

Thinking Ecologically about Biology



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THINKING ECOLOGICALLY ABOUT BIOLOGY

This paper is part of a work in progress which in its current state is rough, and largely exegetical. It has its source in four interconnected issues:

- 1. The persistent power of deterministic readings of biology – if not as destiny, at least as univocal in its import – as DNA evidence, for example, plays an increasingly definitive part in ‘reading’ what biological findings produce.*
- 2. The related power of what Carla Fehr calls unifying views and causal mechanical views of biology as they work reductively against claims in favour of pluralist explanations.*
- 3. The entrenched appeal of a ‘vulgar Darwinism’ (borrowing a phrase from Lenny Moss) in shoring up unilinear, mechanistic biological explanation, together with the social-political effects such explanations unleash.*
- 4. The next section, not yet written, will address the fall-out from debates between Kwame Anthony Appiah and Naomi Zack, and others, in the aftermath of claims to the effect that DNA evidence incontrovertibly shows that there are no races.*

*I have not followed all four strands here, but my purpose is to read certain modes of biological explanation ecologically, through a feminist lens, in an exploratory way. I was prompted to think along these lines by the 2007 Darwinian theme at the Institute of Advanced Study at Durham University, and by an invitation to take part in an American Philosophical Association panel ‘New Paradigms in Biology’, in spring 2007. Its aim is continuous with that of my 2006 book, *Ecological Thinking: The Politics of Epistemic Location*: to unsettle a hegemonic epistemology of mastery and control. This paper could be subtitled: ‘What’s Wrong with Fence-Sitting?’*



In advocating the epistemological and moral-political value of thinking *ecologically* about biology, as I will do here, my aim is to examine divergent yet reciprocally informative and mutually constitutive approaches to biology (cursorily aggregated) rather than to seek new Kuhnian-style paradigms, where the new would have to supersede the old to establish a hegemonic explanatory principle. I will try to show how diverse yet often complementary ways of viewing – of *imagining* – biology, across a spectrum that runs from seeds to insects to human beings, and thence to feminist analyses of embodiment, can yield ways of knowing and acting with and in response to ‘nature’ that are at once scientifically respectable, and epistemically responsible. And I will suggest that contests, tensions between and across seemingly incompatible approaches, can be productive rather than aporetic, even if they do not result in ‘reconciliation’ or homogenization. In this summary formulation, I take scientific respectability to hinge on rigorous pursuit of and attention to ‘the evidence’ informed by and gathered according to state-of-the-art ‘normal’ scientific practice, yet with the caveat that even evidence secured by the most sophisticated available methods rarely speaks for itself. I take epistemic responsibility to hinge on practices of being accountable to the evidence: to

determining and knowing it well. But it equally requires responsiveness to circumstances, situations, people and places that are shaped, negatively or positively, by the attention, care, interpretive and political-moral commitments through which evidence comes to count as evidence and is enlisted to inform practice. A central component of epistemic responsibility is an acknowledgement that in the smallest empirical 'fact' and the most dazzlingly innovative scientific discovery the effects of careless, inadequate or too-swift epistemic closure are manifest, and can be devastating in their consequences. I will conclude by suggesting how ecological thinking can contribute to thinking responsibly about biology in the current social imaginary.

My approach is animated, in part, by Gilles Deleuze's conception of *ethology*, which he extends, literally and metaphorically, beyond its more usual reference to the scientific study of animal behaviour, to characterize it as inquiry that considers 'the capacities for affecting and being affected that characterize each [living] thing'; that studies 'the compositions of relations or capacities between different things [...] and is [...] a matter of sociabilities and communities' (Deleuze, 1988, pp. 125-6). It is further animated by the epistemic and ethical-political force of his question: 'How can a being take another being into its world, but while preserving or respecting the other's own relations and world?' (Deleuze, 1988, p. 126). Ethology thus invoked gestures toward thinking about knowing as ways of mapping peoples' and other living beings' relations to one another, to physicality, sociality, place, cultural institutions, materiality, corporeality, to name just some ways of charting its effects, where neither 'worlds', 'beings', nor 'relations' can be presumed before the fact to be static, unchanging (see also Deleuze and Guattari, 1987, p. 336). Its social-political-ethical potential is both remarkable and subtle. Deleuze resists simplistic taxonomies that issue in reductive, mechanistic understandings of individual capacities and powers; for a body, he says, 'can be anything [...] it can be a linguistic corpus, a social body, a collectivity' (Deleuze, 1988, p. 127). Understanding biological science, and engaging biologically-derived and -related practices through which such capacities could be realized, is a central project of ecological thinking, which is variously consonant with and enriched by Deleuze's conception of ethology.

