ANIMAL TRANSEX

Myra J. Hird

The universe is not only queerer than we suppose, it is queerer than we can suppose. (Haldane 1928, 298)

When animals do something that we like we call it natural. When they do something that we don't like, we call it animalistic. (Weinrich 1982, 203)

Introduction

Punky and Elvira, two female red-faced Japanese macaques, have lived together for 15 years and raised three adopted juvenile monkeys together. Whether or not they want to marry (or have any recognition of this distinctly human concept) remains beside the point for the moment, as the state of Ohio, and indeed the whole of America it seems, is embroiled in a heated debate about gay marriage. On one side of the debate, Angela Murray, executive director of the Human Rights for Animals organisation, argues that it is Punky and Elvira's right to have a full wedding that carries the same legal entitlements as human marriages. At the opposite end, Roberta Crombs, president of the Christian United Movement disagrees: 'Animals marrying? That's beyond being ''under attack.'' These zealots have scaled the walls and society has begun to crumble!' (Busse 2004, 2).

Non-human animals have for some time been overburdened with the task of making sense of human social relations. In most cultures, and for most people, non-human animals are symbolic. It matters less how non-human animals behave, and more how we think they behave. Non-human animals supposedly exemplify human animal qualities like the family, fidelity, selfless care for young and, perhaps above all, sex complementarity (that femininity and masculinity are categorically different and complementary). As the quotes at the beginning of this paper allude, non-human animal morphology and behaviour are most often cited to confirm our assumptions about the nature of things and human beings' relationship to this nature, even though these meanings may indeed have very little to do with the biological and social realities of non-human animals (Bagemihl 1999). Moreover, and as in the case of Punky and Elvira, discussions of animal behaviour often move quickly to moral debates about topics such as gay marriage, the nuclear family and gender relations. As I will argue, morality and nature enjoy an interesting relationship: nature is often invoked in discussions of morality in so far as natural behaviours are considered to be morally superior. Punky and Elvira incite debate because they are non-human animals (natural) that are engaged in homosexual behaviour (unnatural and therefore morally inferior), thus disrupting the historic Judaeo-Christian association between nature and moral superiority.[1]

It is certainly of value, then, to exercise caution when the behaviour of non-human living organisms is cited in the service of discussions of human socio-cultural relations. And yet in recent years there has been a rejuvenation of feminist interest in ethology and biology, with a number of scholars making the specific argument that the study of

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non-human living matter might usefully inform debates about social structures and relations. Birke *et al*. (2004) argue that animals are both common and rare in feminist studies of science, in so far as feminist theory is strongly concerned with the biological sciences that use and define non-human species but rarely considers how we think about animals specifically. They contend that animals should be of interest to feminist theory because they are deeply implicated in discussions of sex, gender, race and sexuality. Feminist scholars and social scientists more generally have provided a number of thought-provoking analyses of non-human species. For instance, Donna Haraway's path-breaking *Primate Visions* (1989) and *Simians, Cyborgs, and Women* (1991) provide critical analyses of the myriad consequences of a topography grounded upon the distinction of human being from all other living beings. A number of analyses focus on the human ethical treatment of animals such as Lynda Birke's *Feminism, Animals and Science: The Naming of the Shrew* (1994), Carol Adams's *Neither Man nor Beast* (1995), Josephine Donovan and Carol Adams's edited collection *Beyond Animal Rights* (2000), and Greta Gaard's edited collection *Ecofeminism: Women, Animals, Nature* (1992). Other analyses focus on the hybridity of particular human–animal relationships, such as Haraway's *The Companion Species Manifesto* (2003), and Nik Brown's work on xenotransplantation (1999a, b; Brown and Michael 2001).

A number of feminist theorists have also begun to think through the implications of analysing human understandings of embodiment, sexual difference and sexuality with non-human data. Arguing more generally for the recognition of sex and sexual diversity amongst non-human animals, Sharon Kinsman states:

> Because most of us are not familiar with the species, and with the diverse patterns of DNA mixing and reproduction they embody, our struggles to understand humans (and especially human dilemmas about 'sex', 'gender' and 'sexual orientation') are impoverished . . . Shouldn't a fish whose gonads can be first male, then female, help us to determine what constitutes 'male' and 'female'? Should an aphid fundatrix ('stem mother') inform our ideas about 'mother'? There on the rose bush, she neatly copies herself, depositing minuscule, sap-siphoning, genetically identical daughters. Aphids might lead us to ask not 'why do they clone?' but 'why don't we?' Shouldn't the long-term female homosexual pair bonding in certain species of gulls help define our views of successful parenting, and help [us] reflect on the intersection of social norms and biology? (Kinsman 2001, 197)

