly the interrelations between the different places where knowledge is produced; secondly the ethical and moral controversies; and finally the appropriation and valorisation mechanisms which, through specific political and cultural dynamics, have brought to the surface emergent forms of life.

Rebecca Skloot's study explores and analyses the technoscientific social worlds with a vivid and smart narrative that I would define as *STS Novel*. This dramatically styled narrative is able to overturn the rigid canon that characterizes the scientific academic production and to stimulate new perspectives in social research in order to investigate the technoscientific social dimensions. This genre of writing could represent a style of inquiry that tacitly complies with multi-sited ethnography and defines a technoscientific history which is able to reflect all levels of the social, cultural and political theory. The main challenges and perspectives that an *STS Novel* offers are: firstly, the methodological implications, namely the need to adopt multi-local technique as a way to access the various strategic places of production and sharing of scientific knowledge; secondly, the possibility of using a mode of polyphonic representation of social phenomena, which restores the agency to all social actors and technologies involved within an ecology of relationships for mapping the situatedness of knowledge; finally, the chance to construct a multi-audience text which keeps rigor and precision, without dissolving in technological determinism, or reductionism, the complexity of the social investigation of technoscience.

Arguably, this was certainly not the intention of the author. However, as usual, all the artefacts, books included, are constantly subjected to continuous processes of translation during their life time and circulation. What happens is a form of situated reconstruction and recontextualization through which the entities, ideas and artefacts acquire meaning through the relations with other entities, whether human or not. It is certainly true that the ideas which are contained in an abandoned book on one shelf cannot circulate. It is equally possible that a book that goes hand in hand acquires new energy and new meanings in virtue of the fact that social actors will change and adapt it to their research or intellectual project.

To summarize, an *STS Novel* is a narrative multi-audience artefact, which stimulates the reflexivity and deconstruction of technoscientific representations. Such a narrative artefact allows us to acknowledge a multiplicity of conflicting discursive reconstructions of social phenomena entering into a stream of representations. For this reason, it is important and desirable to juxtapose and integrate different genres of writing, thinking and working with historians, novelists, literary critics, science journalists, scientists in order to produce polyphonic texts which are able to inve-

stigate the implosion of nature/culture from which technoscientific contexts emerge.

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