Yet the benign tone of the passages I have cited risks masking the extent to which Deleuze is critically aware of the destructive, selfish aspects of ethology, with the dog-eat-dog struggles for survival that are as integral to it as its respectful modalities. As I caution in *Ecological Thinking*:

Ecosystems – both metaphorical and literal – are as cruel as they are kind, as unpredictable and overwhelming as they are orderly and nurturant, as unsentimentally destructive of their less viable members as they are cooperative and mutually sustaining; and ecological thinking is as available for feeding self-serving romantic fantasies as for inspiring socially responsible transformations. So if it is to avoid replicating the oppressions endemic to orthodox epistemologies and ethical theories, ecological thinking requires principled adjudication of incompatible claims; effective deliberative practices for enacting it; and the vigilant monitoring on which most revisionary social movements depend to promote and preserve its fragile gains while countering threats of renewed oppressions (Code, 2006, p. 6).

These thoughts, too, are central to thinking ecologically about biology.

Against this backdrop, I will proceed by way of examples to illustrate some practices in which ecological thinking is at work, en route to turning, in the final sections of this analysis, to feminist issues in/with biology, in a historical period marked, in the western world, by the

authority biological determinism has claimed. I will propose that the scientific-epistemic credibility of biological determinism is open to challenge for its undue reliance on an implausibly reductive and dislocated knowledge base; and for the extent to which it has been enlisted to shape social-political conclusions that have been dire for late-twentieth and early-twenty-first-century liberatory social movements. Reductive practices are thus a central critical focus of this essay: I acknowledge their power and their remarkable explanatory capacity, while urging an ongoing interrogation of the possibilities of understanding they truncate, the socially-politically damaging effects they can, unwittingly, enact. Moving instead toward preserving and respecting organisms – human and other-than-human – in their multiple relations, be they benign, malign, or indifferent, opens a range of differently creative yet empirically justifiable ways of understanding – imagining – the resources and resilience of life.

Ecological Thinking

Starting perhaps implausibly from seeds, I want to move toward dislodging the allegedly self-evident, if seldom articulated, belief that ‘a seed is a seed is a seed’ by recalling Hugh Lacey’s ecologically-motivated claim that ‘what seeds [...] and the plants that grow from them *are* is partly a function of the sociocultural nexus [...] of which they are constituents’ (Lacey, 2001, p. 91, my emphasis). The basic claim echoes Vandana Shiva’s documentation of the effects of genetically modified, high yield variety (HYV) seeds in radically reconfiguring the agricultural practices and gendered divisions of labour of an entire society, and not demonstrably for the better. In her view, the reductionist biological knowledge that underwrites mono-cultural farming destroys the ‘invisible ecological flows [...] the] linkages [through which] ecological stability, sustainability, and productivity under resource-scarce conditions are maintained’ (Shiva, [1993] 2006, p. 240). The issues are as economic and political as they are biological and epistemological (as in how seeds are *known*, not just ‘in themselves’ but across a complex nexus of ‘sociabilities and communities’). Lacey and Shiva detail economic hardships engendered in societies hitherto reliant on the ‘custodianship of seeds’ which had been nurtured to reproduce themselves from generation to generation, when seeds become commodities, when farmers – often women – come to be dependent on multi-national agrobusiness to purchase seeds they would otherwise have produced, and when permacultural practices that had sustained the population and nourished the soil are displaced. Among the principal biological effects is the eradication of biodiversity: ethologically, in Deleuze’s more benign sense, there is scant evidence of commitment to taking the being of others into one’s world, while preserving or respecting their own relations and world.

Undoubtedly, sceptics could dismiss such localized criticisms and transparently political claims as nostalgic yearnings for mis-remembered practices and states of affairs no longer viable in twenty-first-century mass societies when hitherto unimaginable numbers of people need food, work, clothing and shelter; could cast them as naive failures to acknowledge the price of progress. Indeed, the rhetoric of ‘development’ often mobilizes just such strategies. Yet Shiva and Lacey, among others (cf. Curtin, 1999), amply document the implications of ‘knowing’ seeds merely as biological entities, where biology ‘proper’, so to speak, sharply separates itself from any thought of according *epistemological* significance to what Lacey calls the socio-cultural nexus. In documenting how sustainability and self-sufficiency, both individual and social, are undermined by reductive scientific practices that disdain ecological investigation, neither Shiva nor Lacey advances a naively, or even a sophisticatedly, anti-science position. Their point, as Lacey puts it, is to challenge ‘the powerful links of mainstream science [...] with currently hegemonic values’ encapsulated in ‘materialist strategies’, which reduce what seeds are to their ‘genomes and to the biochemical expressions of their component genes’,

abstracting them from their place in human experiences and practices, and dismissing as non-scientific, epistemologically irrelevant, their links ‘with social value and with the human, social, and ecological possibilities they might also admit’ (Lacey, 2003, p. 95). Thus the argument is as much about a re-evaluation of entrenched values as it is about how to know seeds – or weeds! In short, now citing Richard Lewontin, ‘a deep ideological commitment that goes under the name *reductionism* [...] has produced a] false dichotomy of nature and nurture’ (Lewontin, 1993, p. 107). Agreeing with him requires examining the scope and limits of reductive, mechanistic, quantitative ways of purporting to know living things.

