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NEIL TENNANT

PHILOSOPHY AND BIOLOGY:  
MUTUAL ENRICHMENT OR ONE-SIDED ENCROACHMENT?

Philosophers of science often have a thankless task. It is not unusual for scientists to respond to the philosopher's interest in and own ideas about his branch of science with an air of tolerant disdain, if not territorial hostility. Some scientists do not like having their concepts "clarified", often by conceptual analysts whom they regard as mere ingenués in the science concerned. Nor, very often, are they interested in topics such as incommensurability, or truth's possible transcendence over ideal theory in the limit; they are often unmoved by the conceptual questions thrown up by a study of the history of science. All this is perhaps in part due to the nature of our scientific curricula, and a prevailing tendency, in our increasingly technological climate, to underestimate the importance of locating ourselves and our theories as historical products.

Philosophers of biology are no exception. But they are confronted in their undertaking by biologists who are themselves at times of extraordinary philosophical bents. Especially with the advent of sociobiology, the philosophy of biology has become a minefield. One goes about one's business "clarifying concepts", or explaining to a lay public the significance of a theory and its implications for our understanding of the human condition, with the utmost trepidation. Carefully hedged statements are liable to be misinterpreted, especially when conceptual clarity is mistakenly thought to have been bought at the cost of particular political coloration. But the issues are, in my view, too exciting and important for any philosopher of biology to be put off by the risks. He must simply be aware that he is likely to draw fire from all sides: from philosophers in the theory of knowledge, philosophy of mind and moral philosophy who are opposed to any attempt to naturalize their subjects, and especially to naturalize them by appeal to evolutionary theory (Bertrand Russell once wrote in a letter to a friend: "Any mention of matters evolutionary drives me into a fury"); and from biologists,

whose motives can range from the simple attitude of "We practitioners know best" to the very laudable desire not to have their theories bowdlerized in support of some controversial account of the human condition.

With the attendant risks thus highlighted, I want to provide an overall view of what I see as the pressing issues in the philosophy of biology. I shall illustrate how fraught the business is.

The issues seem to divide pretty clearly into those that are internal to the philosophy of biology, considered as a philosophy of just one branch of science among many others; and those that are suggestive of some philosophical views or doctrines about the human condition. It is this second class of issues that lends the philosophy of biology an excitement, perhaps even urgency, somehow lacking in, say, the philosophy of physics. There the issues are at once deeper and more demanding (mathematically and conceptually). The major metaphysical topics are at the fore: space, time, causality, substance; and, apart from some spin-off for the problem of free will and determinism, the applications to the human condition are perhaps somewhat remote. But this is not so with the philosophy of biology. Not only is it a less exact science (exactly *how* being itself an interesting question), but it is the one that carves our reality very close to *our* joints. We are the kind of thing — indeed, more piquantly, just one kind among many — that biology seeks to describe, account for, understand. I do not share the view implicit (and no doubt tongue in cheek) in David Hull's once wondering why we were so interested in *homo sapiens* rather than slime moulds (supposedly a much more fascinating substance — or substances...). I am sure I am not alone in still having the Socratic desire to be able to describe, account for and understand human beings better. And not just for the purpose of being better able to predict or control their behaviour; but rather to fashion for oneself a richer, because clearer and more truthful, conception of what kind of creature one is, and — perhaps partly *thereby* — what kind of world it is that we inhabit.

The division of issues that I have intimated was one that suggested itself most naturally when working with my geneticist colleague Florian Schilcher, on a book on the philosophy of biology. To the best of our knowledge, it is the only book of its kind that is the outcome (for better or worse) of a collaborative effort across the disciplinary divide. I imagine we are not the only authors who have felt misunderstood or misrepresented by some of their critics. We have had biologists wielding philosophical dogma against us (thus Rose: "... the task is... to show

how it is that, in the complex evolution of human brains and human societies, it is precisely our biology that makes us free”), and we have had philosophers supposedly trained in the craft of reading a text criticizing us for views we do not hold with arguments that, to my mind (but I speak as an interested party) have sometimes found their clearest expression in our own text. (See the review by Woodfield in the *Times Literary Supplement*, and the subsequent correspondence). Moreover these critics display an extraordinary fascination for the forty-old pages in which we discuss sociobiology and ethics, to the exclusion of anything else we say by way of conceptual clarification of evolutionary theory, or by way of considering, in its light, topics in the theory of knowledge and the philosophy of mind and language.

