

Chapter 13

The Nanoengineering of Desire

Luciana Parisi

Affective Relationality

It is difficult not to feel a strange familiarity when hearing about genetically modified food, cloned mammals, and artificially grown cells and tissues. In this biotechnological age, the evolution of the human species is bypassing sexual exchange and the threat of the death drive.¹ Yet, biotechnology seems to be caught in the middle of a positive paradox: the more it guarantees control of the reproduction of life the more it challenges its biological forms and functions. The more it promises the absolute regeneration of *bios*, the more it exposes the autonomy of the inorganic from the organism.

Biotech amplifies the uncertainties about the body-sex and sexual difference at the core of evolutionary dynamics. Darwin himself suggested that sexuality is not always compatible with the reproduction of the species and that sex's variations are dependent on environmental pressures (1993/1859, 117–20; 319–74). Nevertheless, sexual reproduction and sexual difference have continued to maintain a certain identity in biotechnologies. It has been argued that the biotech's apparatus of power – from IVF treatments to medical discourses – acts to reinforce the biological determinants of gender. Biotech's techniques of fertilisation, such as ectogenesis, indeed seem to accelerate the desexualisation of difference and the disembodiment of the maternal.

Yet, we may need to ask: is a body-sex the mirror of discourses? Is sex the end-product of ideological structures? Is sexuality determined by sex? And if the body, sex and sexuality were instead primarily thought of in terms of movements, affects, percepts, ecologies of desire? How would we explain the impact that biotech realises on the body-sex and sexual difference? In other words, how can we account for the way biotech contributes to changing the perception of sexual difference below the level of the discursive, in the imperceptible layers of affective relations? These seem to be crucial questions

1 On the history of biotech, see Aldridge (1996); Rabinow (1996); Thacker (2000). On the end of the death-drive, see Baudrillard (1993, 120–25); Parisi (2004, 159–62).

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to ask if we want to detract sexuality from ontologies of essence and structures, identity and signification.

In the field of science studies, there have been considerable attempts to disentangle sexuality from ontologies of essence. In particular, the notion of type at the core of the Aristotelian metaphysics of nature has been questioned by scholars of evolution suggesting that the body-sex changes over time according to environmental conditions. This crucial mobilisation of natural science against the metaphysics of fixed essences has opened notions of sexuality and sexual difference up to a new spatio-temporality of the body-sex now embedded in evolutionary contingencies.² Yet, the reattachment of sexual difference to nature has also served as a scientific source to redetermine the essence of sex, the normalities and the abnormalities of sexuality, a new system of perfect correspondence between sex and gender, the natural and the cultural, the biological and the sociological.

Many feminists in science studies have crucially shown that such a system of correspondence is based on an ideological reification of nature as the ultimate source of truth of human culture. Much work has then been devoted to detaching gender from sex, to exposing the material-semiotic constructions of sex, sexual difference and queer sexuality, and to reformulating the autonomy of gender from its biological source. The works of feminists, such as Judith Butler, have marked a novel approach to sexuality as *performance*, with an emphasis on doing and undoing gender rather than biologically being of this or that gender. In brief, to avoid the trap of naïve essentialism, the biologism of sexuality, a critical tendency towards the emphasis of (semiotic) techniques of gender performance has acquired a central voice in modes of conceptualising sexual difference and queer sexuality.³

From this standpoint, biotechnologies, or cyborg technologies of communication and extension of the body, have become a favourite instrument to mobilise radical critiques against the natural. Since Donna J. Haraway's publication of the 'Cyborg Manifesto' (1991), such critical tendencies against the natural have pushed the debate about sexuality, sexual difference, queer sex towards an emphasis on the artificiality of the body, suggesting that despite the advancement of cybernetic technologies, genetic engineering, transgenesis, and so on in a specific historical context, it is possible to dare to say that we

2 Elisabeth Grosz, for example, has recently reread Darwinian theories of evolution in the light of Henri Bergson and Friedrich Nietzsche's philosophy of difference and has argued that sexual difference at the core of all evolutions needs to be rethought as a process of differentiation or bifurcation of one sex into two (Grosz 2004).

3 Amongst many theories taking on such a critical task in the field of queer studies, see Sullivan (2003).

have always been cyborgs. There has never been an ultimate essence to nature. Rather, nature cannot be disentangled from the cultural artefacts through which we live, experience, affect the natural. In feminist science studies, the concept of the cyborg has helped to reformulate the specificity of a body-sex within a set of connections – historical, cultural, racial, gender, class, and so on. The cyborg has then become, as Haraway says, our ontology, the nesting of the technological into the biological has only shown that the natural has always been artificial since the technicality of the body-sex, its being embedded in situated knowledges of production – for example, scientific, social, cultural, historical, geographical, communal, technological, and so on – defies all attempts at assigning a metaphysics – an abstract dimension – to the changing experience of sexuality. More than that, the cyborg figurations of gender provide a way out of the relativism of a structure of power where all relations are systematised in an order of representation and ideological encoding of the body – the abstract geometrico-mathematical grid of positions – imposed on lived experience. Indeed, the flickering signifiers of gender in the everyday, which in turn act to subvert such order through the unstable performances of gender, are always ready to construct new narratives of what a body-sex is.

The centrality of such cyborg-performance visions of sex in queer theories and theories of sexual difference is however predicated on a highly problematic assumption. If the natural order is the site where power congeals difference within a pregiven grid, then, it is here assumed, the place to resist repressive determination is culture, since it is the historical lived experience of gender that triggers change, that subverts the natural state of things, that produces new avenues for a feminist politics of liberation. What remains assumed here is a historicised nature, a human-centred materiality, an anti-abstract concept of sex, which separates the concrete from the abstract, the lived from the conceived. Even when new technoscientific paradigms of science, from thermodynamics to chaos and complexity theory and quantum mechanics have been used to radically revisit concepts of nature in terms of a nonlinear order, the attachment to non-causal practices of gender performances has left a metaphysics of nature behind.