These issues, urgent as they now are both epistemologically and ethically-politically, are not new. One of their earliest champions and practitioners was Rachel Carson, to whom my mention of insects obliquely refers. The position I develop in *Ecological Thinking* takes its point of departure and owes its working conception of ‘ecology’ to an epistemological position I find implicit in Carson’s work, where I read as emblematic her insistence that ‘neither man [sic] nor any other living creature may be studied or comprehended apart from the world in which he lives’ (Carson [1956] cited in Lear, 1977, p. 278, my emphasis); echoing a point from her acceptance speech for the National Book award: ‘It is impossible to understand man without understanding his environment and the forces that have molded him physically and environmentally’ (Lear, 1977, p. 219). It would distort Carson’s approach to read it as tracing discrete, unilinear causal relationships to explain the ‘forces that have molded’ nature and human nature, but give it less than its due to gloss over the multiple connections and reciprocal effects she exposes. Again, it would overstate the case to represent such factors as *determining* either the production of biological knowledge or the substance of the knowledge produced; but understate it to gloss over their constitutive effects. These aspects of Carson’s thinking are consonant with an informed opposition to reductionism, and to biological inquiry that abstracts from the lives and circumstances of so small an entity as a seed or an insect; so large an entity as a human being or an elephant. It is also with reference to her work that I have referred to a spectrum running from seeds to insects to human beings, for one of Carson’s path-breaking contributions to twentieth-century ecology was her approach to eradicating such insect ‘pests’ as the Japanese beetle, the spruce budworm, the fire ant, and the gypsy moth, by ecologically sensitive methods which avoided the quick and dirty – environmentally devastating – effects of the new chemicals available after World War II. That approach, I am suggesting, translates widely across epistemological – and hence biological – practices and principles, albeit with situation-responsive variations and nuances.

An extended quotation (modified) from *Ecological Thinking* will illustrate my point:

[In *Silent Spring*] Carson displays ecological thinking at work, across diverse modes of knowledge, domains of inquiry, subject matters; bringing together scientific and experiential evidence to produce conclusions sufficiently particular to address the distinctive character of precisely individuated local phenomena; sufficiently cognizant of wider patterns in nature to generate hypotheses for knowing other, relevantly analogous phenomena; sufficiently informed and coherent to engage with the agendas of policy-makers, the doubts of disbelievers, and the bewilderment of a public caught between ‘expert’ scientific assurances and experiential incongruities. The very complexity of each separate subject matter requires a knower to be multilingual and multiply literate: to speak the language of laboratory science, wildlife organizations, government agencies, chemical-producing companies, secular nature lovers, and many others; to understand the detail of scientific documents and the force of experiential reports; to work back and forth between an imaginary of mastery and of ecology – sometimes, all for the sake of understanding something so very small as a beetle.

Carson's accounts of massive insect-control spraying programmes nicely exemplify the epistemological significance of a complex interplay between precise local hypotheses and empirical generalizations. Germane to their ecological implications are contrasts she draws between the environmental destruction consequent upon massive spraying, and the success of 'natural' methods in achieving equivalent or even better regulation and control with markedly less environmental damage and monetary cost [...]: contrasts which, she notes, 'raise a question that is not only scientific but moral [...] [W]hether any civilization can wage relentless war on life without destroying itself, and without losing the right to be called civilized' (Carson, 1962, p. 99; Code, 2006, p. 44).