Elizabeth Wilson extends this invitation to consider non-human species through her analysis of Charles Darwin's work on barnacles (2002, 283–5). Whilst first assuming that the classification of this organism would occupy little time, it would eventually take years to accomplish, involve correspondence with scientists and collectors around the world, and require the dissection of hundreds of specimens. Through dissection, Darwin discovered that most species of barnacles are intersex: each barnacle has female and male organs. Other barnacles first appeared to be sex dimorphic, but closer inspection led to an interesting discovery. What Darwin initially discarded as tiny barnacle-infesting parasites turned out to be male barnacles. Completely different in bodily shape and microscopically small, the male barnacles lived, embedded, inside the body of the female. This was not 'simply' the case of one sex living inside the other; *multiple* (sometimes thousands of) males live inside single females. So barnacles can be intersex but they can also be something else, something for which we have yet to have a common term. Wilson points out that 'these females and hermaphrodites with many husbands are not simply

the intermediary stages in the evolution of barnacle form; they are also evidence of the somatic diversity that nature produces' (2002, 284).

To some extent, then, feminist interest in non-human animal morphology and behaviour has extended beyond feminist evolutionary biology and ethology. I see this interest as part of a wider concern with 'new materialism'.[2] Briefly, new materialism attends to a number of significant shifts in the natural sciences within the past few decades to suggest agency and contingency (Grosz refers to this as 'emergence, which is neither free nor determined but both constrained and undecidable' (1999, 19)) within the living and non-living world.[3] New materialist developments within the natural sciences have made a significant impression on feminist scholars who increasingly find themselves grappling with issues involving life and matter (for instance in debates about the body, the sex/gender binary and sexual difference).[4] These analyses acknowledge the reluctance of feminist theory to engage with the natural sciences in so far as matter has been traditionally understood as inert, stable, concrete, unchangeable, and resistant to socio-historical change; and that the principle means of studying matter—science—has been used to shore up the subordination of women within patriarchy. The reluctance on the part of feminist theory to engage with material processes of development has meant that, while feminism has cast light on social and cultural meanings of concepts such as sex, gender and sexual difference, there seems to be a hesitation to delve into the actual physical processes through which stasis, differentiation, and change take place. Only a minority of feminist studies analyse how physical processes, and particularly non-human processes, might contribute to feminist concerns.[5]

This paper aims to contribute to the growing interest in new materialist approaches to understanding sex, gender and sexual difference. More specifically, I want to bring together two hitherto largely mutually exclusive literatures—new materialism and transsex/transgender/trans—in order to suggest that the study of non-human trans might make a useful contribution to a number of debates engendered within the trans literature. These debates include questions about the authenticity of sex and gender and the extent to which trans is transgressive. The analysis of trans is important for feminist theory inasmuch as it keys into wider debates about the ontology of sexual difference, the vicissitudes of sexuality, and the limits of subjectivity. I will argue these debates tend to occur within cultural analyses, as though assuming that trans is a distinctly and exclusively cultural phenomenon. This has serious consequences for some of these debates (such as the authenticity of trans) in so far as the debate is anchored by a sense of what is natural about sex. Janice Raymond's *The Transsexual Empire* (1979) may have to some extent pioneered the view that trans represents an inauthentic claim to (natural) womanhood, but this argument remains central to more recent analyses of trans.

I want to explore evidence that trans exists in non-human species and what this evidence might suggest about cultural explanations that implicitly rely upon a nature/culture distinction. In this effort I want to extend feminist interest in trans as a specifically sexed enterprise (as in transitioning from one sex to another), but also in a broader sense of movement across, through and perhaps beyond traditional classifications. As such, I share Haraway's interest in species/cendence/fusions/gene/genics/nation that disturb the hierarchy of taxonomic categories (genus, family, class, order, kingdom) derived from pure, self-contained and self-containing nature. For Haraway, trans 'cross a culturally salient line between nature and artifice, and they greatly increase the density of all kinds of other traffic on the bridge between what counts as nature and culture' (1997, 56). What appeals

to me about the concept of trans is that it works equally well between and within matter, confounding the notion of the well-defined, inviolable self which precedes Western culture's 'stories of the human place in nature, that is, genesis and its endless repetitions' (Haraway 1997, 60). As Haraway argues, in these Western stories

> history is erased, for other organisms as well as for humans, in the doctrine of types and intrinsic purposes, and a kind of timeless stasis in nature is piously narrated. The ancient cobbled-together, mixed-up history of living beings, whose long tradition of genetic exchange will be the envy of industry for a long time to come, gets short shrift. (1997, 61)

With this in mind, I turn now to a short review of feminist approaches to trans with a view to then exploring how animal trans might usefully inform these approaches.