Most recently, however, there has been a shift in feminist science studies from engaging with a technoscientific reconceptualisation of nature to emphasising the material causalities for a new vision of the body-sex. The emphasis on gender performance in theories of sexual difference and queer sexuality has indeed left the legacy of an inadequate reading of the body-sex as a passive container of socio-cultural techniques of modification. By reworking the concept of performativity in the light of technoscientific visions of materiality, some feminist theorists, such as Karen Barad (2005/2003), have argued for a post-humanist

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conception of performativity for queer studies.⁴ In particular, borrowing from the quantum mechanics theorisation of the atom by Neils Bohr, Barad sets the scene for a performative metaphysics challenging the separateness between the observer and the observed. The crucial re-elaboration of the notions of relation as intra-actions between specific physical arrangements serves to rethink the ontological inseparability of distinct agents acting together. In short, for Barad quantum mechanics enables a reconceptualisation of causality as embedded in specific agential practices, intra-actions and performances that defy any attempt at splitting the material from the discursive, offering a material-physical dynamics to the production of meaning. By reworking Butler's performing bodies to include nonhuman material agencies involved in the process of the active and not just discursive materialisation of a body-sex, Barad proposes a concept of performance beyond its assumed anthropomorphic limitations. Thus matter is not delimited to the linguistic or discursive acts or to the human-centred vision of the organic body. The body-sex is opened up to an empirical process of materialisation that includes the atomic, invisible microworlds of matter.

By regiving historicity to matter, rather than imposing human history on materiality, Barad argues, 'reality is not composed of things-in-themselves or things behind phenomena, but "things-in-phenomena"' (2005/2003, 202). This implies that specific intra-actions produce, perform and enact a changeable being: a materiality in continual change is derived from its interactions between its constitutive components. The discursive therefore is always already the material intra-production of phenomena, which Barad defines as 'agential intra-actions' constituting apparatuses – that is, particular physical arrangements – that give meaning to certain concepts rather than others (204). These apparatuses, resonating but not matching with the Foucauldian discursive practices, are material reconfigurations that produce material phenomena – that is, a dynamic relationality that is locally determined in a particular phenomenon, through specific causal intra-actions (205). In short, Barad reworks, in the light of quantum physics, the material-discursive practice of gender performance as entailing specific iterative enactments – agential intra-actions – through which matter is differentially articulated (207).

4 Barad clearly explains that the notion of performativity adapted by Judith Butler is derived from British philosopher J.L. Austin's study on speech acts and the relationship between saying and doing. Butler's notion of gender performativity indeed proposes an engagement with gender in terms of 'doings' rather than being. Whilst, as Barad points out, Butler articulates the linkage between gender performativity and the materialisation of the sexed body, the work of Eve Kosofsky Sedgwick argues that performativity's genealogy is inherently queer. See Barad (2005, 193); Sedgwick (1993); Butler (1993; 1997).

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By assigning no priority to a given materiality or discursivity, Barad points at how intra-actions are constraining activities that do not determine the future, but rather remain uncertain because of the intra-activities of phenomena – which entail human, nonhuman, cyborgian forms of agency: an enactment or doing. By this, Barad concludes that a posthumanist materialist account of performativity challenges the assumption that nature is passive or the end-product of the activities of culture, defying the belief in an ultimately exterior observational point. Rather, as elaborated in quantum theory, she suggests that the queerness of performativity is delimited not to human interactions in the world, but to the enacting intra-actions that are of the world (213), where agential intra-actions – human and nonhuman – are causal enactments of the world in its dynamics of differentiation.

Whilst Barad's work significantly emphasises the materiality of performativity and thus directly shifts the notion of queer sexuality and sexual difference away from discursive apparatuses and towards a renewed physico-discursive production of sex, exposing the relevance of technoscientific propositions to a rethinking of nature, it may be useful here to investigate further the question of intra-action between nature and culture, the material and the discursive, the metaphysical and the physical. If the impact of technoscience on the ontology of sexual difference and queer sexuality has to be taken seriously (that is, causally) beyond its mere textual effects, then it may be helpful to develop a philosophical concept of relationality that derives not from technoscience but that engages in a speculative fashion with technoscientific experimentations in matter.⁵ From this standpoint, the material-semiotic axis of performativity may be rethought not merely in terms of the intra-actions between the biophysical and discursive in so far as these still risk remaining actions added *a posteriori* to relations as if these were set in motion by an external motor. Rather, this chapter argues for an engagement with the *abstract activities of relationality*, the concrete incorporeality of relations exposing 'zones of indistinction' (Deleuze

5 The notion of speculation here is derived from Alfred North Whitehead's notion of speculative philosophy, where the relation between philosophical concepts and technoscientific functions is taken to be one of experimentation and probing into the material capacities of nature to become culture. Speculative philosophy is not intended to stand for an idealist vision of the future from the standpoint of a past occurrence, but to engage with a mode of thought that evolves, via the infra-temporalities of the past and the future, as motors of the present. Speculative philosophy includes not the foreseeing of the future according to the progressive narrative of technoscience, but engages with the unforeseen temporalities of the present. For Whitehead (1978), speculative philosophy addresses what exists as part of a cosmic adventure, while sciences address the order of nature.

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and Guattari 1994) between thinking and doing, between philosophical concepts and technoscientific functions, which may enable us to rethink at the ontology of queer sexuality and sexual difference in the current climate of technoscientific experimentation, as an ontogenetic variation of material desire.

In order to do this, we may need to turn to the philosophy of the virtual-actual relationality as developed in the works of Gilles Deleuze and Félix Guattari, and their rearticulations of the philosophy of nature through Henri Bergson, Alfred North Whitehead and Baruch Spinoza. It may be useful here to briefly explain how such philosophy contributes to a materialist metaphysics of sexual difference and queer sexuality. In the first instance, Deleuze and Guattari's conception of the body as a machinic ecology is crucial to exploring distinct layers of connectivity that compose a body in terms of intensive degrees of affinities – that is, non-exact measures – rather than given categories. These affinities are mental, social, technological, biological, desiring, physical, intuitive and perceptual, and operate beneath (and across) the macroaggregations of positions such as gender, class, race, as well as human, animal and machine. Hence a body always entails an environment of relations between distinct milieus, which are however associated by intensive – amodal or virtual – links. Such links are arranged in accord with velocities of compositions – speeds and slownesses of conjunctions and disjunctions – and affective impingement – the non-emotional yet felt activities amongst bodies triggering transformations in the states and conditions of each composition. There is no inherent naturalness in such ecology since this latter envelops a primary process of relational invention. Yet such relationality entails not simply the way different components come together to constitute a specific body, the way in which material relationality is thought of in terms of historical formations of a body-sex. More than this, relationality is above all *machinic*, entailing the residual capacities of every intra-action between components to enter a new composition, to mutate by virtue of a potentiality inherent in matter, connecting actual worlds with a constellation of virtual worlds.