Carson is proposing the detail and the larger frame of what I have called a renewing epistemic imaginary, which seeks to know relationally, casting its evidential net more widely than reductionism can allow, to accord experiential, testimonial, situational evidence the significant place it indeed merits, in epistemological discovery, justificatory, and circulation-implementation projects. The process is distantly analogous to standpoint theory's commitment to situating the investigator and the investigated on the same plane of inquiry.¹

Indebted to Carson, and – more critically – to Quinean naturalized epistemology with its professed debt to Charles Darwin in its appeal to a revitalized doctrine of natural kinds, I call my epistemological-ethical position 'ecological naturalism.' In response to his own question as to why human beings' 'innate spacing qualities' are so attuned with nature 'as to make our inductions tend to come out right,' Quine famously observes: 'There is some encouragement in Darwin. [...] Creatures inveterately wrong in their inductions have a pathetic but praiseworthy tendency to die before reproducing their kind' (Quine, 1994a, p. 66). Yet while commending his departure from *a priori* epistemology, I find that the promise of Quinean naturalism is truncated by its restricting 'natural knowledge' to the activities of replicable human subjects in laboratory studies; by its silence about the unequal epistemic parts played by diverse social groups; and hence by its failure to engage with specifically populated, socially, ecologically, geographically, and politically located projects of knowing the very 'natural kinds' on which its projects depend; hence by its granting exemplary status to so minuscule a portion of what and how these creatures profess to know. In short, its promise is truncated by issues analogous to those Lacey, Carson, and Shiva variously cite in deploring the reductionism of seed biology and insect control.

In locating itself critically in relation to Quinean naturalism, my project, then, also locates itself obliquely in relation to the legacy of Charles Darwin who is, sometimes unjustly, counted among the negative influences when natural kinds are invoked to rationalize social-political injustices, in tacit endorsement of a reductive biological determinism. Noteworthy in this regard is Linda Lear's – Carson's biographer's – claim that patterns of life Carson traced in her early work 'were molded not by some fierce Darwinian determinism [sic!]' but by 'endless cycle, comforting in its certain repetitions' (Lear, 1997, p. 103). Yet Carson's sole reference to Darwin in *Silent Spring* attests to a less 'fearsome', less deterministic reading than Lear presupposes: one that finds in him an interactive understanding of forces in nature. Writing of Darwin's *The Formation of Vegetable Mould, through the Action of Worms, with Observations on Their Habits*, Carson commends the originality of the understanding Darwin 'gave the world' in his depiction of a soil community consisting of 'a web of interwoven lives, each in some way related to the others – the living creatures depending on the soil, but the soil in turn a vital element of the earth only so long as this community within it flourishes' (Carson, 1962, p. 56). She deplores the neglect of 'the ecology of the soil' by scientists and 'control men' alike.

In this reading, Carson anticipates such later twentieth-century thinking as Kristin Shrader-Frechette's insistence that the science of ecology 'cannot provide precise, fundamental, testable, scientific laws' (Shrader-Frechette, 2001, pp. 304-5), Lewontin's observation that there are almost no causal laws in biology, for every organism is the outcome – often unpredictable, surprising – of networks of internal and external relations; and Mary Hesse's remark: 'It is impossible in studying theories of evolution, ecology, or genetics, to separate a mode of knowledge relating to technical control from a mode relating to the self-understanding of man [since] the very categories of these theories, such as functionality, selection, survival, are infected by man's view of himself' (Hesse, 1980, p. 186; Rouse, 2002, p. 89). Here she anticipates recent feminist readings of Darwin, to which I will return.

Naturalizing epistemology, when it is conceived – as I think it must be – as a project of rereading reason and knowledge production in their multiple manifestations as expressions of 'our' identity as a natural, biological species, requires exposing and deconstructing tacit yet entrenched decisions about what counts as 'our' natural identity, about which of its myriad expressions have contributed well to viable knowledges and practices, and which have, justly or otherwise, been relegated to the realm of 'subjugated knowledges'² (cf. Foucault, 1980, p. 82). Even in this age of DNA-informed biological sophistication, producing a 'natural history' of human knowing is hampered by a remarkable ignorance of where nature begins and cultural or other 'artificial' accretions end: indeed of whether an idea of nature 'in itself' or 'as such' behind the accretions is remotely intelligible.³ Constrained by these imponderables, naturalized epistemology has long been in the business of naturalizing as it goes; and self-proclaimed *epistemological* 'naturalism' is not alone in so doing. Together with, and often in concert with the ontology they presuppose and inform, and the moral-political theories they implicitly sustain, theories of knowledge are imagined without question to derive from and pertain to 'nature' and 'human nature' *tout court*, even as their effects have been to naturalize many of the very attributes and actions they commend or condemn.