Debating Trans

Since the media publicisation of autobiographical narrations of transsex people that began to proliferate in the 1960s and 1970s, feminist scholars have systematically analysed the social, political, economic and cultural implications of trans in society. For the most part, these analyses tend to argue against trans in so far as it is seen to reify patriarchal constructions of femininity and masculinity. Feminist scholars are familiar with the widely cited analyses of Janice Raymond and Sheila Jeffreys, and elsewhere I have critiqued the ontological and epistemological grounds of these analyses (Hird 2002a, 2004d). Here I want to distil the major criticisms that transsex has engendered within feminist theory with the aid of a recent feminist analysis. In her 2000 article 'Out/Performing our Selves: Sex, Gender and the Cartesian Dualism', Tamsin Wilton argues that transsex women represent a 'shallow' reading of the body resulting from an uncritical endorsement of Cartesian dualism. Wilton's critique includes the claim that being a woman despite male corporeality reifies hegemonic regimes of gender, and that transsex people reproduce rigid gender performances.

The first observation is that, despite recent post-structuralist emphasis on performativity, discussions of transsex remain deeply concerned with authenticity, which is itself anchored in a distinction between natural and artificial sexual difference. In Wilton's work, for example, authenticity hinges on the notion that experience of gender (phenomenology) and embodied gender (corporeality) must cohere: Wilton combines vaginas (as corporeality) and menstruation (as phenomenology). Wilton argues that, while surgical reconstruction makes it possible for a transsex woman to possess a vagina, she does not have the experience (phenomenology) of womanhood which menstruation apparently constitutes. Nor, according to Wilton, is the transsex woman's vagina real as it is surgically constructed to the requirement of penile penetration rather than delivering a baby, a point I will return to in my analysis of the ontology of sexual difference. This, for Wilton, depends on a '"shallow" and chronologically static model of the gendered and sexed body which bears little resemblance to its phenomenology' (2000, 244).[6] Using Wilton's terms, transsex fails the authenticity test on two counts. Firstly, it is socially artificial in that transwomen and transmen are precluded from experiencing the meanings of womanhood and manhood. Secondly, trans is materially artificial in that the ontology of sexual difference as naturally grounded renders any transition from one sex to another impossible. This second point coincides with a related critique, that transsex is materially artificial in so far as it relies on human-made technology.

Feminist analyses have also concerned themselves with the extent to which trans renders obsolete the modern relationship between sex and gender.[7] Recent transgender and queer studies employ trans as a key queer trope in challenging claims concerning the immutability of sex and gender. As such, trans studies invest heavily in trans's transgressive potential. For example, Leslie Feinberg refuses to legally conform hir sex to hir expression of gender, instead directing hir efforts towards questioning society's need to categorise by sex at all—the requirement to pass for Feinberg is itself a product of oppression. Kris, one of Feinberg's respondents, asks 'does the fact that everywhere I go everyone calls me "sir" make me a man? Does the fact that I have breasts and a cunt make me a woman'? (quoted in Feinberg 1996, 158). Kate Bornstein (1994) argues that transpeople are not men or women, not because they are inauthentic but because transpeople, by their very existence, radically deconstruct sex and gender. Emerging analyses focus on deconstructing the modern two-sex system. As Zita writes: 'queer scramble[s] the categories of heterosexual sex/gender ontology and open[s] up the possibility of playing against the edge of meaning with the body' (1998, 55).

Although trans and queer studies offer very interesting analyses of the gender system, feminist analyses remain ambivalent about the potential of trans to render sex and gender obsolete. The principal problem is that, although queer theory contests the attribution of any character to masculinity and femininity, performing or doing gender seems to consist principally in combining or parodying existing gender practices, for instance in assertions of a third sex (Taylor 1995). After the meteoric rise of *Gender Trouble* (1990) as the definitive work on gender transgression through drag, Butler spent some time in clarifying her position. In *Bodies that Matter* (1993) Butler asks whether 'parodying the dominant norms is enough to displace them; indeed, whether the denaturalisation of gender cannot be the very vehicle for a reconsolidation of hegemonic norms' (1993, 125). Butler goes to some length to clarify that 'there is no necessary relation between drag and subversion': this relationship is more accurately ambivalent in the sense that the parodic imitation is always implicated in the power that it opposes (Butler 1993, 125).

