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## Biobanks and the reconfiguration of the living

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## EDITORIAL

### **Biobanks and the reconfiguration of the living**

While previous discussions of biobanks have addressed standardization and innovations, law and ethics, governance, donation, citizenship, race, data and economy (Cromer 2017; Ehrich, Williams, and Farsides 2010; Eriksson and Webster 2008, 2015; Franklin 2006; Meskus 2018), this special issue explores the role of biobanks in the reconfigurations of the living, as they constitute a central place in the manufacture of biological resources. Certainly, the role of biobanks as biomedical platforms playing a central role in contemporary medicine had already been highlighted by Keating and Cambrosio (2003). But understanding them as spaces where both a work of shaping and socializing living beings is carried out is an original research perspective. Our introduction aims to show its heuristic, which is not limited to human biobanks.

#### **Biological resources in the making**

Pioneering research in the field of oncology has shown the interest of an ethnography of living banking activities (Milanovic 2008, 2018a). A research carried out on tumor banks established that cancer tumors are not stable realities, defined once and for all according to fixed and essential characteristics: they are always evolving, formatted by sociotechnical processes that make them shift from the status of living entities – linked to the bodies of the people from which they come from – to “things” or “bio-objects” (Webster 2012), partially reproducible (derivatives) or available in limited quantity (oligo-resource). A tumor can be broken into multiple entities, each of them with differentiated capabilities of action. The legal framework helps participate to this process: the link maintained between the patient and his tumor gives him rights over it – a right of withdrawal- while a severed link paves the way to a legacy potential transferability. In short, the actions of linking and severing a link depend on a legal regime – which governs people-, or another – which governs things-, some authors asking for the constitution of a third – related to “human things”; all these regimes are related to other practices (commerciality, appropriation, etc.) (Bioy 2018).

It is thus relevant to scrutinize the various steps that punctuate biobanking process to highlight how biological resources, before being a material base for biomedical actions, constitute an output of an activity of extraction and conservation

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(Milanovic 2011). These activities, articulated within a sociotechnical chain, transform the tumor: from the tumor to the sample, which is later split into further samples and subsequently turned into derivatives (Milanovic 2018a). During this process, associative or connectionist properties are given to tumors. Through this sociotechnical chain of mediations samples are transformed into biological resources: in other words biological resources are *made*.

From these first results, we consider that investigations on biobanking should develop interdisciplinary approaches and articulate the different poles of a material – and epistemological – triangle which encompasses vital processes, technical processes and construction of social institutions. From this standpoint, it is interesting to underline the convergence of F. Milanovic’s approach – influenced by French researchers in STS (Callon, Latour) – with the comparative project of Anthropology of Life – developing in the wake of Descola’s Anthropology of Nature-, carried by P. Pitrou and with N. Merleau-Ponty’s research on reproductive medicine and stem cells – in relation with Strathern, Franklin and Thompson works. It is from this epistemic space we have suggested to tackle the issue of biobanking in an international Conference organized in 2016<sup>1</sup> and now in this special issue.

The multiplicity of orders of fact on which one could investigate on human relations with the living and the associated “theories of life” (Pitrou 2017a) justify the participation of the social sciences to an *interdisciplinary* reflection on life, in particular to provide the insights of anthropological comparative method. Since 2012, an international network of researchers has been building up around the Laboratoire d’Anthropologie Sociale of the Collège de France to address this problem and elaborate a methodological basis for a project of “Anthropology of Life”, which aims at developing a model able to describe the variations, in space and time, in the conceptions of life. The comparison is established through the analysis of technical activities developed by human societies to interact with living beings. Indeed, within the category of biotechnology, we can study either ancient practices, such as plant grafts – “archaic biotechnologies”, according to F. Dagognet (1988) to the most contemporary biotechnologies. Investigation on biotechnologies of traditional societies in the Andes, Amazonia, Mesoamerica and Oceania (Angé and Pitrou 2016; Coupaye 2013; Coupaye and Pitrou 2018; Pitrou, Neurath, and del Carmen Valverde 2011) have shown that it is fruitful to study the various modalities of the interweaving of vital and technical processes (Pitrou, Coupaye, and Provost 2016), by identifying the participation of human and non-human agents in fields such as agriculture, livestock, medicine or child care. Beyond the description of these hybrid practices, the challenge is to highlight the connections between living techniques and social organizations, whether the latter take the form of institutions of power or systems of rules and values – in the fields of economics, morality, law or aesthetics.