Feminist Implications

To illustrate this point, feminists and other Others need only remind themselves of a long history in which representations of female nature (cursorily aggregated) as more emotional than rational or less rational than (idealized) male nature are enlisted to naturalize women's putative rational inferiority and to rationalize their marginalization; while analogous presuppositions about other Others' – Blacks', women's, slaves', the workers' – natural incapacity for rational self-governance are similarly enlisted to rationalize wide-ranging and intransigent hierarchical social orders. Genevieve Lloyd's *The Man of Reason: 'Male' and 'Female' in Western Philosophy* stands as a point of entry into charting the conceptual spaces that have made such naturalizing possible, and that it has continued to maintain (Lloyd, [1984] 1993). Given Quine's reliance on scientific psychology for his conception of natural kinds, it is worth recalling Naomi Weisstein's demonstration in 'Psychology Constructs the Female' that natural (female) human 'kinds' are as artefactual as they are factual⁴ (Weisstein, 1971); Carol Gilligan's exposure of Kohlbergian psychology's contribution to naturalizing female moral immaturity (Gilligan, 1982); and Philippe Rushton's 'discovered' correlations between genital and brain size, which produce 'natural' hierarchical differences in Black, Oriental and white intelligence as persuasively as they 'merely' record them. In such studies, which are emblematic for early second-wave feminists of psychology's complicity in naturalizing practices that erase human differences while casting the objects of inquiry in their own image, 'nature' is as much a product of experimental design as it is a 'given', suggesting

that psychology constructs, as frequently as it 'finds', woman, the Black, the other Other, as natural kinds. Nor is there reason to believe that psychology is unique among human and natural sciences in this respect. Hence, in *Ecological Thinking*, and informed by my work in feminist epistemology, I move the discussion of natural kinds into social-political domains, to argue that although continued survival may indeed attest to the reliability of 'our' perceptual-inferential processes, as long as those processes are so diversely realized, as long as survival varies so widely, both qualitatively and quantitatively across this putatively natural kind, and as long as possibilities of achieving epistemic and moral-political authority are so narrowly determined and unevenly distributed, there is more to say about who 'we' are, and about the myriad effects of (Lacey's) socio-cultural nexus in how we assume to *know* who we are.

Curiously, and I think mistakenly, some of its advocates and critics, and Alessandra Tanesini among them, read naturalized epistemology and ecological naturalism along with it, as endorsing a conception of reason that 'like all "natural" occurrences [...] is to be explained scientifically in purely causal terms,' going on to maintain that ecological naturalism, therefore, 'is committed to a causal account of knowledge' (Tanesini, 1999, pp. 117-8). In short, in reading naturalized epistemology reductively, she offers a restrictive account of its explanatory potential. Such a reading is curiously implausible: feminist heirs to the Quinean project such as Lynn Hankinson Nelson and Jane Duran (Nelson, 1990, 1995; Duran, 1990) would surely contest it. And my point in producing a 'desublimated' account of reason and knowledge, together with my criticisms of the artefactual character and unremitting scientism of Quinean conceptions of 'the natural' and my pleas for recognizing the multiple contributions of situation, circumstance, and subjectivity to knowledge and rationality, inform a reading of causality that is far removed from the 'purely causal terms' she invokes. 'Effects', of which I frequently speak, are far more complex, temporally remote, multi-stranded, even chaotic than linear causality.

Reading 'pure causality' into naturalized epistemology bespeaks a 'methodolatry', generated perhaps by the elegance, simplicity, and power of genetic explanation, yet allowing it to push all other epistemological considerations aside, dismissing them as anti-scientific or naively unworthy of scientific attention. Such dismissals, in different garb, were endemic to the struggles Carson consistently faced in claiming epistemic validity for detailed local and 'life historical' studies and for everyday, secular testimony about environmental damage, in their capacity to challenge linear, one-size-fits-all causal explanations of ecological 'damage': for her attention to the socio-cultural nexus.

One of the principal villains rarely read but frequently caricatured in such critical engagements with biology was Charles Darwin: or, more precisely, a 'vulgar Darwinism,' a position to which Lenny Moss persuasively attributes a 'propensity to want to explain too much on the basis of too little [...] denying] agency to living organisms in favor of the abstract dictates of an algorithm or the logic of "the replicator"' (Moss, 2005, p. 349). He is gesturing toward a difference between taking genetic/evolutionary theory as seriously as it must be taken, and reading it as capable of explaining everything, mechanistically and without remainder. In some circles it is by now a truism that scientific knowledge (here roughly aggregated), like all products of human cognitive-creative endeavour, rarely speaks for itself in contexts either of discovery or justification; nor is it a morally-politically neutral product of simple, innocent observations or manipulations of 'nature,' whether for good or ill. Contingent practices operate at every stage: choices, judgements of relevance and meaning, issues of access, credibility, expertise and authority, power and privilege, and of epistemic responsibility. Unless a biologist or an epistemologist can show that mechanistic accounts are *sufficient*, and can thereby condemn interpretive, situated, politically and experientially generated epistemic practices