Living Organism Trans

Feminist analyses of trans, like those by social scientists generally, have tended to argue from socio-cultural perspectives, as though trans is a distinctly human enterprise. I now want to consider how the concerns about authenticity and transgression outlined above might be affected by a consideration of trans in other species. The diversity of sex and sexual behaviour amongst (known) species is much greater than human cultural notions typically allow. This diversity confronts cultural ideas about the family, monogamy, fidelity, parental care, heterosexuality, and, perhaps most fundamentally, sexual difference. For instance, non-human animals engage in a very wide range of sexual behaviours. Socio-biologist Edward Wilson notes that 'monogamy, and especially monogamy outside the breeding season, is the rare exception. Parent–offspring bonds usually last only to the weaning period and are then often terminated by a period of conflict' (Wilson 2000, 315).[8] Single parenting, or indeed no parental investment at all, is the *norm* in the non-human living world (only 5 per cent of mammals form lifetime heterosexual pair bonds). Yet, in human cultures, single parenting is seen as the antithesis of the natural order of things. Amongst non-human living organisms day-care, fostering and adoption are common, as are infanticide (many parents eat their children) and incest. To take one example, in a

study of spotted sandpipers, Oring *et al*. found that fully half of the offspring had been produced by more than two birds, and thus had a complex parental origin (1992).

Nor do many animals have sex solely or primarily in order to reproduce. There is a general lack of acknowledgement of pleasure as an organising force in relations between non-human animals, and neo-Darwinism generally. Edward Wilson notes that male house flies remain copulating with female house flies for a full hour after all of its sperm are transferred, despite the fact that this prolonged copulation decreases its ability to have sex with other flies (and thus produce more offspring) (2000, 321). Indeed, some insects have sex for an entire day. Animals also derive pleasure through masturbation. For instance, one ethologist recounts the following observation of stags:

> He may masturbate several times during the day. I have seen a stag do this three times in the morning at approximately hourly intervals, even when he has had a harem of hinds. This act is accomplished by lowering the head and gently drawing the tips of the antlers to and fro through the herbage. Erection and extrusion of the penis . . . follow in five to seven seconds. . . . Ejaculation follows about five seconds later. (Darling, cited in Fausto-Sterling 1997, 51)

Many female animals engage in sex when they are already pregnant. Birth control is not restricted to humans; many animals practise forms of birth control through vaginal plugs, defecation, abortion through the ingestion of certain plants, ejection of sperm and, in the case of chimpanzees, nipple stimulation. Embryos are also known to kill each other before birth.

Perhaps the single most popular debate about sexual diversity, however, is whether or not homosexual behaviour is natural or unnatural. Homosexual behaviour is part of our evolutionary heritage: it can be traced back at least 24–37 million years (Vasey 1995). Homosexual behaviour occurs in over 450 different species of animals, is found in every geographic region of the world, in every major animal group, in all age groups, and with equal frequency amongst females and males (Bagemihl 1999). Homosexual behaviour in animals is enormously diverse, and in some species is more diverse than heterosexual behaviour (Pavelka 1995). Lifetime pair-bonding of homosexual couples is not prevalent in mammal species, nor is heterosexual lifetime pair-bonding. More than half of mammal and bird species engage in bisexual activities. Non-human animal homosexual behaviour varies in frequency within and between species from non-existence (that is, it has not been reported by ethologists) to levels that meet or surpass heterosexual behaviour.

Whether homosexual behaviour is still considered a deviation from the heterosexual norm, there is a list of other sexual behaviours classified as abnormal that few people question. Sex between different species is one of them.[9] Yet findings are beginning to emerge to suggest that sexual behaviour amongst non-human animals is again much more plastic and diverse than human culture allows. Sexual behaviour between flowers and various insects is so commonplace that it is rarely recognised as transspecies sexual activity. But other examples have been found. For instance, Krizek has documented a sexual interaction between two different orders of insects, a butterfly and a rove beetle (1992, 118). The rove beetle was perched on a leaf with its abdomen elevated. The butterfly approached and for several seconds explored the beetle's anogenital organs with its proboscis. Krizek notes that other such interactions between different orders of human and non-human animals have been observed.

In sum, non-human living organisms display a wide diversity of sexual behaviour. But non-human living organisms also display a wide diversity of sex. Non-humans eschew the assumption that sex involves two (and only two) distinct (and opposite) entities (female and male) and further that these two sexes behaviourally complement each other. Virtually all plant and many animal species are intersex. That is, living organisms are often both sexes simultaneously—which means that there are not really two sexes at all. Most fungi have thousands of sexes. *Schizophyllum*, for example, has more than 28,000 sexes. And sex amongst these promiscuous mushrooms is literally a 'tough-and-go' event, leading Jenni Laidman to conclude that for fungi there are 'so many genders, so little time' (2000). Nor are living organisms genetically sex dimorphic. Studies of people with intersex conditions reveal that there are many variations of sex in humans: XXY, XXXY, XXXXY, XXYY, and XXXYY to name only a few. There is also great diversity in non-human animal chromosome structures: male birds are homogametic with two Z chromosomes and females are heterogametic with one Z and one W chromosome—thus female birds determine the sex of their offspring (Snowdon 1997). Some reptile and amphibian species have no sex chromosomes, and the sex of offspring is determined by the temperature of egg incubation. The platypus has five X chromosomes and five Y chromosomes (Australian Broadcasting Corporation 2004).