In short, a machinic relationality here stands for the mutual activities of differentiation between the abstract and concrete dimensions of matter, which are not easily reconducible to a set of intra-actions between components. Here materiality acquires a new sense: it is a virtual materiality, the amodal relationality that cannot be disentangled from the actual intra-action between elementary components. Relations therefore are never relations between parts summed up together to make the same whole. Rather machinic relationality entails a primary invention of the new out of mismatching connections between the abstract and concrete worlds of a body. A sense of machinic nature is then derivable from Deleuze and Guattari's notion of the machinic, pointing at how the impasse between nature and culture and the articulations of the relations between

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the mental and the physical, requires a radical rethinking of what matter is in terms of what matter can do. This is the crucial adaptation of Spinoza's ethics-ethology of nature in the work of Deleuze and Guattari (1987).

From this standpoint, only a reconceptualisation of the ontology of nature in terms of virtuality, potentiality, capacities to become, is able to abstract from the actual intra-actions between components, a relational metaphysics that exceeds the empirical sums of parts. A new empiricism is indeed at work here. A radical empiricism as William James (1912) calls it, concerned not so much with the intra-active behaviour of things in phenomena, established by sensory measures of observation, but with the abstract dimensions of affectivity, with the capacities of a body to experience abstraction, toprehend virtual relations.

Spinoza argues that all affective relations – any mode of encounter between bodies – are imbued with affect, an unrealised capacity to engender an unexpected change in the bodies affected. Affective relations therefore entail not simply the action of a body over another action and vice versa, but their mutual participation in the abstract capacities of affect, into a metaphysics of the not-yet actualised, which whilst preceding and exceeding, directly accompanies, all actual intra-action. This is the sense in which a body can only be defined in the spatio-temporal interval between here and there, now and before, again and anew. It is the abstract – or virtual – relationality that opens the question of what a body-sex can do.⁶

This question remains crucially important to a reconceptualisation of sexual difference and queer sexuality since it explicitly points at the autonomy of affective relations from the biological and discursive organisations of the body-sex. It opens the very notion of nature to an ontogenetic process, involving above all the capacities of nature to modify itself, to engender and be engendered by change. This may be conceived of as a historical vision of nature, in terms of a genealogical formation through material intra-actions of distinct components in time and space. And yet such a vision cannot account for the nonlinear reversibility between cause and effects, where actual intra-actions are not in royal isolation from virtual relationality. Indeed, a machinic nature entails the *viral contagion* between technology and biology, the cross-pollination between natural genes and genetically engineered genomes, the microaffectations between atoms and nanoatomic machines that expose how micro-socialities of invisible relations act on what we perceive-experience a body-sex to be.

6 The contribution of Deleuze and Guattari's philosophy of sexual difference has been extensively discussed in the field of feminist theories and science studies. The works of Elisabeth Grosz, Moira Gatens, Sadie Plant and Rosi Braidotti in particular have been crucial in adopting a materialist philosophy of difference in conjunction with the philosophy of sexual difference developed by French feminist Luce Irigaray.

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This is where this chapter locates the impact of nanotech. Such impact does not concern the atomic constitution of a body-sex, but, more importantly, the abstract activities of atomic sexes as fully part of the material experience of sexuality. Hence, the impact of nanotech implies no simple dematerialisation of the body-sex, a sort of pulverisation of the specificity of sexual difference and sexual desire into digital components, ultimate units of calculation, a combinatorics of sex. Quite the contrary, this chapter argues that such an impact cannot but be felt, it is a touch at a distance, a contactedness in matter prior to sensory contact. This feeling indeed is not directly translatable via sensory perception or mental recognition. It is not the feeling of actual phenomena – a transparent intra-action between phenomena ready to apprehend the existence of each other – but of an affective involvement in the virtual, the physical resonances of the abstract capacities of matter to change, vibrating across bodies of all sorts.

Feelings, as Whitehead points out, are vectors ‘for they feel what is *there* and transform it into what is *here*’ (1978, 87). An impact then pushes the body-sex outside of its actual conditions to transform what is there into what is here. An impact primarily defines the affect enveloped in the affective relations, a transduction between distinct phases of matter. Yet affect is autonomous from emotional and cognitive awareness (Massumi 2002, 30–31). It is primarily intensity or vibrations passing through bodies, connecting extended parts through abstract (virtual) dimensions. The impact of nanotech is then virtual. It is related to the body’s capacities to be affected, its opening towards its own imminent mutability.

Trans-sexual Nature

Before discussing the implications of the virtual impact of nanotech on the body-sex, I wish to turn to critical discussions of sexual difference and queer sexuality engaged with the natural sciences and biotechnologies. In particular, I wish to draw attention to the way technoscience – from molecular biology to reproductive technologies and xenotransplantation biotechnologies – has been used to rethink notions of transsexuality and chimerism in nature, challenging culturalist assumptions about the natural whilst developing a neo-materialist engagement with sexuality. Myra Hird, in particular, clearly addresses the problem of rethinking the natural away from the predominant critique of science as a patriarchal tool that constructs nature from the outside. Recently, she has written on the importance, for queer theories, of not remaining anchored to notions of sexual authenticity in the formulation of trans-sex. She has argued that the nonhuman living world of animals, where the natural

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order based on monogamy, fidelity, heterosexuality, two-parenthood, sexual reproduction, is turned upside down (2006, 39–40; reprinted here), serves not as natural justification for human transsexuality, but as a way to challenge the naturalness of nature by highlighting the unfamiliar – non-assumable – forces of nature itself.

Hird addresses the ‘trans’ of transsex from the standpoint of animal sex, where homosexual behaviours, intra-species sexes, display a wide diversity of sexuality. Whilst all plants and animals are virtually intersex – two sexes at the same time – humans’ heterosexuality remains instead strangely anchored to the biology of the two sexes. Hird pushes this virtuality further and importantly points at the microworlds of bacterial genomes trading genes without any respect for the heterologic of sexual reproduction at the core of species boundaries. She echoes Lynn Margulis and Dorion Sagan’s claims that there are as many sexes in nature as there are colonies of bacteria, exposing not the authenticity but the unnatural complexity of natural sex. Hird also highlights that to separate biology from technology – nature from culture, the authentic from the artificial which still determines debates on queer sexuality – is a way to overlook the ‘energetic invention and use of technology by non-human living organisms (termites high-rise cities include “birth chambers, hatcheries, the insect equivalent of schools, hospital”), as well as the extent to which so-called human technologies actually mimic technology already invented by other species’ (44).