In doing so, bridges were built with the STS domain. Indeed, the study of conceptions of life in genetics (Pálsson 2007), biology (Helmreich 2009), biomedicine (Franklin and Lock 2003), cell culture (Landecker 2007), assisted reproduction

(Franklin 1997) have largely demonstrated the ability of techniques to assemble heterogeneous elements and to combine in multiple ways the living beings and the materials and processes that compose them (Mol 2002; Pálsson 2009; Thompson 2005). In this case too, it is not only the power of techniques to transform living things that matters, but the fact that these interventions are part of socio-technical chains (Merleau-Ponty 2018; Milanovic 2018a) along which the living entities – or their fragments- and the social institutions within which they transit or develop, are modified. In the framework of the Reproductive Research Group leads by Sarah Franklin at Cambridge University, the work of Merleau-Ponty (2016, 2017) on stem cells and reproductive medicine offers interesting case studies, in France and India, to follow this kind of dynamics. It is therefore essential to connect investigations on (local) biotechnologies with other on (translocal) level of organization, to examine biopolitics configurations (Radin and Kowal 2017) or “biosocialities” (Rabinow 2010). More broadly, we should take into account the link between these biotechnologies and systems of rules and values. This may include the legal environment or moral rules that govern intervention on organisms (Knoppers et al. 2013), for instance in transplantation (Lock 2002) or aesthetic values attributed to action on living organisms (Kac 2007). The close link between the development of new technologies and the emergence of biocapital (Helmreich 2008; Rajan 2006) invites to scrutinize the economic value associated with biomaterials and the techniques used to intervene on living organisms (Waldby and Mitchell 2006).

In the same way, the papers of our special issue highlight that human biological resources are *fabricated* through the interweaving of a technical processes and not « natural » at all. As the etymology of the word resource – re-source, *re-surgerer* in Latin; to appear again- suggests it, a process is require to allow re-use of elements extracted from the human body. Such an approach to biological resources enables us to understand their socializing transformation: how are they built and turned into a state that enables humans to use them as they become part of the collective? Socializing living, out-of-body, fragmented organisms or plant entities, is not just a procedure which complies with technical or legal/ethical standards to authorize their circulation and their use in various environments. It is also a process of shaping them according this goal. Living beings become hybrid entities, during a process which interweave biological, technical and social dynamics (Helmreich 2015; Vermeulen, Tamminen, and Webster 2012). Within this framework, we wish to explore the socialization of living beings through the current specificity of activities within conservation banks. Bank conservation implies the extraction of elements from a body or a plant; but, afterwards, what kind of link does exist between those elements and their origin? How do samples become resources to act upon?

As the social can be seen as an attachment process between human and non-human entities (Latour 2005) we can ask what happen when this dynamic involves living organisms, fragmented (Rose 2007) into various parts destined to circulate within different environments (for example clinical, academical, industrial...)

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and designed to achieve a variety of objectives (for example medical, scientific, economic ...). From this standpoint collections exist only in relation with their environments as collections are built and can be mobilized by the infrastructures that manage them, the arrangements of which they are the object, the activities of which they are the support, the spaces where they circulate, the markets where they are exchanged.

#### **Biobanking, in a broader sense**

It is from these general problematics, at the point of distinct theoretical traditions, that we propose to explain how biobanks participate in a reconfiguration of the living. With the contributions of anthropologists and sociologists working in different cultural contexts we wish to study this reconfiguration from a twofold perspective, which are strongly connected. On the one hand, we wonder how technical intervention on living organisms (human, plant, animal) produces material transformations of some of their fragments that are collected, preserved and used in the production process. On the other hand, what is at stake is the emergence of new systems of relations and new institutions that rule the circulation of these new entities from one body to others. We consider, then, biobank as they are anchored in a sociotechnical process which reconfigures the materiality of living beings or vital processes, in new corporal and geographical spaces and tend to change the social relations and the status of human and non-human agents connected by this process.