for granting those accounts too little credence; unless he or she believes naturalism is or can be interpretation-free, it is not easy to understand a conviction that naturalism reliant on mechanistic, linear causal explanation yields 'good enough' knowledge; or that interpretation and naturalism are mutually antithetical. Thus although biology figures as prominently in ecological naturalism as psychology does in Quine's now-landmark claim: 'Epistemology, or something like it, simply falls into place as a chapter of psychology and hence of natural science. It studies a natural phenomenon, viz., a physical human subject' (Quine, 1994b, p. 25), my claim is not that epistemology should 'fall into place' as a chapter of ecology. The beauty and the promise of an ecologically-informed naturalism has precisely to do with the productive, multi-faceted ambiguity of ecologically-informed conceptions of causality in biology, both human and other-than-human. Ecological thinking entails no naive dismissals of science, biological or other; yet neither does it subscribe to a unity-of-science credo on whose terms any science – or social science – indebted to causal explanations must conceive of these explanations mechanistically, and accord them overarching explanatory license.

Well aware of the hegemony of the reductionism that informs biological determinism, thereby naturalizing female subordination in patriarchal societies, feminists in the early years of the 'second wave' had high hopes for a sex/gender distinction capable of offering an explanatory and liberatory potential that, while acknowledging the given-ness – the facticity and relative constancy through change – of bodies, and hence of biological *sex*, would find in *gender* a conceptual tool powerful enough to account for the diverse realizations, enactments, and social-cultural meanings of sex. There was a sense that the material, structural capacities and limitations of biologically sexed bodies were fixed, ontogenetically and phylogenetically, and had thus to be assumed, worked with, not challenged; while gender afforded the conceptual openness required to allow free play of differences within or against that given-ness, thereby making space for transformative practices of contesting and undermining sex-based restrictions and oppressions. Biology (cursorily naturalized and homogenized) was thus persistently imagined as static, reified, the rarely contested substratum, and thence a stumbling block which feminists had to negotiate, endeavour to transcend, or explain away; while gender promised a conceptual and analytic apparatus capable of accounting for historical, cultural, individual 'differences', prefigured in Simone de Beauvoir's famous pronouncement: 'One is not born, but rather becomes, a woman. No *biological*, psychological, or economic fate determines the figure that the human female presents in society; it is civilization as a whole that produces this creature, intermediate between male and eunuch, which is described as feminine' (Beauvoir, [1952] 1989, p. 267, my emphasis). Beauvoir invokes a nature/culture dichotomy, with 'the human female' representing nature, and the feminine figure she 'presents in society' representing culture. For a time, feminists were able to find a richness in the apparent freedom this separation of facticity and possibility offered.

Yet in large part indebted to Judith Butler's trenchant analysis in *Gender Trouble*, feminists of the late twentieth and early twenty-first centuries have been working away from the sex/gender dichotomy to examine multiple performances and representations of sexes and genders in complex interpretive re-imaginings. Not only does Butler demonstrate the implausibility of extracting 'gender' from 'the political and cultural intersections in which it is invariably produced and maintained' (Butler, 1990, p. 3), but her provocative questions 'Can we refer to a 'given' sex or a 'given' gender without first inquiring into how sex and/or gender is given, through what means?' and 'Are the ostensibly natural facts of sex discursively produced by various scientific discourses in the service of other political and social interests?' (Butler, 1990, pp. 6-7), destabilize both terms of the distinction in which feminists had seen such theoretical and emancipatory promise, calling for genealogical analyses not just of gender, but also of the making of sex.

What then is a feminist biologist to do? Well aware of these tensions, Lynda Birke observes that feminist biologists occupy an uneasy position. In respect to physiology – the biological body's functions: the endocrine system, the nervous system, the immune system, women's health and reproductive rights – the material, 'biological' insistently demands scientific knowledge. Thus she worries that such arguments as Butler's about the social construction of sex lose sight of the materiality of biological bodies in emphasizing their cultural meanings (Birke, 2000). Yet Birke is nonetheless wary of how epistemological reductionism 'contributes to biological determinism and thence to particular ways of conceptualizing gender' (Birke, 1998, p. 195). Her concern, prompted by a sense that biological knowledge of the body's 'interior' tends to drop out of cultural constructive analyses, is less about how sexed bodies come to be represented than it is about how biological science, epistemologically, can avoid conceiving of bodies as 'fixed by the parallel languages of genes (determining who we are) and homeostasis (which ensures we stay that way).' Although physiological language is indeed mechanistic, then, in its talk of control systems and feedback loops, what disappears from epistemological view in the power and persuasiveness of such language is the *active* responsiveness 'to change and contingency' (Birke, 1998, p. 199) integral to living a human body, to experiencing it as changing and changeable, as transformable.