So I want to return to the fray with an unrepentant summary of our main views in this broad and complex field. I shall dwell a little on certain points of methodological interest that the discussion will throw up. I do not intend to repeat the elucidations we tried to offer under the first head. Instead, I shall merely list the issues or concepts that stand in need of careful examination or explication. They are as follows:

1. Does evolutionary theory predict or merely explain?
2. Is it tautological?
3. Does it render teleological notions superfluous?
4. What is the relative importance of chance and accident in the history of evolution?
5. Are the natural kinds of evolutionary theory more problematic than those of physics?
6. Are species natural kinds or historical individuals?
7. What is the unit of selection?
8. What are selective forces?
9. The problem of distinguishing organisms from their environments and accounting for their interactions with it.
10. The population-statistical *versus* essentialist conceptions of species.
11. What is meant by fitness?
12. The statistical nature of biomathematics and of work in genetics.
13. Is evolutionary theory compatible with adjoining physical theories such as thermodynamics?
14. The tempo of evolution.
15. The concepts of heritability and innateness (*much* danger of confusion here!)

16. Concepts of genetics: epistasis, polygeny, homozygosity, recessiveness, polymorphism, variability, mutation, recombination, drift, gene linkage, etc.

17. How strong an analogy can be drawn between genetic and cultural evolution?

18. Is all evolution adaptive? (The problem of "panglossianism").

19. What is the relationship between biological facts and physical facts? And — *different* question! — between evolutionary theory and physics?

20. Are there (emergent) laws of biological form, governing bodily structure and embryological trajectories?

I shall end here, on a round number. The range in character of these questions is considerable. Some raise very deep and difficult methodological issues, while others are more a matter of getting clear about what it is that biological theory is actually saying.

I want to focus on some of them by way of litmus tests for some of the vitriol exchanged in current debate. Perhaps the most hazardous combination of views here is the following:

- the gene (or allele) is the unit of selection
- fitness is measurable; or, if not, at least a real notion
- evolution can be very fast
- a lot is heritable and a lot is innate
- cultural evolution is a lot like genetic evolution; indeed, is coupled with it, or even subordinate to it
- all evolution is adaptive
- biological facts emerge out of, and are determined by, the physical facts
- biology may one day be reduced to physics
- likewise, psychological and social facts emerge out of, and are determined by, biological facts; and psychology and sociology (or the respectable bits of them) will one day be reduced to biology

Let me hasten to say that I do not hold this combination of views. Nor is it the combination of views put forward in our book. I set the views out the way I do in order to indicate what sort of hostile response they draw:

- concentration on the gene as the unit of selection blinds one to the importance of the organism as the entity that struggles to survive and reproduce, and on which the selective forces go to work

— fitness is a theoretical construct that is seldom accessible in real-life situations as a measurable magnitude; and it makes no sense if it cannot be measured

— evolution can stagnate for long periods; and then enjoys rapid bursts (theory of punctuated equilibrium)

— by the time one comes to human beings on the phylogenetic tree, little is heritable or innate; environment can make all the difference in the development of individual traits; and it is not only conceptually confused but immoral to suggest that there are systematic and in some sense genetically determined differences in (say) cognitive traits between different population sub-groups

— a great deal of evolution is non-adaptive, a mere by-product of selection for other traits

— biological facts, even if emergent, are *sui generis*; they can be captured only by a biological theory that is irreducible to physics

— likewise, the social and psychological levels cannot be fully determined by the biological level, and the disciplines of psychology and sociology will never be reduced to biology.

Clearly this is a head-on collision. The opposing sides are disagreeing on every point. It is not a caricature of the two positions either; but I shall spare my audience the exegetical work that would show this. Looking at the opposed conspectuses one has an awful sense of being caught in a jihad. The one camp consists of millenarian “cannabilizing” sociobiologists, and the other Marxist molecular biologists. One is tempted to formulate an average of these views, with the Aristotelian hunch that the truth lies somewhere in the middle. This is what we tried to do, but — there being no Geneva Convention governing academic debate — the hapless stretcher bearers got fired on by both sides.

So let me briefly indicate where we stand on these issues. The details can be drawn at leisure from the book I have referred to.