The term “biobank” is used according to a definition that is not restricted to a definition stemming from national and international regulations. As a starting point we use the definition of Milanovic, Pontille, and Cambon-Thomsen (2007, 3). They write:

there is no consensus on terminology in regard to these resources, which are designated by diverse terms: collections, biological resource centres, biological databases, biorepositories, biobanks, to name only a few. “Biobank” will be the term used throughout this paper for such organized collections. (...) A biobank can be generically defined as a group of biological samples that may consist of any tissue or fluid containing nucleated cells (solid tissues, blood, saliva, etc.) that are associated with computerized files generally including the origin of the donors, clinical data and biological data.

From this broad definition, our analysis is not restricted to elements coming from the human body as biobanks refer to the conservation of a diversified set of living beings (animal, vegetal, micro-organisms), more or less domesticated and cultivated species. The utilization of these biological resources depends on biobanks, which allow biological elements to be produced, stored, circulated and socialized in various ways (Milanovic 2018b). The complexity and heterogeneity of biobanking activities cannot be reduced to storing (Milanovic and Pontille, 2007). Indeed, we approach biobanks as spaces – whether centralized or dispersed – that “work

on” the living by performing a number of operations: classifying, storing, circulating, making available, etc.

The sociotechnical inquiries presented in the articles follow in details how fragments of living beings are extracted, collected, stored, classified and made available, before being eventually reinserted into new living beings and vital processes in order to expose the ways in which biobanks produce distinctive forms of life (Pitrou 2017b). This special issue “Biobanks and the reconfiguration of the living” aims to shed light on the biotechnological manufacturing of the living in biobanks and the ways living is socialized. We proceed in two phases. A first series of articles concern more specifically the distribution of elements of the human body: biobanks circulate by redefining the value of what is circulated (Kim 2018), detach biological entities from their original bodies and attach them to other subjects (Bärnreuther 2018), circulate cell lines (Mperleau-Ponty, Vertommen, and Pucéat 2018). A second part presents texts which focus on the uses: in these cases, what is at stake is what embryos are made to do (Cromer 2018), how to archive biomaterials in order to make them participate to a museal endeavor (Van Allen 2018) and how to distribute the agency between humans and non-humans in forestry practices (Milanovic and Lefèvre 2018).

### **Biobank and the spatial distribution**

This special issue demonstrates the interest of studying temporal and geographical dynamic. Corporeal borders are dissolved and remade through normative negotiations of the relations between people, legal frameworks and medical staff. Financial investments and biotechnical innovations are associated with futuristic visions nourished by long-term genealogies of evaluating life, may it be blood in Japan, patriarchal lineage in North India, science and religion in the USA, or national reproduction in France and Israel. These normative dynamics create ambivalences that biobanks, these ensembles of infrastructures and actors, rework by storing.

Since 1990, blood donation is valued as the expression of solidarity in Red Cross campaigns in contemporary Japan. Jieun Kim paper, “The Specter of ‘Bad Blood’ in Japanese Blood Banks”, offers an historical perspective and a meticulous study of media reports, published accounts and policy papers, which complicates a positive narrative of solidarity celebration. Indeed, many controversies surround the use of blood banks in Japan. Tracing their manifestations and historical genealogies, Jieun Kim demonstrates which political forces, social hierarchies and economic forces accompanied the making of contemporary blood biobanking practices. Beyond the Red Cross depiction of donation as fun and altruistic, the persistent “fear of ‘sold blood’ (*baikestu*)” points at “the indelible mark left by commercial blood procurement in Japanese history.” This “mark” indicates the particular reconfigurations of “social boundaries, bodies, and substances in the growing bioeconomy”. Indeed, before 1990, “a series of public health scandals reified commercially procured blood as an inherently problematic substance for their

origins in stigmatized bodies”. With great historical depth, and acute details, Jieun Kim delineates how sold blood was originally bought and extracted from daily laborers living in marginalized districts (*Yoseba*) inhabited by ethnic minorities. Their blood had been associated with impurity and pollution, by contrast to “the pure Japanese blood”, which was endowed with proper capacities to make lineages and reproduce the imperial nation. However, the “capital vampiric appetite for laborers” transformed this tainted blood into a “surplus vitality” for national health insurance and needy recipients. A series of scandals in the 1960s brought “national shame”, as commercial blood banks spread hepatitis. “Sold blood” suddenly became “bad blood”, and participated to the ever-growing segregation of *Yoseba* districts where laborers did not benefit from health coverages. Fusing biology and morality, blood donation programs campaigned on the extraction and circulation of “good quality blood”.