While affirming a commitment to retaining a full sense of biological organisms as entities, then, Birke notes that even within the language of science, there are positions worthy of greater recognition that, for example, emphasize the active engagement of an embryo in its own development: approaches for which organisms are 'more than [...] strategic assemblages of cells/information: they are self-actualizing agents.' The point is both epistemological and political: *knowing* organisms, knowing bodies as self-organizing entities, hence not merely as passively subject to genetic inheritance, Birke proposes, 'works against the social devaluation of the body and its interior that contributes to women's (and others') oppressions' (Birke, 1998, p. 201). In short, according to Birke, scientific knowledge that relies on studies of single variables can offer accurate accounts of how certain aspects of bodies 'work'; but it is less successful in 'predicting how these different bits and pieces interact, especially over time' (Birke, 2000, p. 595). She urges an openness to 'heterogeneity' (which Carla Fehr might call 'pluralism') (Fehr, 2001a, 2001b), in which scientists and other theorists 'attempt to combine the multiple, fragmented, layers of knowledge(s) about the world(s) that we inhabit' (Birke, 2000, p. 597). The resultant approach would be less static than the sex/gender dichotomy, while assuming neither a rigid bodily – hence sexual – inertia nor a free-floating performative enactment of subjectivity utterly unconstrained, ontologically, by the 'facticity' on which Beauvoir insists. Consonant with my concerns in *Ecological Thinking* and with the position in her 1998 piece, Birke observes in her 2000 article, with reference to 'gender-bending' chemicals: 'we ignore "the biological" at our peril. Rejecting it altogether for fear of collapsing into biological determinism means that we leave ourselves with no means of understanding how things like bodies or ecosystems work' (Birke, 2000, p. 597). Fence-sitting, as Birke ruefully observes, might not lead to a clear politics, but at the very least it avoids the premature closure, both epistemic and social-political, that is too often the outcome of scientific reductionism where, to recall the old analytic mantra, 'clarity is not enough.'

Birke is not alone among feminist and other critics and creative re-thinkers of a reductive determinism's presumed epistemic hegemony in biological science, of its trickle-down effects into entrenched conceptions of 'the natural' across the diverse domains I have mentioned, and of its persistence in sedimented stereotypes through which human physical and cultural 'differences' from a presumed norm have been 'known.' Space permits no more than a brief sketch of two lines of thought I will explore in future sections of this inquiry, which are

continuous with the central epistemological implications of her work. These are pieces I have selected, also, for their creative readings of Charles Darwin.

Fully cognizant of feminist resistance to biology as 'nature', figured in the dominant social imaginary as a fixed and intransigent 'given', an obstacle to be struggled against and an area of scientific knowledge enlisted to sustain paternalistic, patriarchal, racist, and class assumptions in the aim of preserving hierarchical social orders, Elizabeth Grosz nonetheless urges that feminists and others Othered by these very assumptions, need a complex and subtle account of biology to explain – rather than explain away – the 'rich variability of social, cultural, and political life' (Grosz, 2005, p. 14). Equally cognizant of feminist resistance to looking to Darwin as a source for such an account, she sets out to counter any tendency to reduce Darwinism to a form of determinism. Feminists reading biology have, in the main, she suggests, counted Darwin as a principal player among those whose theories justify 'relations of domination and subordination' sustained in a version of the views I have mentioned earlier, to the effect that 'the social is uninfected by the biological, the biological is secured from intrusion by the social' (Grosz, 2005, p. 16). For Grosz, by contrast, 'Darwin's work offers a subtle and complex critique of both essentialism and teleology' (Grosz, 2005, p. 17). Indeed, as the title of her book – *Time Travels* – suggests, she urges readings of Darwin that see in his engagement with *temporality* a way of perceiving how 'temporal movement forward' can point toward generative surprise, dynamism, growth, the transformability of living systems, and not as quasi-automatic, mindless, directionless processes (Grosz, 2005, pp. 17-19). Hers is no simplistic reversal of readings for which reductionism and mechanism are the dominant Darwinian themes; it is rather a reading against the grain, below the surface, in the interstices: it pays as careful attention to the possibilities Darwin makes available as to the constraints his world view addresses.