Indeed, biotechnologies, such as genetic engineering, the transfer of genetic material amongst cells, have brought back one of the most ancient modes of sex on the biotic strata: bacterial sex.⁷ Bacteria – non-nucleic cells – invented genetic engineering three billion years ago: a viral borrowing of genes to repair genetic material damaged by harsh atmospheric conditions.⁸ In a sense, bacterial sex is the virtual biotechnology of non-nucleated cells, preceding and exceeding the sexual reproduction of eukaryotic species: animals, plants and humans. Similarly, biotechnologies are also virtual triggers of new bacterial superbugs. The novelty of the relation between biotechnology and the biotic sphere is not however the technological imitation of biology (biomimetics). Such a relation remains open-ended: is biotechnology a vehicle for bacterial transmission or has bacterial sex become a new technical medium? There is no easy mode of defining such a complex, mutual modulation of nature and culture. Sexual difference and queer sexuality are not simply to be rethought as natural or artificial but also, as

7 On bacterial sex, see Margulis and Sagan (1997, 50–70). On the relation between bacterial sex and genetic engineering, see Parisi (2004, 147–62).

8 Bacteria are prokaryotic (without nucleic DNA) cells. Eukaryotic cells are organised around a nucleus (Margulis and Sagan 1986, 38–53; 153–69).

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Hird suggests, in terms of an unfamiliar transsexuality that exceeds modes of assimilating nature, where natural forces cannot simply be anthropomorphised.

Drawing on a feminist neo-materialist approach to biology,⁹ Hird challenges the feminist critiques of science as the cultural analysis of materiality where technoscience is mainly thought of as a tool of patriarchy (2002, 95). Beyond language and discourse, a materiality of sex lays at bay. Hird proposes to give a non-linear account of biology so as to rethink the materiality of sexual reproduction beyond the naturalness assigned to biological sex. Drawing on Manuel DeLanda's nonlinear accounts of matter, inspired by Deleuze and Guattari's notion of the 'machinic phylum', Hird crucially asks how such accounts can be used by feminists to rethink the reproducing body (99). Her detailed exploration of the heterogeneity of biological reproduction sets out to challenge any easy ontological resolution between nature and culture, the pure and the artificial. Indeed, she points to the bacterial world of inter-sex as a way to rethink notions of human bodies as 'engaging in constant non-binary sex, as biologically queer' (103).

Hird also addresses reproductive technologies, which complicate the naturalness of blood-governed notions of kinship by unravelling the unintended proliferation of chimerism and mosaicism (2004, 221). Genetic filiation is here put into question by nonlinear molecular transmissions between the same species and across species – for example, xenotransplantation – which are not simply caused by human technological interventions, but rather are part and parcel of a chimeric bio-logic, which radically challenges the cultural assumptions of biological sex. Such cultural assumptions are here challenged by a technoscientific knowledge of the biological and not merely by human technological innovations. Indeed, the uncertainties of technoscientific understandings of nature may serve to change cultural discourses on kinship, sexuality and reproduction.

Whilst sharing Hird's point about the importance of addressing the materiality of sexuality away from the emphasis on the normative and discursive conceptions of science, this chapter wishes to consider whether it is possible to readdress the relation between nature and culture from another standpoint, where there is no ultimate bio-logic that resists the cultural determinations of sexuality. This chapter indeed sees an implicit falling-back – in emphasising the indeterminate bio-logic of sexuality – onto the ground of organic nature, where biological complexity is always already disrupting cultural norms, where the unnaturalness of the organic remains external to the naturalness of culture.

⁹ She draws, in particular, on Rosi Braidotti and Elizabeth Grosz for such a definition of feminism (Hird 2004)

Rather, this chapter points to the possibility of engaging with abstract material relations encompassing nature-culture on a continuum, a cultural evolution of the natural and a natural evolution of the cultural variations of a body-sex.

From this standpoint, it is important to point out that the natural is as stratified as the cultural and that the biological imperative of sexual reproduction and sexuality is part of the nonlinear organisation of bacteria cells entering into nucleic sexual and reproductive orders under certain environmental pressures, which have indirectly affected the cultural formations of bodies ordered in a grid of biological positions. This chapter however stirs towards another, more invisible, path of engagement with materiality emphasising the abstract or virtual expressions of an ontogenetic sexuality that is directly prehended by all bodies participating in the speculative exercises of technoscience. Technoscience, it is true to say, is not a human invention since technical machines are able to enter in direct relations with the biophysical layers of matter. Yet this does not mean that technoscientific inventions are a direct imitation of biological complexity since the bio-logical order does not remain immune from the technoscientific touch. Their abstract relationality implies that new biological kingdoms can emerge from technological interventions and similarly new technological machines can emerge from biological realms. In short, what remains to be addressed in debates about natural sciences, technosciences and new ontologies of queer sexuality and sexual difference is the abstract relation between nature and culture entailing the direct – affective – prehension of changes in matter, resonating across micro and macro scales of the orders of sex.

This relation entails the heterogeneous formation of an event, where all components – concepts, affects, percepts – participate in the transformation of matter. Here culture is not the place for technoscientific normalisations of nature, but is primarily caught up in the prehensive feeling of abstract relations, the material potential of culture to change, which challenges its primary functions as the governor of matter. From this standpoint, the impact of nanotechnology on the biological and cultural order of sexuality and sexual difference is implicated in the material prehension of their transformation stemming from the micro-perceptual activities of subatomic sexes – a non-organic sub-world running beneath yet throughout the bio-logic of organic sex and the cultural determinants of gender.

Atomic Sexes

If, as argued by many feminists, biotechnologies – genetic engineering and cloning – have pushed the conception of sexual difference away from the biological imperative of sexual reproduction, based on genetic essence, and have therefore

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exposed the plasticity of genomes, the genetic ambivalence between animals and humans, it is possible to say that nanotech pushes the indeterminacy of this entire biotic realm of mutations further. In short, what we know of sexual difference before the impact of nanotech still pertains to the biospheric realm of organic life in accord with the cultural bio-order. Even when biotechnologically re-engineered, sexual difference, reduced to the elementary components of chromosomes, or egg cells, mitochondria, artificial wombs, and so on, still maintains a certain stability in social relations: acquired parenthood, extra-partner filiation, multiple genealogies have all modified the stabilised norms of cultural procreation, and the social structures of the family, and yet still fall on the ground of a biologically complex order of organic life. The impact of nanotech is of another nature however. At stake here is no longer the biotechnological manipulation of genetic networks, but the inorganic nanodesigning of the entire biosphere – the entire biology of sexuality. Nanotechnology (Scientific American 2002; Turton 1995; Regis and Chimsky 1996) moves well beneath carbon-based life, affecting the fluctuating movement of atoms, entering the scale of inorganic dust to redesign carbon-based life.¹⁰