Noémie Merleau-Ponty, Sigrid Vertommen and Michel Pucéat, two social scientists and a life scientist, also offer an account of the circulation and reconfiguration of living substances through biobanking practices. “I6 Passages: On the Reproduction of a Human Embryonic Stem Cell Line from Israel to France” delineates how the first clinical trial in regenerative medicine using human embryonic stem cells in France, was launched in 2014 using cells extracted from an embryo conceived in an Israeli fertility clinic. The derivation and international exchanges of the I6 stem cell line entailed the use of biobanks through which cells were “passaged”. These passages connected laboratories, institutions and countries that co-produced a global tool for basic science. When the research project started in 2005, no biobank or human embryonic stem cells were present in France. A protective legal framework rooted in bioethical debates define embryos as reproductive substances that need protection from their scientific objectification and commercial uses. This prevented the making of stem cell lines at this time. In the early 2000 Israeli scientific institutions had derived cell lines from supernumerary embryos conceived in fertility clinics. “The abundant presence of supernumerary IVF embryos and their availability for research purposes as well as the production and storage of the I6 line” is strongly connected to “Israel reproductive embryonic interface”. In this interface, the idiom of the scientific frontier plays a major role as well as bioethical leniency and academic entrepreneurialism. When the Israel Number 6 (I6) line was imported to France, the cells were connected to a French version of science and reproduction, managing the ways and terms under which biobank practices were regulated. The emerging medical practices of regenerative medicine are intimately connected to reproduction. “Even when scientific materials such as embryonic stem cells are disentangled from personal reproductive histories, they are still tied up to reproduction at a national level.”

Sandra Bärnreuther’s ethnography of Mr Singh’s larger sperm bank in North India, as well as an extensive research in other medical institutions, offers an account of the daily clinical life in biobanks connected to in vitro fertilization hospitals in New Delhi. We delve into the world of assisted reproduction and third

party donation (embryos, eggs and semen, with a stronger focus on semen). In “Suitable Substances: How Biobanks (Re)Store Biologicals”, we learn how fertility clinics enact “relational work” of “suitable substances” for family making projects. Never merely repositories of cells, these biobanks do and undo kinship links. “By cutting connections while simultaneously facilitating others, biobanks enable the restoration of reproductive substances”. By questioning why such reconfigurations are needed, Sandra Bärnreuther offers a precise account of the values associated with semen, eggs and patriarchal lineages in North India. Substances being semiotic and socially coded, when assisted reproduction is sought out, “suitable” substances must be made. Biobanks are stratified in the bioeconomy as “premium donor” repositories promise reproductive substances of the “elite”, which are unaffordable to lower-income households. Outside of these premium biomedical facilities, “biobanks facilitate the transgression of social boundaries and the establishment of relations that could hardly be achieved in daily life”. Various activities of biobanks work to prevent such transgressions and anonymization is one significant tool to relate while disconnect, along with, spatial and temporal seclusion, bureaucratic procedures, laboratory protocols or clinical rhetoric that “gametes don’t have any caste or religion”. All these tools are part of the relational work that is precisely described and analyzed in this article.

### **Biobanks and the uses of their products**

In addition with papers which address the issue of geographical and corporeal space, other focus on the several uses that can be made of biobanks products.

Risa Cromer’s contribution focuses on embryonic cryopreservation in the United States. Between 2008 and 2013, she investigated the Sunflower Adoption Agency, a Christian embryo adoption agency, and the REDEEM biobank, which promotes the use of frozen embryos known as “supernumeraries” to develop stem cell research. Freezing techniques have been stable since the mid-1980s and there are now about five hundred million so-called “supernumerary” and cryopreserved embryos. Through her ethnographic research within a Christian embryo adoption program and an embryo biobank she “examines the motivations and practices involved in transforming leftover IVF embryos from a remaindered to a repurposed state”. With the notion of “saving”, she investigates the interweaving of “moral discourses, economic logics, and biomedical issues” which “conspire in shaping futures as well as modes of care in the present”.

In this special issue, many cases illustrate the various uses and purposes of medical biobanks. However, the question of the conservation-management of the living beings is not only an issue in this domain: it is also an issue for other activities involving living organisms. The following two articles address the worlds of genomics and trees in relation to biodiversity.