Thinking ecologically, with Grosz, on some of the issues I have addressed, she takes issue with theorists who find in Darwin a 'reduced view of feminism [...] as the struggle for social parity [...] and a reduced view of science [...] as the search for causal relations [...]' (Grosz, 2005, p. 16) – thus recalling my rejoinder to Tanesini's charges. While recognizing that the 'proliferation of diversity' that natural selection allows is limited 'by the type and degree of variability [...] any region or location can sustain,' she contends, persuasively, that 'Darwin has outlined an ingenious temporal machine for the production of the new, which constrains the new only through the history that made it possible and the present which it actively transforms [...]' (Grosz, 2005, p. 25). In a complex reading to which I cannot do justice here, Grosz proposes reading past entrenched convictions about Darwinism's hostility to feminist issues and toward a different understanding both of feminism and of Darwin. She observes, for example, how wrongs, injuries sustained, can become the spur to the 'self-overcoming' which is the very catalyst and substance of feminist and antiracist struggles; noting that self-overcoming is, for Darwin, 'incessantly if slowly at work in the life of all species' (Grosz, 2005, p. 28); and she advocates understanding politics as a commitment to mobilizing possibilities of self-overcoming, both individually and collectively. Affirming convergences between the movements that drive Darwinian evolution and Foucault's understanding of the dynamics of power, Grosz reminds her readers that Foucauldian resistances 'do not come from without but are actively generated by the forms that power itself takes, which are thereby vulnerable to the transforming effects of resistance [... where] neither power nor resistance has ongoing stability or a pregiven form; each [... being] the ramifying effect of the other.' Analogously, for Darwin, she discerns 'a sense in which the domination of individuals or species is precarious and [...] historically limited [... T]he very successes of dominant groups produce the conditions for the domination of other groups that differ from them and serve to transform them' (Grosz, 2005, p. 29). Crucial, then, for the position she advances is an

understanding of ‘the inherent productivity of subordinated groups’ (Grosz, 2005, p. 29), which finds adumbrated in Darwin a ‘future that emerges from the interplay of a repetition of cultural/biological factors, and the emergence of new conditions of survival’ (Grosz, 2005, p. 30). For feminists and other biologically othered Others, the promise of such a reading is in how it re-conceptualizes relations ‘between the biological and the cultural, outside the dichotomous structure’ in which, as we have seen, they continue to be enmeshed. Her proposals are compelling, if contentious, for the openings they create for ongoing thinking biology and epistemic responsibility, ecologically. My intention is to pursue these questions further, by moving through these openings.

Certainly, Grosz offers no ‘vulgar Darwinism’ such as Lenny Moss deplors. Whether it takes some steps along the path, for him not taken, toward a ‘mediation of empirical and phenomenological insights’ capable of doing justice to both the inner and the outer horizons of living nature in the guise of what he refers to as ‘a kind of soft naturalism’ (Moss, 2005, p. 350) is a question I have opened for discussion. For purists, this proposal of a Darwinian, phenomenological, feminist, and even Foucauldian mix may sound so implausibly eclectic – so impossibly chaotic – that it is scarcely worth the effort to try to knit the various pieces even loosely together. For Carla Fehr it might, however, gesture toward a pluralism less scientifically savvy than the version of pluralism she favours, but one with a certain heuristic appeal. Moss laments a conflation of genes according to which they are ‘at once molecular sequences and pieces of the phenotype,’ for he finds in it a contributor to the vulgar Darwinism ‘that depicts the processes of evolution as taking place wholly behind the backs of living organisms’ (Moss, 2005, p. 355). In ways analogous to those advocated by Birke and Grosz, albeit differently by each, he presents an analysis for which ‘Symbiotic associations are the norm, not the exception,’ thereby re-situating ‘organismic selection’ into ‘the context of its ecological relationships’ (Moss, 2005, p. 360) – where ‘organisms’ represent, in his analysis, a spectrum that runs from ‘unicellular’ organisms to seeds and insects – and by extension, to the human form of life which, as he puts it, phenomenologically and eloquently, ‘is such as to disclose a world to itself, a world of which it is a member, but also to be always a body self-centered within the world’ (Moss, 2005, p. 362). This capacity for disclosure, this inner horizon and affectivity of the life and agency of organisms is epistemologically and morally-politically eclipsed in the vulgar Darwinism that situates agency in the gene alone. The socio-cultural nexus, the ecological situation and implications of life, disappear in the ensuing knowledge, leaving feminists, and other Others caught in a stasis which is both experientially implausible, and theoretically-scientifically amazingly difficult to escape. Here, then, is the challenge.



Notes

¹ The *locus classicus* for thinking about standpoint theory and situated knowledges is Donna J. Haraway (1991).

² The term 'subjugated knowledges' is from Michel Foucault (1980) p. 82.

³ Here I agree with Sabina Lovibond that in feminist/post-colonial analyses, reason and knowledge production have been 'irrevocably desublimated [...] revealed [...] in all [... their] historical and cultural particularity [...] not as the sign of our participation in something that goes *beyond* our merely natural existence [...] but as one expression of our identity as a natural species whose members are exposed to an enormous variety of environmental and social conditions' (Lovibond, 1994, p. 72).

⁴ For more recent accounts of these debates, see Crawford and Maracek (1989) and Maracek (1995).

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