Many species also transsex. David Policansky (1982) documents some of the widely distributed geographically and taxonomically sex-changing species. Given the selective and reproductive advantages of changing sex, Policansky questions why more species do not change sex, rather than attempting to explain why some species do have this ability. In other words, in some families of fish, transsex is so much the norm that biologists have created a term for those 'unusual' fish that do *not* change sex: *gonochoristic*. The coral goby, for instance, changes sex both ways, between female and male, depending on environmental circumstances. As further examples, earthworms and marine snails are male when young and female when they grow older. Chaetopod annelids show a similar development, but in certain environmental circumstances will change back into males. For instance, when two females are confined together, one female may kill the other female by biting her in half or eating all the available food. When this female has had sex with a male, the male might then turn into a female and bite her in two (Denniston 1980).

Researchers have also found transvestism to be widespread amongst non-human animals. Sometimes transvestism takes a physical form, when animals physically resemble the 'opposite' sex.[10] Transvestism might also be behavioural, when a non-human animal acts in ways associated with the opposite sex of their species. Some entomologists, for instance, describe transvestism in various insect species. Denis Owen (1988) describes female *Papilio phorcas* (a type of butterfly) that take on 'male pattern' wings of other male butterflies that fly faster and are better able to avoid prey (see also Roughgarden 2004).

Thus, in so far as most plants are intersex, most fungi have multiple sexes, many species transsex, and bacteria completely defy notions of sexual difference. This means that most living organisms on this planet would make little sense of the human classification of two sexes, and certainly less sense of a critique of transsex based upon a conceptual separation of nature and culture.

The Curiosity of Sex Dimorphism

In this concluding section I want to reconsider the concerns of feminist scholars in light of new materialist evidence of sex and sexual diversity in non-human organisms. As

outlined, the concerns include the authenticity of trans, the ontology of sexual difference, the material artificiality of human trans, and the limits of trans as a transgressive identity or being.

Authenticity

Some feminist critiques reject the ability of a trans person (usually a trans woman) to authentically experience a gender other than the one assigned at birth.[11] Wilton, for instance, rejects the ability of a trans woman to authentically experience life as a woman. Whether or not non-human animals 'feel' themselves to be feminine or masculine is a difficult, if not impossible, question to answer, not least because it requires judgements about what constitutes femininity or masculinity in any given species as well as how this experience might feel, and how we might assess how this experience feels. We may assert, however, that non-human animals do experience femininity and masculinity to the extent that any given species' behaviour is gender segregated. To the ethologist, the coral goby fish experiences life as a female coral goby when she reproduces. To suggest that the coral goby is *only* female if and when she reproduces would be the equivalent of reducing human experiences of womanhood to sexual reproduction, something feminist scholars and activists have argued against for over a century.

The Ontology of Sexual Difference

The second, related, feminist critique argues for an ontology of sexual difference that makes impossible any transition from one sex to another.[12] In the case of all non-human living organisms that do trans sex or that completely defy the categorisation of sex dimorphism, this argument cannot be sustained. It might be counter-argued that sex dimorphism is a characteristic of higher life forms and that sex diversity is reserved for lower organisms. To my mind, this hierarchical taxonomy invokes the worst kind of anthropomorphism. As Eileen Crist highlights in her book *Images of Animals* (1999), naturalists like Darwin have been heavily criticised for attributing supposedly unique human qualities (such as affection, fear, anger and joy) to non-human animals. Since then, the almost complete hegemony of ethology and evolutionary psychology within neo-Darwinism has asserted a rigid separation between human and non-human organisms, not only of degree but also of kind.[13] At one time, to challenge this hierarchy (and its Judaeo-Christian origins) was to risk being labelled 'unscientific'. Such challenges, however, have now begun to filter into mainstream biology. For instance, while George Herbert Mead (1934) distinguished humans from all other animals through our supposedly unique ability to recognise ourselves as objects, recent studies conclude that chimpanzees and orang-utans recognise themselves, and subordinate simians hide copulation from other males (Griffin 1992, in Margulis and Sagan 1995, 150).