Drawing on a fieldwork carried out at the Smithsonian National Museum of Natural History between 2014–2016, Adrian Van Allen examines the integration

of biotechnology into museums, exploring how life is being “archived” and for what imagined futures. In “Pinning Beetles, Biobanking Futures: Practices of Archiving Life in a Time of Extinction”, the “collection” of biological samples or artifacts is made in a context in which it is never a simple accumulation of objects: it is based on a continuous assembly of people, places, technologies, materials and interests. The fact that conservation is involved in a classification scheme implies that fragments and samples acquire a new status. In addition to spaces dedicated to medical research or natural reserves that conserve plant and animal entities, museums are therefore other key places where the link between vital and technical processes is reshaped. These places are all the more interesting because, in addition to utilitarian criteria, they attest that humans use aesthetic criteria to order the diversity of living beings. Traditionally, this issue was raised from the dividing line between a natural history museum and a museum of human cultures, which distinguished a living being from an artifact. Nowadays, by integrating the scale of the genome, it is at the very heart of the objects preserved in the museum, depending on whether or not they contain elements from living beings, that a distinction can be made. “Engaging the practices of making and organizing genomic collections”, Adrian Van Allen examines a “specimen’s ontological instability as it is created and circulated”. With a hybrid techniques, low tech and high tech – she leans to pin beetles in order to take genetic samples and extract DNA-, she questions the principle of classification that should be applied in a museum: instead of the life *form*, should we consider that the *materiality* of organism should serve as a voucher specimen.

In their paper, Fabien Milanovic and François Lefèvre, respectively sociologist and geneticist, study the worlds of tree genomics. These ones hardly ever come into visibility in the social science literature, usually eclipsed or preempted by attention to more market-linked agricultural research or the most frequently studied biomedical research areas where various biobanking arrangements figure prominently (as one of the anonymous reviewer told us). Milanovic and Lefèvre also show how, in forestry, biobanks manage collections according to a diversity of purposes: developing knowledge, enhancing resources adapted to a given environment (domestication and selection), preserving the scalability of resources that must cope with changes in their environment. Inserted in a questioning on the articulation of static (*ex situ* biobanks) and dynamic (*in situ* management) living organisms management systems, genetic resources must be conserved in a plurality of states to take into account their diversity. Drawing on a fieldwork investigation in France, they argue

that there is a consistent heterogeneity of entities and practices, which reflects the distribution of the agency conferred to the involved entities. This heterogeneity is related to the awareness of uncertainties, which change the relative importance of the different modes of agency in biobanking.

Their paper studies the diversity of modes of agency from ex situ to in situ conservation dispositifs, arguing that this distribution of agency (between humans and non-humans, between biotic entities and their environment), is part of an *agency policy* that they propose to bring into light.

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1. This publication project emerged from a conference panel addressing biobanks as spaces of life's reconfiguration at the conference "Biobanks and the Reconfiguration of the Living" held at the School for Advanced Studies in the Social Sciences (EHESS), in Paris (France), on May 2016 for an extended presentation, see (Milanovic, Merleau-Ponty, and Pitrou 2017).

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### **Références**

- Angé, Olivia, and Perig Pitrou. 2016. "Miniatures in Mesoamerica and the Andes: Theories of Life, Values, and Relatedness" *Journal of Anthropological Research* 72 (4): 408–415.
- Bärnreuther, Sandra. 2018. "Suitable Substances: How Biobanks (Re)Store Biologicals." *New Genetics and Society*. doi:10.1080/14636778.2018.1546572.
- Bioy, Xavier, ed. 2018. *Public Regulation of Tumor Banks. Establishment, Heritage Status, Development and Sharing of Human Biological Samples*. London: Springer.
- Coupaye, Ludovic. 2013. *Growing Artefacts, Displaying Relationships: Yams, Art and Technology Amongst the Nyamikum Abelam of Papua New Guinea*. New-York: Berghahn.
- Coupaye, Ludovic, and Perig Pitrou. 2018. "Introduction. The Interweaving of Vital and Technical Processes in Oceania." *Oceania* 88 (1): 2–12. doi:10.1002/ocea.5178.
- Cromer, Risa. 2017. "Waiting. The Redemption of Frozen Embryos Through Embryo Adoption and Stem Cell Research in the United States." In *The Anthropology of the Fetus: Biology, Culture, and Society*, edited by Sallie Han, Tracy K. Betsinger, and Amy B. Scott, 171–199. New York: Berghahn Books.
- Cromer, Risa. 2018. "Saving Embryos in Stem Cell Science and Embryo Adoption." *New Genetics and Society*. doi:10.1080/14636778.2018.1546574.