In the book we argued for the following views, roughly expressed:

— the gene (or allele) is indeed the unit of selection, but individual organisms retain their importance as special environments in which selection takes place: thereby giving rise to the forces of individual selection

— fitness is a respectable theoretical notion, and individuals are more or less fit in reality whether or not their fitness admits of measurement; but one must not lose sight of the population-statistical character of the notion — it involves essential reference to the breeding group to which the organism belongs

— to characterize evolution as “fast” or “slow” does not make much sense; one should rather look at the number of generations required in order to effect appreciable differences in the expression of a trait under directed selection for certain of its values. In general, there is a great deal of genetic variability for any trait of interest, be it physiological or cognitive; that is,

— a lot is indeed heritable, in the *population-statistical* sense that at least a part of the difference between individuals is attributable to differences in their genetic make-up; and this without damage to the view that even these traits depend a great deal on the environment for their expression

— there is an interesting analogy between cultural evolution and genetic evolution, tempered only by the question whether cultural phenotypes or “memotypes” are tractably *particulate*, and by the realization that the mechanism(s) of inheritance at the cultural level are dramatically different. For they allow so-called “horizontal” and “diagonal” inheritance, in addition to “vertical” inheritance. Ultimately, however, cultural evolution is controlled or constrained by biological evolution, even though cultural environments become of increasing selective importance, and one’s biological fitness depends correspondingly on the cultural traits one can develop

— not all evolution is adaptive, and it would be a crude mistake to suppose otherwise

— physical facts determine biological facts; and biological facts (plus the Sartrean facticity of ecosystem, environment and so on) determine psychological facts; but this in no way implies that psychology and sociology can be reduced to biology and ecology, nor that biology can be reduced to physics

I hope that this is indeed an Aristotelian compromise. The last strand of the view sketched above is one I wish to highlight by way of response to our critics. The philosophical formula is “physical determinationism-plus-explanatory anti-reductionism”. The formula arguably characterizes for example, weak supervenience theorists such as anomalous monists in the philosophy of mind. (I use ‘anomalous monism’ in Davidson’s sense — although it is possible to take issue with his claim that there are *no* bridge laws at all, even of a statistical nature, connecting the two levels in question) The formula also characterizes strong supervenience theorist who nevertheless insist on the autonomy of the higher level of explanation.



I have an open mind on the exact nature of the supervenience of higher level facts on lower level facts; but I am quite sure that explanatory reductionism is impossible. I believe this not only on practical grounds — the extraordinary complexity of the reducing definitions that would have to be used — but on logical or methodological grounds (which I have spelled out in “Beth’s Theorem and Reductionism”, *Pacific Philosophical Quarterly*). So insofar as the pairs.

psychology-sociology

biology

and

biology

physics

are concerned, the respective higher-level explanations will never, in principle, be reducible to lower-level explanations. It is therefore a gross misinterpretation to say that we wish to “(occupy) and (cannibalise) the other sciences of humanity” (Ruse, *op. cit.*). But such explanatory anti-reductionism is quite compatible with emphasizing that the reach of biological explanations (concerning processes, structures and dispositions within human beings and their social groupings) is much more extensive than lay circles have appreciated before. Such emphasis is all that the exaggerated label of “biologism” can apply to. I take the position to be a moderate one: one from which scientists could gain some philosophical orientation and one which would help philosophers not to dismiss as threateningly reductionistic scientific theories that touch on such matters as cognition, sociality and morals.

Serious minded work along these lines has to contend with some very indiscriminating hysteria from one of the camps described above. A new whipping boy has emerged in the form of “biological determinism”. The recent book *Not in Our Genes* by Rose, Kamin and Lewontin shows just how confused the issues can become when philosophical rigour succumbs to political commitment.

(As an interesting historical aside, let me describe how writers of generally Marxist persuasion have done an about-face. In the Carnap collection in Pittsburgh I came across a fascinating letter from Schlick to Carnap, describing a two-hour long harangue that Schlick had suffered from Neurath in a Vienna cafe. Neurath, the Marxist-logical positivist-sociologist, was fuming at the patrician scholarly gentleman Schilick for turning down a submission for a series Schlick was editing. The usual epithets of “bourgeois”, “capitalist”, etc were flung at him.

Schlick's refusal to publish was based on the execrable style of Neurath's prose — strident, simplistic, jargonised. It is ironic to come across another document written in our time that suffers from the same defects. Only this time the critical hysteria would be directed very forcibly against the very philosophical temper that informed Neurath's own writings: the reductionist materialism against which Rose, Kamin and Lewontin themselves now rail).