To redesign atoms and molecules from scratch implies resculpturing the genetic and neural patterns of a body-sex. Nevertheless, despite all efforts, the nanoprogramming of matter entails no transcendent top-down designing of bio-physical organisations. Nanodesign is structurally open to the variability and contingency of molecular and atomic relations. Nanodesign is directed by encounters between elements, whose potentialities are not predictable beforehand. This is not a simple pre-programming of the body-sex echoing the digital logic of information science. The atoms of nanotechnology do not coincide with the 0s and 1s of digital computation, since the mathematics of digital calculation itself does not simply coincide with exact equations. In other words, the claims of the first wave-cybernetics about the reduction of complexity to building-blocks, elementary units, atoms, or codes out of which entire universes could be calculated, have undergone a new turn towards nonlinear complexity, unexpected randomness, fuzziness, inexact equations, incompleteness, incomputable quantities and differential relations, which, as often argued, have been problems in the mathematical enquiry into calculation since pre-Socratic times (Chaitin 2005, 56–85). Whilst a significant body of critical work has been devoted to debunking the reductionism of digital computation by showing how computer and network culture is productive of sociabilities – artistic, political, communal sociabilities and so on – the argument

10 On recent cultural debates on the implications of nanotech, see Hayles (2004, 11–23); Attebery (2004, 161–72).

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developed here is more strictly concerned with the way atomic and subatomic sociabilities are affected by nanotechnologies and how these sociabilities are implicated into new experiences of sexuality. The underling grey-goo scenario in nanotech indeed points to a mathematics of fuzziness and vagueness made not of building elementary blocks but of intricate complexity and inorganic variation cutting across the organic order of matter.

Nanodesign then forces us to account for a pre-emptive strike on the virtual or abstract materiality of a body-sex – the capacity of matter to be affected. And yet, the nanocapture of ‘chaotic molecules’ does not just reduce their potentials to probable activities – specific tasks – but *produces* new nano activities of the atoms as eventuations of new assemblages in matter. This suggests more than a new technoscientific paradigm or discourse, which can serve us when rethinking queer sexuality and sexual difference. Nanotech is here involved in ‘ecologies of practices’ (Stengers 2002b, 262), articulating new techniques of relations and the proximity between science and nature, nature and culture and thus participating in the ontogenetic expressions of matter, the nanomodification of sex ready to act back on what we take a body-sex and sexual difference to be.

In 1959, the physicist Richard Feynman already envisaged this nanocontrol of matter. In his famous talk, entitled ‘There’s Plenty of Room at the Bottom’, he stated that there was no principle in physics that could prevent the rearrangement of atoms. Much later, in *The Engines of Creation* (1986), Drexler explained that with the atom-by-atom structuring of matter, it is possible to design molecular machines that could reproduce themselves at incrementally smaller scales. Nanotechnology acts upon atoms and molecules ranging from 0.1 to 100 nanometers (a nanometer is one millionth of a millimetre). Atoms aggregate into larger compounds or molecules. By interacting with each other they build up inorganic and organic compounds. After more than fifteen years of research, companies, such as Intel, IBM, Bayer and Merck, are designing real nanoproducts (from atomic computers to smart drugs and from intelligent buildings to smart clothing)¹¹ by using assemblers to modulate the chemical behaviour of atoms. Assemblers or nanosystems are general-purpose devices capable of directing chemical reactions by positioning molecules in a certain way and thus enabling their specific replication. As Drexler reminds us, nanomachines such as ‘Cell repair machines could reassemble the misarranged patterns of atoms that cause cancer, and build bodies from scratch’ (1986, 98).

The novelty here is that nanomachines can rearrange the position of every atom. Each atom can be placed in a selected position to become an active or

¹¹ On commercial developments in nanotech, see Nanobusiness. On nanocomputers, see Brown (2001); Goho (2004).

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structural component of a living system to design. Positional control suggests that the high-speed oscillation and fuzziness of molecules is not an absolute but a relative indeterminacy open to the conditions of nanoengineering. The chaotic instability of molecules is here turned into a kind of dynamic productivity. The quantum fluctuation of atoms implies that atoms cannot occupy a series of discrete positions in space. This position therefore does not correspond to a permanence of the same atom, but to the permanence of a pattern that repeats itself through vibrating energy in far-from equilibrium conditions (Prigogine 1997, 129–51).

By redesigning atomic patterns, nanotech captures their chaotic behaviour into new actualisations; by neutralising chemical reactions in the nanofabrication of new compounds, nanotech intervenes in the emergence of new molecular architectures capturing the quantic behaviour of atoms. Yet this implies no predetermination of molecular patterns. To capture also entails the reversal activities of being captured. Capture thus implies the potentials to actualise new compounds, the transformation of molecular indeterminacy towards novel determinations. Hence matter is programmable only to the extent that nanosystems actualise new atomic functions whose future potentials remain unpredictable. At the core of nanotechnology is not so much the artificial manipulation of molecules, but the production of molecular-designing machines: nanomachines able to direct quantum patterns towards new actualisations.

A perfect example of contemporary strategies of pre-emption,¹² nanobots are virtual agents inbuilt in a body and ready to act at the incipience of threat. Nanobots will cruise our blood stream, taking blood samples, updating diagnosis at our own design, releasing drugs targeted to certain synaptic zones and performing self-repairing molecular surgery. As all strategies of pre-emption, nanotech operates on the level of the virtual – future threats emerging from the body's atomic fluctuations. Yet all pre-emption acts to capture futurity in new actualisations, reducing the unpredictable to the invention of the possible.

Strategies of pre-emption need not be confused with the digital calculation of atoms based on discrete quantities and exact positions on a grid. If pre-emption entails the anticipation of the future in the conditions of the present, the nanodesign of atomic complexities cannot occur without the tiniest variations creeping into the present from the future, without the irruption of uncertainty in atomic design. Bill Joy, the co-founder of Sun Microsystems, warns us against the unforeseeable dangers of nanobots in the strange new combination of genomics and robotics: 'Our most powerful 21st-century technologies – robotics, genetic engineering, and nanotech – are threatening to make humans

12 On pre-emptive power, see Massumi (1993, 11–12); Parisi and Goodman (2005).

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an endangered species' (2000, 1). The imminent threats of nanorobots to the nature of the human species and, more importantly, to the biotic strata of life often assume the form of dangerous self-replicating devices spreading disastrously beyond control. In 1986, Drexler also considered the double face of the nanotech coin, the dark side haunting the perfect nanodesigning of matter, and named it the 'grey-goo scenario': when non-biotic machines start to grow autonomous characters, behaviours, intelligences, mobilities that surpass the ability of existing devices of control. It is when machines take on a life of their own.