- Dagognet, François. 1988. *La maîtrise du vivant*. Paris: Hachette.
- Ehrich, Kathryn, Clare Williams, and Bobbie Farsides. 2010. "Fresh or Frozen? Classifying 'Spare' Embryos for Donation to Human Embryonic Stem Cell Research." *Social Science & Medicine* 71 (12): 2204–2211.
- Eriksson, Lena, and Andrew Webster. 2008. "Standardizing the Unknown: Practicable Pluripotency as Doable Futures." *Science as Culture* 17 (1): 57–69.
- Eriksson, Lena, and Andrew Webster. 2015. "Standardizing Work as a Recursive Process: Shaping the Embryonic Stem Cell Field." *New Genetics and Society* 34 (1): 72–88.
- Franklin, Sarah. 1997. *Embodied Progress: A Cultural Account of Assisted Conception*. London: Routledge.
- Franklin, Sarah. 2006. "Embryonic Economies: The Double Reproductive Value of Stem Cells." *Bio-Societies* 1 (1): 71–90.
- Franklin, Sarah, and Margaret M. Lock. 2003. *Remaking Life & Death : Toward an Anthropology of the Biosciences*. 1st ed. *School of American Research advanced seminar series*. Santa Fe: School of American Research Press; James Currey.
- Helmreich, Stefan. 2008. "Species of Biocapital." *Science as Culture* 17 (4): 463–478.
- Helmreich, Stefan. 2009. *Alien Ocean: Anthropological Voyages in Microbial Seas*. Berkeley, LA: University of California Press.
- Helmreich, Stefan. 2015. *Sounding the Limits of Life. Essays in the Anthropology of Biology and Beyond*. Princeton, NJ: Princeton University Press.
- Kac, Eduardo, ed. 2007. *Signs of Life: Bioart and Beyond, Leonardo*. Cambridge, MA: MIT Press.
- Keating, Peter, and Alberto Cambrosio. 2003. *Biomedical Platforms: Realigning the Normal and the Pathological in Late-Twentieth-Century Medicine, Inside Technology*. Cambridge, MA: MIT Press.
- Kim, Jieun. 2018. "The Specter of "Bad Blood" in Japanese Blood Banks." *New Genetics and Society*. doi:10.1080/14636778.2018.1546575.
- Knoppers, Bartha, Rex L. Chisholm, Jane Kaye, David Cox, Adrian Thorogood, Paul Burton, Anthony J. Brookes, et al. 2013. "A P3G Generic Access Agreement for Population Genomic Studies." *Nature Biotechnology* 31 (5): 384–385.
- Landecker, Hannah. 2007. *Culturing Life*. Cambridge, MA: Harvard University Press.
- Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory, Clarendon Lectures in Management Studies*. Oxford: Oxford University Press.
- Lock, Margaret M. 2002. *Twice Dead: Organ Transplants and the Reinvention of Death, California Series in Public Anthropology*. Berkeley: University of California Press.
- Merleau-Ponty, Noémie. 2016. "Sexualité et conception assistée en Inde et en France." *Journal des Anthropologues* 144–145 (1): 101–122.
- Merleau-Ponty, Noémie. 2017. "Féconder in vitro dans des laboratoires en Inde et en France. Une somatotechnique?" *Ethnologie française* 167 (3): 509–518.
- Merleau-Ponty, Noémie. 2018. "Sélectionner des embryons humains. Une relation opératoire au sein de laboratoires de biologie de la reproduction en Inde et en France." *L'Homme* 225 (1): 101–124.
- Meskus, Mianna. 2018. *Craft in Biomedical Research*. New-York, NY: Palgrave MacMillan.
- Milanovic, Fabien. 2008. *La socialisation des tumeurs cancéreuses. Une enquête sociologique des tumorothèques françaises* Rapport de recherche, Inserm U558, Toulouse (France), research funded by INCa.
- Milanovic, Fabien. 2011. "Biological Resources." Introduction to the special issue. *Revue D'anthropologie des Connaissances* 5 (2): a–q.
- Milanovic, Fabien. 2018a. "Socializing Tumors. From the Conservation of Tumors in Banks to Their Ontological Variations." In *Public Regulation of Tumor Banks. Establishment, Heritage Status, Development and Sharing of Human Biological Samples*, edited by Xavier Bioy, 73–84. London: Springer.