From Darwin's perspective, all surviving species are equally successful, and any other classification of superiority or inferiority is based upon human-made criteria. Further, the homogenisation of non-human animals shifts attention away from contemplating the possible similarities between humans and other animals (humans share 98 per cent of the same genes with chimpanzees), and, more disturbingly, the possible 'superiority' of non-human organisms in certain respects. We might, for instance, consider that humans and other primates should be considered inferior to some other organisms, particularly with

regard to sex. Evolutionary theory is commonly assumed to favour sexual reproduction over non-sexual reproduction and sex differences over sex diversity. These assumptions, however, are based more on competing evolutionary theories than on Darwin's original thesis. New materialism, on the other hand, has generated a renewed interest in what I argue have become more silent, yet nevertheless intrinsic, elements of Darwinian theory: contingency, diversity, non-linearity and self-organisation (all of which are distinctly non-functional). As Elizabeth Wilson argues, 'there is no pre-given identity of form or function to be found anywhere in nature [Darwin] argues; rather there is mutation, inconstancy and radical interconnectivity that produces the identities and differences we recognize as individuals and species' (2002, 284).

Take bacteria, for instance. Sagan observes that 'Bacteria are biochemically and metabolically far more diverse than all plants and animals put together' (1992, 377). On their curriculum vitae, bacteria cross species barriers (indeed, bacteria cannot be referred to as a species), perform hypersex (permanent symbiosis), pass on pure genes through meiosis, shuffle genes, and successfully resist death. Although the subject of a paper in its own right, it is worth noting that much of the brave new world of reproductive technologies is human mimicry of well-worn bacterial practices that are millions of years old. Our remote ancestors continue to promiscuously exchange genes without getting hung up on sexual reproduction. Bacteria are not picky, and will avidly exchange genes with just about any living organism anywhere in the world, including humans. Thus bacteria are beyond the female/male dichotomy of human discourse (Margulis and Sagan 1997, 89). Since bacteria recognise and avidly embrace diversity, they do not discriminate on the basis of sex differences at all. The bacteria that move freely into and within our bodies are already infinitely sex diverse.[14]

Until recently, however, the bacterial world has been under-researched, precisely because of assumptions made about the unimportance of bacteria in sustaining the living and non-living environment. As Lucien Mathieu and Sorin Sonea (1996, 3) note, 'the every day contribution of bacteria to life on Earth is momentous' in terms of the maintenance of global homoeostasis, the dependence of living organisms (including humans) on bacteria for processes such as digestion, and, indeed, the origin of species themselves. Perhaps it is telling that we feel the need to distance ourselves through a taxonomic hierarchy from our earliest ancestors. Sociobiologists and social scientists alike have tended to overlook the sex lives of bacteria in order to adhere to a paradigm that a priori defines the kind of sexual reproduction humans engage in as superior. As Lynn Margulis and Dorion Sagan argue:

> Our own biologically parochial existence as sexually reproducing beings does not mean . . . that there is only copulatory, genital-based sex or that sex has anything necessarily to do with reproduction. . . . Sex is not equivalent to reproduction. On the one hand, any organism can receive new genes—can indulge in sex—without reproducing itself. On the other hand, plants bud, bacteria divide and cells with nuclei reproduce all without any requirement for sex. (1997, 17)

Evolutionarily speaking, sexual reproduction is a recent phenomenon. Margulis and Sagan (1986) argue that sexual reproduction evolved by accident as a necessary by-product of the evolution of multicellularity and cellular differentiation. In multicellular organisms, cells begin to specialise and carry out different functions: 'mixis . . . becomes a consequence of the need to preserve differentiation . . . mixis itself is dispensable and . . . was never

selected for directly' (Margulis and Sagan 1986, 180).[15] Put another way, 'multicellularity provided evolutionary advantages and sex came along for the ride' (Fausto-Sterling 1997, 53). Thus, rather than deliberate on how most living organisms are able to reproduce without sex, scientists are more puzzled by those species that *do* engage in sexual reproduction. Sexual reproduction consumes twice the energy and genes of parthenogenic reproduction. After an extensive search of the biological literature on sex, Mackay concluded:

> The most intriguing aspect of my research was why we have sex at all. After all, sexual reproduction in animals started only 300 million years ago. Life on earth got on pretty well for 3000 million years before that with asexual reproduction. . . . [Sexual reproduction] takes more time, it uses more energy, and mates may be scarce or uncooperative. (2001, 623)

The Material Artificiality of Human Trans

To argue that human transsex relies entirely upon technology is to significantly circumscribe the definition of technology to the human sphere. As Arthur C. Clarke points out, 'we never invent anything that nature hasn't tried out millions of years earlier' (2000, 333). At a basic level, life itself is, and has always been, technological in the very real sense that bacteria, protoctists and animals incorporate external structural materials into their bodies (Margulis and Sagan 1997, 227). Bacteria also invented all major forms of metabolism, multicellularity, nanotechnology (controlling molecules in ways that continue to elude scientists), and metallurgy. Given that Western societies routinely deploy technology in a plethora of varying circumstances, the specific regulation of technology in the case of transsex becomes a more transparently moral exercise, raising again the association between morality and the nature/culture distinction. For instance, Wilton describes the from-birth vagina as 'a complex organ, muscular, self-maintaining and dynamic' compared with the surgical construction of a vagina in which 'you flay the penis, turn it inside out, and insert it into the pelvic cavity between the bowel and abdominal wall' (Wilton 2000, 245). Most surgery, and I am thinking here particularly of eye and heart, makes for pretty grim reading, and yet may be attributed entirely positive meaning, as is skin 'flaying' for burn-victim skin grafting.