The nanocontrol of molecular patterns reintroduces the threat of nonliving matter to biotic life: the inorganic remaking of the organic strata. The grey-goo scenario envisages nanodesigned molecules spinning out of control and taking over living systems. Moving beneath carbon-based life (the use of protein to generate new proteins), nanotech aims to refabricate the body through controllable abiotic nanobots. Yet, the extent to which nanobots are not inorganic agents able to control themselves in their remaking of biotic systems remains an open question. Nanobots do not abide by Asimov's laws of robotics (the human-robot distinction) or the bioinformatic rules of the cyborg (the human-machine hybrid). Nanobots entail the inorganic redesigning of the organic composition of matter all together. Bypassing the genetic engineering of biotic life, nanobots force biotic life to confront the far from equilibrium dynamics of its quantum condition. Pre-emption here works to actualise new nanomachines of quantum matter by amplifying – or distributing – the impact of atomic sexes throughout all scales in evolution.

Machinic Expansion

The atomic fabrication of nanobots yields neither the artificial outdesign of evolution nor the imitation of the biosphere. Nanotech rematerialises the biosphere by redesigning patterns of chaotic quanta in two different directions: bottom-up molecular self-assembly and top-down mechanical – microelectronic – assemblers. Yet the bottom-up and top-down controls of atomic patterns are not sufficient to map the impact of nanotechnology on the biosphere. If nanobots are inorganic machines of the kind of those existing in an ancient past preceding the biosphere and an imminent nanotech present-futurity redesigning the biosphere then, we may ask, what does this connection between inorganic matter and nanotechnology tell us about the relation between the nature and culture of sex?

Call this connection, the extended experience of a body-sex. Stretch the actual present far back towards a virtual past and then forward towards a virtual

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future. And stretch again the future back in the past towards the actual present. Then name this extended experience, duration.¹³ Here a body-sex is caught in the topological expansion of events where the indeterminacy of a future-past is at work in the imperceptible speeds of the present.

The materiality of a body-sex is embedded in the events of such a future-past.

Henri Bergson affirms that time in evolution lies in the continuity of duration where past and future are at work in the present: an elastic temporality rubbing against the past and opening up to the future (1983, 5). Each present experience emerges from the influence of the virtual actions of the past and future. Yet such action concerns no psychological memory of the past haunting the present. For Bergson, this is an ontological past linked to every present and future. The virtual past does not lie in us, but vice versa we lie in it. The virtual action of the past on the present pushes the present outside of itself towards the ontological conditions of time (beyond the human condition). For, in duration the past like the future remains virtual, undetermined in the yet-to-be-lived passing of the present.

The past is not simply supplanted by the present, but rather becomes the field of invention for a present-futurity: the reversal ingression of change in the present-past. Nanotech profoundly intervenes in the body's network of durations – connecting the abiotic sphere of matter to the virtual actions of a future-past. By redesigning the inorganic atomic composition of biotic matter, nanotech exposes living systems to a novel aggregation of atoms opening the inorganic past of the biosphere to a new present-futurity. Call this abstract temporality re-engineering the irreversible trajectories of evolution, a machinic phylum (Deleuze and Guattari 1987, 406)

A machinic phylum is neither determinable by biological dynamics nor technological machines. Running beneath (and transversally) the biosphere and technosphere – organic nature and culture – a machinic phylum highlights abstract relationality in the extended experience of a body-sex, topologically stretching beyond acquired forms in the continual variations of matter. In a sense, nanotech is precisely embedded in such machinic trans-connection

13 Duration is inspired partly by Bergson and by Whitehead. For Bergson, duration 'is the continuous progress of the past which gnaws into the future and which swells as it advances' (1983, 5). For Whitehead, duration 'is a concrete slab of nature limited by simultaneity which is an essential factor disclosed in sense-awareness' (2004, 53). Here duration is not a continual and indivisible experience of time. Duration entails events coming into being and perishing. Like a sequence of cinematic frames, events interweave and pass on part of themselves to the next event. On these different notions of duration see Whitehead (1967/1925, 148–9); Stengers (2002a, 71–3).

implying a point of inflection, a curling line or a fold, in the encounter between distinct layers of duration in the matter of nature and culture.

Mutant Culture

The ingression of scientific objects in the passage of nature entails an immanent contact between physical and sense objects in abstraction. An event: something that happens not in the world (as if it were its representation), but to the world as much as technoscience partakes of its changes. Neither essence in things nor mental construction of things determines the relation between nature and culture. It is the material experience of such relation, of a zone of indistinction between nature and culture indeed to be productive of a culture that evolves. Scientific objects indeed do not reduce physical objects to bare facts or cultural norms. Instead ‘All bare facts are born factoid’ (Massumi 2002, 214), embedded in a certain virtuality that produces certain facts rather than others. Technoscience is not primarily an interpretation of nature. Rather, it adds its knowledge to nature, folding into relational virtualities one more time.

Drawing on Whitehead, Stengers questions the paradigmatic understanding of science (1997, 3–18). Science is not primarily an institution that reproduces dominant knowledge, hegemonies and discourses. Similarly, the singularity of the sciences has not to be reduced to the ‘privileged expression of a rationality that would be set against illusion, ideology, opinion’ (134–5). Science is itself subjected to the ‘chance-event’ characterised by non-scientific procedures, which define scientific history and knowledge as ‘transituational’: produced by the passage, the interval from one phase to another. Rather than disqualifying scientific events as always derived by structures of dominion, Stengers argues for the ‘ecology of practices’ producing scientific facts: an *affective* rather than a paradigmatic method of relating nature and culture, the sciences and the humanities. The scientific object is an adventure in experience concurring to nature’s own activities of change.¹⁴ In other words, a risky business: ‘Scientific hypotheses always attempt to situate what is given within a much vaster set of possibilities. One can, in most cases, make them commence with “And if?”’ (136–7)

14 Whitehead’s metaphysical redefinition of experience challenges the critique of science and scientific knowledge as reductive. What is given in experience does not belong to the intentional human subject and to the lived world. Whitehead like Bergson is interested in the experience of the cosmos, what exceeds the subjective world. Bergson uses the concept of duration to push human experience outside, yet he criticises modern technoscience as unable to grasp the *élan* vital of time. Whitehead instead embraces science to map the world’s own activities through its involvement in the ‘passage of nature’. See Latour (2003).