Here are some of their representative assertions:

Over the past decade we have watched with concern the rising tide of biological determinist writing, with its increasingly grandiose claims to be able to locate the causes of ... inequalities ... in Western societies in a reductionist theory of human nature.

... oppressive forms in which determinist ideology manifests itself ... The need was, we felt, for a systematic exploration of the scientific and social roots of biological determinism ...

Biological determinists ask ... Why are individuals as they are? Why do they do what they do? And they answer that human lives and actions are inevitable consequences of the biochemical properties of the cells that make up the individual; and these characteristics are in turn uniquely determined by the constituents of the genes possessed by each individual. Ultimately, all human behaviour — hence all human society — is governed by a chain of determinants that runs from the gene to the individual to the sum of the behaviours of all individuals.

Not only do I know of no-one with such a ludicrously crass position in the philosophy of human nature, but the confusion of this exaggeration is all too apparent when these authors advance in support of this characterization of so-called biological determinism the observation that:

(t)he causes of social phenomena are thus located in the biology of the individual actors in a social scene, as when we are informed that the cause of the youth riots in many British cities in 1981 must be sought in «a poverty of aspiration and expectation created by family, school, environment and genetic inheritance».

I would like Rose, Kamin and Lewontin to tell us just what causal factors, at whatever level, have been omitted in this near-tautologous claim that they quote!

My quotations have so far been drawn only from their first six

pages. The invective continues in much the same vein throughout the book. A truly breathtaking straw position is set up on page 7, to become the target of their subsequent critique. One of the claims they see as going to make up the position in question is that:

(Behaviours of individuals) can be treated as objects, that is, *reified* into properties located in the brains of particular individuals.

and later, on page 12, we are told that:

Biological determinism sees ... the undoubted plasticity of organisms — especially humans — as they develop as a series of modifications imposed upon an essentially passive, recipient object by the buffering of «the environment» to which it is exposed and to which it must adapt or perish.

I shall not continue to quote their characterizations of a position, occupied by no-one, to which they are so messianically opposed. I shall end by merely remarking, as devil's advocate even for someone who did hold such an extraordinary combination of views, that he could object to having Rose, Kamin and Lewontin visit upon him, as supposedly part and parcel of that position, the dreadful non-sequitur (p. 79):

If inherited social inequalities are the result of ineluctable biological differences, then the elimination of inequality requires that we change people's genes.

Compare:

If the bruises on the apple are the result of the tornado, then the elimination of the bruises requires that we change the course of the tornado.

It is not as though, in criticising these writers, I do not share their genuine concern for a better and more just society. One can emphasize the importance of biological factors in human behaviour and social organisation without despairing of reform, and without commitment to brave new wordly methods of reform.

What does worry me, however, is that this sort of intellectual reflex to the merest hint of interest in matters biological might, if not checked, be inimical to honest inquiry into the human condition. It might obstruct a deeper understanding of how we have come to be the way we are, and it might even prevent us from discovering ways in which we might improve our lot without the attendant perils of the methods

of brain surgery and drug therapy about which Rose, Kamin and Lewontin are so rightly concerned.

For interest in matters biological has bearings on moral philosophy in two quite different ways, one of which these writers appear completely to overlook. One way is descriptive; the other way is normative. The first applies evolutionary theory about the origin and stability of social dispositions in our species (especially via the theory of kin selection and evolutionary stable strategies) to explain how it is that we come to have the various moral codes that we do. It has to account for the measure of altruism that characterizes our species, and for the variety of moral codes in which specifically human forms of life are shaped. This is the way the findings or theories of modern sociobiology really ought to be applied. It is a very Humean enterprise. And it ought to remain a merely descriptive enterprise, taking no stand on the ultimate morality or value of the precepts and principles that it sees as the evolutionary outcome of a long process, both biological and cultural.

The second, normative, application of biological theory is a different matter. This is where the danger lies; but even here the danger could be exaggerated. One does not have to believe that one could read off a complete moral code (the one we ought to live by) from an evolutionary account of how we have come to be what we are. It is enough merely to believe that such biological knowledge could yield some wisdom about our own natures — some intimation of the limits of possible forms of sociality, for example — for one to have a legitimate interest in pursuing such a line of enquiry, quite apart from the mere satisfaction of intellectual curiosity. Of course we know the past dangers of social Darwinism, the doctrine that was based on a crude simplification of evolutionary theory. We should be able to avoid such mistakes in future. And there is always the ultimate retreat of maintaining a fact-value distinction in order to subvert the derivation of odious principles of individual conduct and social organization from empirical theories of human nature-at-it-has-come-to-be.