This use of technology to distinguish between nature and culture obscures the very real and energetic invention and use of technology by non-human living organisms (termite high-rise cities include 'birth chambers, hatcheries, the insect equivalent of schools, hospitals, honeymoon quarters, workshops, and morgues' all under sensitive climate control) as well as the extent to which so-called human technologies actually mimic technology already invented by other species (Margulis and Sagan 2002, 118–20). The continued focus on technology also further limits the discussion to transsex rather than considering the lived experiences of transpeople more generally.

Trans as Non-transgressive

In terms of the debate within feminist theory about the transgressive potential of trans, it seems to me that if trans and queer studies concern the ways in which we might work within current structures to transform sex, gender, and sexuality, then the study of trans amongst non-human living organisms is a vital part of this project. Elizabeth Wilson

notes that feminists have positively reclaimed the notion of perversity for its supposed defiance of nature, in so far as heterosexuality is venerated as normal because it is natural. By taking on board Darwin's finding that 'nature is already generatively and happily perverse' feminist theory might reconsider the ways in which this 'natural perversity [might] reorganize our culture-centric theories of difference, embodiment and identity' (Wilson 2002, 284).

Elsewhere I have critiqued queer theory for what I saw as an implicit assumption that queer is constituted through the domain of culture (Hird 2004d). I argued that the morphologies and behaviours of many living organisms are queer in that they challenge heteronormativity. The problem with my argument, it seems to me now, is that I read non-human living organisms through the lens of queer, rather than critically reflect upon how we socio-culturally constitute queer and how we might read queer through a non-human lens. Referring to Darwin's barnacles, Elizabeth Wilson distils this alternative term of reference:

> to characterize Darwin's barnacles as queer is too glib—if by this characterization we mean that the barnacles simply mimic those human, cultural and social forms now routinely marked queer (the transgender barnacle! The polyandrous barnacle!). This characterization has more punch if it is used, contrariwise, to render those familiar human, cultural and social forms more curious as a result of their affiliation with barnacle organization. The queerness of Darwin's barnacles is salutary not because it renders the barnacle knowable through its association with familiar human forms, but because it renders the human, cultural and social guises of queer less familiar and more captivated by natural and biological forces. (2002, 284)

We need to consider the viability of continued discussions of human trans as though it were an entirely socio-cultural phenomenon. To take Wilson's point, we need to resist the temptation to name certain species as queer—queer barnacles, queer *Schizophyllum*, queer fish, queer lichen. It is much more interesting to consider how we might understand trans in humans from, say, a bacterial perspective. From such a perspective, given the diversity of sex amongst living matter generally, and the prevalence of transsex more specifically, it does not make sense to continue to debate the authenticity of trans when this debate necessarily relies upon a notion of nature that implicitly excludes trans as a non-human phenomenon.

Perhaps given its prevalence amongst living matter, we should be concerned with how infrequently humans trans sex. As Birke *et al*. point out:

> there are sets of practices and performativities, both human and non-human, *which reproduce 'the animal' as something apart, as different* . . . we need to understand more about 'animality'—and hence 'humanness'—and how that cuts across gender. But that must be done in ways that allow for animal agency, participation, and performativity—whether they are stag beetles, laboratory rodents, or companions by the feminist fireside. (2004, 178; my emphasis)

NOTES

1. Punky and Elvira's case evinces one side of the ambivalent relationship between nature and morality. Animals also represent all that is base or inferior in humans. See Daston and Park (1998).