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‘And if?’ is a way to jeopardise what is taken to be normal and common sense. ‘And if?’ is the starting point of ‘a problem imposed on the collective by any innovative fiction, and through which the sciences invent their histories’ (138–9). Scientific knowledge thus concurs with the construction of novel fictions of a body-sex. Yet this construction cannot occur without abstraction: an immanent invisible relationality between distinct phases of matter, a continual invention triggered by the passing of events.

Nevertheless, we may still ponder: isn’t the ‘and if’ of nanotechnology (for example, and if the atomic composition of matter could be redesigned from scratch?) another way to privilege (dominant) stories about the ontology of the body-sex? Isn’t nanotechnology postulating new functions of matter that enclose the virtuality of extended experiences within a set of possible – already actualised and thus programmable – conditions of sex, sexuality and sexual difference?

To engage with these questions, science must be redefined not as the source of new ontologies, as the cyborg ontology tends to do, but as operating on a plane of reference able to actualise the virtual (Deleuze and Guattari 1994, 118). Science then depends on states of affair – formed matter – which are limits set on a plane of immanence (the virtual). Every science tends to limit the field of relationality between objects, by integrating variables together. Whilst all sciences rub against virtuality through productive speculations, they continue to bind functions to the event and to actualise the event into one specific thing that can be referred to. Scientific knowledge attaches a recognisable face to its outside limits, turning virtuality into probabilities. Deleuze and Guattari argue that the philosophical concept, on the contrary, maps ontologies as it abstracts from states of affair their abstract connection. In philosophy, it is the consistency of the event to be pulled out from objects. Consistency entails amodal or virtual links: a sort of holding together of potential situations. Rather than appropriating potentials, philosophical concepts ‘give the virtual a consistency specific to it’ (118).

It would be misleading however, to affirm that scientific functions are deductions of philosophical concepts. Rather ‘*Concepts and functions ... appear as two types of multiplicities or varieties whose natures are different*’ (127). Virtualities do not actualise without changing in nature. Science and philosophy are confronted with multiplicities emerging from a common field of problems responding to what is not known (128). For Deleuze and Guattari, philosophical concepts and scientific functions do not cease to enmesh via a certain *sensibilia* towards the unknown (131).

In a sense, science and philosophy have the task of responding to problems posed by events in the passage of nature. Science and philosophy are symbiotic activities in mutual complicity with the becomings of nature. They are held

together by a ‘dynamics of infection’ as Whitehead names it (Stengers 2002, 182–90), a contagious relationship unable to transcend from variations in nature. Infection here stands for an enduring excitation between concepts and functions, science and nature, nature and culture, culture and science, geared towards the immanent fabrication of ontomolecular changes. Call this enduring excitation in the techno-cultural becomings of nature, *affective contagion*.

Affective contagion is a term that cannot do without calling forth a body. For Spinoza, arguing against all mind-body dualisms, a body is a mode of thought and extension. The idea of the body can only derive from the way a body is primarily affected by other bodies. Thus the mind is always the idea of a body (*Ethics*, II, ax. 3, prop. 11; II, prop. 13, schol.; II, props 12–31). Similarly, Whitehead affirms that concepts are conceptual feelings which ‘primarily derivate from physical feelings, and secondarily from each other’ (1978, 247). Affect entails the rhythmic encounter of biophysical energy-particles enveloping abstract capacities to think. The reverse is also true; all thoughts are as if they were themselves feelings prompting from a transmutation in physical feelings. In short, modes of extension and thought are linked by abstract contagion.

The affective contagion between science and nature, nature and culture cannot but be felt. New technics of manipulation, such as nanotechnologies, are not only techniques of observation of atomic matter, but are more importantly implicated in the abstract relations between physical and conceptual feelings, adding modifications to the extended experience of a body-sex. In other words, nanotech is involved in the eventuation of new assemblages of desire on a nature-culture continuum. Yet, we still do not know how this nanoengineering of matter is adding variations to the feeling-thoughts of sexual difference.

Desire and Futurity

If a nanobody is not to be defined by what we take the natural and artificial to be, then how can we rethink sexual difference in the age of nanoengineering? If a body-sex can not only be genetically engineered, but its atomic neuro-genetic determinants can be rearranged at will, then what will count as sexual difference? Does this imply that sexual difference – in accordance with Luce Irigaray’s conception of a mode of feminine desire detracted from the imperative of heterosexuality based on the phallic organisation of the body-sex – will no longer matter? Answer this question with a more difficult one: can we account for variations in modes of desire, in sexual experience without holding onto organic essence or discursive structures of sex? Does sexual experience coincide with the organic order of the body-sex or the mental representation of natural sex?

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Experience, Whitehead suggests, entails the living body as a whole (1978, 105–109). Each experience has its origin in the physical activities of a body, which change when any part in nature undergoes variation. Thus, experience extends outside the living towards the entire nature – including the smallest parts, atoms, electrons, and so on. Difference in experience then cannot be disentangled from what happens to all particles of a body, which are at the same time entangled with what happens to all scales of matter. Experience therefore is always extended, pushing the living outside its bio-physical architecture so as to construct itself again in changing ecologies of connection.

For Whitehead, the basic elements of experience are ‘prehensions’ (or concrete concepts and feelings) of actual entities, and the ‘nexus’ (or system of relationships) which connects the development and functioning of all actual entities (or actual occasions) (1978, 18–20). Prehensions are concrete modes of analysis of the world. To prehend something is to have a concrete idea or concept of that thing. But prehension is not merely a mode of thinking. A prehension is a material process of appropriation of an element of an actual entity, or of an element, which is derived from an actual entity. A prehension of an object, or of an element of an object, changes the internal constitution of the prehending subject.

Change in experience thus involves the assembling by material prehension of particles-thoughts on a nature-culture continuum. Here the passage of events in nature corresponds to its double ingression in culture: the event virally propagates across regions of feeling (physical and conceptual feelings) across scales of sociabilities – atomic, molecular, organic, technical, affective, mental – without in turn ceasing to change its composition. It is not one and the same event that connects nature and culture. It is the virtuality – or abstract relationality – of an event that remains as if it were *in common* in an expanded experience linking nature again to its becoming and culture to its evolution.