- Milanovic, Fabien. 2018b. "Socialiser le vivant tumoral. Episode 2 : Des modes d'existence des collections d'échantillons biologiques." In *La régulation publique des centres de ressources biologiques. Le cas des tumorothèques*, edited by Xavier Bioy, 117–130. Bordeaux: LEH édition.
- Milanovic, Fabien, and François Lefèvre. 2018. "Biobanking in Forestry Practices: Towards an Agency Policy?" *New Genetics and Society*. doi:10.1080/14636778.2018.1548270.
- Milanovic, Fabien and David Pontille. 2007. "Quand les règles ne suffisent pas: heurs et malheurs du travail réglementaire." *Sciences Sociales et Santé* 25 (3): 71–78.
- Milanovic, Fabien, Noémie Merleau-Ponty, and Perig Pitrou. 2017. *Biobanques: quelles reconfigurations pour le vivant? Approches interdisciplinaires*. *Natures Sciences Sociétés* 25 (3): 268–275.
- Milanovic, Fabien, David Pontille, and Anne Cambon-Thomsen. 2007. "Biobanking and Data Sharing: a Plurality of Exchange Regimes." *Genomics, Society and Policy* 3 (1): 17.
- Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice, Science and Cultural Theory*. Durham: Duke University Press.
- Merleau-Ponty, Noémie, Sigrid Vertommen, and Michel Pucéat. 2018. "16 Passages: On the Reproduction of a Human Embryonic Stem Cell Line from Israel to France." *New Genetics and Society*. doi:10.1080/14636778.2018.1548269.
- Pálsson, Gísli. 2007. *Anthropology and the New Genetics*. Cambridge: Cambridge University Press.
- Pálsson, Gísli. 2009. "Biosocial Relations of Production." *Comparative Studies in Society and History* 51 (02): 288–313.
- Pitrou, Perig. 2017a. "Life as a Making." *Natureculture* no. 4: 1–37.
- Pitrou, Perig. 2017b. "Life Form and Form of Life Within an Agentive Configuration: A Birth Ritual among the Mixe of Oaxaca, Mexico." *Current Anthropology* 58 (7): 360–380.
- Pitrou, Perig, Ludovic Coupaye, and Fabien Provost, eds. 2016. *Des êtres vivants et des artefacts. L'imbrication des processus vitaux et des processus techniques*. Paris: Les actes de colloque du musée du quai Branly. <https://actesbranly.revues.org/647>.
- Pitrou, Perig, Johannes Neurath, and María del Carmen Valverde, eds. 2011. *La noción de vida en Mesoamérica*. Mexico: CEMCA, IIFL, UNAM.
- Rabinow, Paul. 2010. "L'artifice et les Lumières : de la sociobiologie à la biosocialité." *Politix* 90 (2): 31–46.
- Radin, Joanna, and Emma Kowal. 2017. *Cryopolitics: Frozen Life in a Melting World*. Cambridge, MA: MIT Press.
- Rajan, Kaushik Sunder. 2006. *Biocapital: The Constitution of Postgenomic Life*. Durham: Duke University Press.
- Rose, Nikolas. 2007. *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century*. Princeton: Princeton University Press.
- Thompson, Charis. 2005. *Making Parents: The Ontological Choreography of Reproductive Technologies, Inside Technology*. Cambridge, MA: MIT Press.
- Van Allen, Adrian. 2018. "Pinning Beetles, Biobanking Futures: Practices of Archiving Life in a Time of Extinction." *New Genetics and Society*. doi:10.1080/14636778.2018.1546573.
- Vermeulen, Niki, Sakari Tamminen, and Andrew Webster. 2012. *Bio-Objects: Life in the 21st Century*. Farnham: Ashgate Publishing.
- Waldby, Catherine, and Robert Mitchell. 2006. *Tissue Economies: Blood, Organs, and Cell Lines in Late Capitalism*. Durham: Duke University Press.
- Webster, Andrew. 2012. "Bio-Objects: Exploring the Boundaries of Life." In *BioObjects: Life in the 21st Century*, edited by Niki Vermeulen, Sakari Tamminen, and Andrew Webster, 1–10. Farnham: Ashgate.