2. See my discussions in Hird (2002b, 2003a, b, 2004a, b, c, d, forthcoming).
3. For examples of these shifts see De Landa (1997a, b), Deleuze and Guattari (1987), Jonson (1999), Kirby (1997, 1999, 2001), Margulis and Sagan (1997), Rabinow (1992), and Sagan (1992).
4. Indeed, elsewhere I suggest that some of the most thought-provoking and promising explorations of new materialism have recently been produced by Australian feminists. See Hird (2003b).
5. For example, much has been written within feminism on eating disorders and the body, including the social construction of dieting, fitness, beauty and the patriarchal system that regulates women's relationships with their own bodies. See, for instance, Orbach (1986) and Bordo (1993). Despite the enormous number of feminist analyses on the gendered construction of eating disorders, 'these analyses consider the cellular processes of digestion, the biochemistry of muscle action, and the secretion of digestive glands to be the domain of factual and empirical verification . . . only a certain understanding of the body has currency for these feminist analyses, an understanding that seems to exclude ''the biological body''' (Wilson 1998, 52).
6. Wilton parenthesises the word 'shallow' to allude to her critique that the sex change of post-operative trans bodies is only skin deep, such that a technology-made vagina is not connected to a uterus. Elsewhere I detail the problems with this account of phenomenology and corporeality. See Hird (2003c).
7. Transsexualism currently defines an individual's relation to gender reassignment: pre-transition/operative, transitioning/in the process of hormonal and surgical sex-reassignment, and post-transition/operative. Transgender and trans signify an attempt to loosen the association between transitioning from one sex to another, and hormonal and/or surgical intervention. As such, transgender and trans (and more recently still the term 'queer') eschew a foundational essence and focus instead of performativity within socio-cultural relations of power.
8. For a discussion of child abuse within non-human primates, see Reite and Caine's edited volume *Child Abuse: The Nonhuman Primate Data* (1983). For ethologists and biologists, sex change typically refers to an organism that functions as one sex during one breeding season and the 'other' sex during another breeding season. This definition excludes those organisms that can change sex within one breeding season.
9. People recognise that sexual intercourse between a horse and donkey might produce an ass, but, on the whole, transspecies sex is considered impossible.
10. Bruce Bagemihl (1999) notes that transvestism does not mean taking on activities or behaviours that are considered to be either typically 'female' or 'male'. For instance, the sexual reproduction of offspring is typically considered a female prerogative. But for sea horses and pipe fish the male bears and gives birth to offspring. So male sea horses and male pipe fish are not practising transvestism when they produce offspring. Bagemihl (1999, 38) notes that this is also the case for behaviours involved in what biologists term 'courtship'. In many species, females are more aggressive than males in these behaviours. Should a female in these species behave passively, she would be practising transvestism. It is worth noting here that non-human animals that engage in transvestite behaviour, like their human counterparts, specifically avoid homosexual behaviour. The misconception that transvestites (usually male) attempt to be 'feminine' in order to attract sexual relationships with men is as erroneous for the non-human as it is for the human animal world.

11. This scepticism is not limited to academia. Witness the outcry that ensued in 1995 when Kimberley Nixon, a trans woman, attempted to train as a volunteer counsellor for women sexual assault survivors at Vancouver Rape Relief organisation. When Nixon revealed herself to be trans, the Rape Relief organisation refused to allow her to engage in counsellor training. This decision culminated in a British Columbia supreme court ruling, and a case that remains ongoing. See Prasad (2005) and Namaste (2000). The case pivots on arguments about the authentic embodiment of femaleness.

12. Ontology tends to be (as in Wilton's case) morphologically defined.

13. Here I refer to ethology as a post-modern synthesis of Darwinian theory.

14. I am not the only social scientist interested in bacteria. For example, Donna Haraway (2001, 82) provides a superb example of how knowledge of biological diversity can inform key feminist debates about embodiment and subjectivity. Haraway describes *Mixotricha paradoxa*, a minute single-celled organism that lives in the gut of the South Australian termite. For Haraway, this tiny organism engenders key questions about the autonomy of identity (we tend to assume that single organisms are defined by the possession of nucleated cells), or, as Haraway puts it, 'the one and many'. *Mixotricha paradoxa* lives in a necessary symbiotic relationship with five other organisms, none with cell nuclei but all with DNA. Some live in the folds of the cell membrane, whilst others live inside the cell, whilst simultaneously not being completely part of the cell. Haraway asks: 'is it one entity or is it six? But six isn't right either because there are about a million of the five non-nucleated entities for every one nucleated cell. There are multiple copies. So when does one decide to become two? And what counts as *Mixotricha*? Is it just the nucleated cell or is it the whole assemblage?' Advancing a similar argument, Joost Van Loon (2000) uses symbiosis theory within non-linear biology to argue the parasite with the body as the ultimate 'Other', and invites a reconsideration of a politics of difference from inside the body.

15. Mixis refers to the 'production of a single individual from two parents by way of fertilization occurring at the level of fused cells or individuals'. See Margulis and Sagan (1986, 232).

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Myra J. Hird is Associate Professor and Queen's National Scholar at Queen's University, Canada. She is the author of *Sex, Gender and Science* (Palgrave, 2004), *Engendering Violence* (Ashgate, 2002) and co-editor with George Pavlich of *Sociology for the Asking* (Oxford University Press, 2003). She has also published several articles on new materialism, sexual difference, intersex and trans in *Signs*, *Feminist Theory*, *Body and Society* and *Parallax*.