The nanoengineering of matter intersects with the virtuality of experiences on nature-culture continual variation. Here, sexual difference does matter, but in a new sense. It is not biological experience that makes sexual difference autonomous from the cultural organisation of desire into the binarism of the two sexes. Similarly, it is not the complex biology of sex that makes feminine sex uniquely distinct from or fully intermixed with masculine sex. In other words, the ambiguous biologisms of sex fail to account for how sexuality is implicated in the virtual relationality between inorganic and organic matter, between the concrete and the abstract experience of sex on a nature-culture continuum.

What matters in sexual difference is the way experience is extended across nature, the way it participates in all kinds of sex disclosing the organisation of the two sexes to molecular affections operating at the subatomic levels (of

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extension and thought) of a body-sex. What matters then is the way sexual difference is involved in the nanoprehensions of that which happens to the world and thus in the eventuation of new feeling-thoughts of sex. In short, it will be a challenge for concepts of sexual difference to account for how sexuality acts as a heterogeneous milieu of attraction of the abstract connection between inorganic and organic matter, for how such abstraction becomes expression of a lived sex on a nature-culture continuum.

Nanotech entails a new level of abstraction of subatomic matter initiating a virtual action on the capacities of nature to become culture: the capacities of inorganic subatomic matter to become nanotechnological and in turn the capacity of nanotechnology to become enveloped in subatomic worlds. Here we are confronted with the experience of abstract relations or transitions between inorganic and organic nature-culture coinciding with the prehensions of the quantic composition of matter. Nanotechnology does not explain the quantic fluctuations of matter, but it rather adds quantum dynamics to the extended experience of an infinitesimal world, intervening in the past-futurity of a body-sex. Call this new layer of experience: the nanoengineering of desire. The latter has unprecedented implications for what we take sexual difference to be.

For Deleuze and Guattari, assemblages of desire do not cease to produce new modes of living the body or new modifications in nature-culture. Yet it is clear that these assemblages are not determinable by objects, aims or sources, identity or subjective essence (1983, 1–8). Desire here is to be defined in terms of collective bodies, turbulent networks, viral transmutations relinquishing all logic of lack, scarcity, survival, alterity, and the repressed unconscious.¹⁵ Assemblages of desire are directed not by intentionality but by the fluctuating movements of particle-forces implicated in ecologies of layered relations between their internal external and associated milieus of composition connecting one phase to another.

By nanodesigning the movement of molecular quanta, nanotech acts to preempt the movement of desiring assemblages, the un-calculable fluctuations of the tiniest sexes acting back on the larger aggregates of organic sexual difference. As such it takes sexuality, the site of modification of desiring assemblages *par excellence*, as its field of action. The nanoengineering of desire demands the biotic qualities of sexuality to face new onto-evolutionary implications: the atomic redesigning of matter intervenes in assemblages of desire – mental, affective, social, technical, ethical, cultural – recombining present conditions of

15 On assemblages of desire, femininity, sexual difference, queer bodies, see Grosz (1994, 187–210; 2004, 244–60); Flieger (2000, 38–63); Driscoll (2000, 64–8); Colebrook (2000, 110–27); Kaufman (2000, 128–43).

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experience with an ancient inorganic past and with the incipience of an atomic future yet to come.

In such reversal of causal relations, sexual difference can no longer remain attached to the bio-logic of organic sex, whereby the difference between the sexes is defined by an onto-evolution of the two sexes governed by organic sexuality. If, as Grosz has recently argued (2004, 67–70), sexual difference resonates with the unique differentiation of the species in two sexes, whereby sexuality is independent from survival, then it is also true that sex extends beyond the biotic distinction of the sexes as much as nature precedes and exceeds carbon-based life. Similarly, if the ontology of sexual difference is always already embodied, then it is important to highlight that a body is not definable away from the passage of nature, desiring assemblages extending throughout the sublayers of inorganic matter.

The impact of nanotech then raises new questions about what we take sexual difference to be as it adds to the genetic variation of biological sex – trans-sex, xeno-sex, and so on – an inorganic layer of atomic sexes redesigning the biosphere of organic sexes anew, whilst exposing the unforeseen architectures of an inorganic nature in culture. Whilst abstracting atomic assemblages from bio-physical objects, nanotech enters invisible assemblages of desire. This indicates no disappearance of sexual difference, but the expansion of sexuality onto the atomic field of matter: inorganic nanosexes acting back on the organic architecture of a two sexes culture.

Whilst focusing on the impact of nanotech on what we take sexual difference and sexuality to be, it may be important to specify here that this is not just a way to favour nanotechnological possibilities of redesigning sex and gender, the genetic and neural patterns of sexual difference, the plurality or neutralisation of sex-gender. Rather, this is a speculative philosophical gesture that probes into the abstract conception of sexuality as the lived experience of a processual nature-culture composed of events linking (pre-biotic inorganic) past and (nanobiotic) future in the occurrences of the present, where technoscience intervenes to question the biological ground of nature-culture, reopening the body-sex to the durations of a past faced by a new present-futurity. Hence, it is not a question of privileging the biological ambiguities of sexuality – the nonlinear natural ground that exceeds the ideological, discursive, technological structures of culture. On the contrary, this entails the importance of opening nature and culture to the material experience of abstract relations whereby sexuality is implicated in the imperceptible movements of assemblages of desire – not simply the cross-pollination of parts but their collective participation in the production of a new constellation of universes stretching beyond our cosmos. The experience of the fuzzy quantities of atomic matter acts to transform the feeling-thought of sex

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beyond the biological and towards the abstract materiality of a sexuality already felt and yet still to come.

Nevertheless, it may be misleading to assume that the expansion of sexual difference onto the quantum field of matter is a way to favour, for example, nanotechnological possibilities of redesigning organic sex, inciting therefore a disappearance of the biological order of sexual difference. Rather, such an expansion can only be thought of as implicated in the abstract architectonics of sex, the relational experience connecting the actual occasions of sex in the quasi-felt durations of matter, which remain autonomous from the chronological evolutions of organic sex. Hence, this is not a question of the techno-evolution of sexuality, but a way to challenge the bio-logic of sex, the organic order of nature-culture. Here the nanoengineering of desire entails not a mechanisation of sexuality – a queering of the future through nanobotic sex. On the contrary, such nanoengineering is only important in so far as it is implicated in the futurity of desire, the reversal causality between nature and culture embedded in the abstract fabric of sexuality, whereby new kingdoms of sex can spread out of the inorganic assemblages of nanobots, a nanoculture of sex. Here the experience of sexual difference entails a feeling-thought for the ingression of futurity into the present-past of a body-sex, acting to queer the nature-culture of organic sexuality in an unforeseen fashion.

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