I cannot in the space available go into any great detail concerning particular areas of contact between biology and philosophy, insofar as philosophical problems might be approached with fresh ideas. My purpose is rather to give a short survey of all of them, in an attempt to make plausible the claim that it is at least worth looking at some of those problems in an evolutionary perspective.

Moving from the particular problems of moral philosophy and the alleged dangers inherent in any attempt to discuss morals in the light

of biological accounts of the nature of humanity, let us consider what the theory of biological evolution has to offer in the theory of knowledge. Here too there is a major distinction to be observed between two kinds of application. First there is evolutionary epistemology in the tradition of Lorenz, but not at all necessarily wedded to his own outdated ideas about group selection and survival of the species. In this tradition the focus of interest is on the extent to which our cognitive capacities (as based, presumably, on neurological structures) are the product of our evolutionary past: a product, that is, of selection for them, or selection for other capacities of which they might be by-products. Piecing together the phylogenetic mosaic here complements the account of organismic or bodily changes that started in slime, passed through fish and culminated in philosopher. Lorenz is concerned to make plausible the view that our intellectual abilities or cognitive functions have an evolutionary pre-history. They supervene on neurological structures which can be linked, modified or arranged in new hierarchies by mutations affecting loci controlling the growth programme. Just as computer software becomes more sophisticated by modularization and nesting, and by being harnessed in parallel, so too do the cognitive functions subtended by burgeoning neurological circuitry. One can imagine one day having a detailed functionalist, inter-specific, comparative theory of cognition — one from which we could piece together our own intellectual heritage if only we had the details concerning the *nous* of some of the missing links. Lorenz's own formula that expressed the significance to him of this theory for traditional epistemology was that it enabled us to regard Kantian individual *a priori*'s as phylogenetic *a posteriori*'s. I think also that it brings to the fore one of the deepest problems of philosophy quite generally. On the one hand it impels us to accept the limitations of a species-specific view. For is not *homo sapiens* just one species among many, enjoying the (very limited) «affordances», to use Gibson's phrase, of the limited environment in which we have struggled against the forces of natural selection? The theory teaches us that our senses are fallible, because the outcome of merely optimizing selection for the ability to process information before *acting* in survival relevant ways. There is a premium on time, and on biological investment in complicated circuitry. We are in all probability — as products of evolution — corner-cutters and rounders-out. So we are fallible, shallow coherentists. It's not so much a case of watch thou the mutant, as watch thou the noumenal!

And this is the view on the other hand to which Lorenz's position impels one, and which produces the tension. For are we not, in giving

our comparative account, in emphasizing that we are just one species among many, in representing different species as all accessing the environment for survival-relevant information in their respective species-specific ways, thereby committed to a view of different creatures pitted against some hypothetical Reality which each kind can only imperfectly know? Or is there a way of construing the theory so that we remain, in Kantian terminology, *empirical* realists only, without adopting such a stance of metaphysical realism?

If the earlier discussion of reductionism and biological determinism revealed the need to be clear about one's methodological position on scientific theorizing, I think this branch of evolutionary epistemology reveals the need to be clear also about one's overall metaphysical position. This indeed is one of the reasons why biology is philosophically challenging. One cannot help oneself to parts of it without getting clear about basic methodological and philosophical positions. It provides impetus, as it were, towards coherent philosophical integration into one system, one set of views, about the nature of reality, language, mind, theories, fact and value.

Apart from the Lorenzian branch of evolutionary epistemology, there is another branch that deals with evolutionary processes in the third world of concepts and theories. Here the «evolutionism» has more to do with regarding concepts and theories as cultural products with an evolutionary past. Donald Campbell and Karl Popper have perhaps done the most to have us take seriously the view that our so-called knowledge is just a fragile, tentative and temporary outcome of a past process of random variation and selective retention. The selective filtration has been by fit with experience or even less 'rational' or truth-retentive screening by the social mechanisms of peer review, reputational momentum, grant-getting and career consolidation. New concepts are fashioned not so much by purposive intellects, as by sporadically adventurous ones; and theories likewise. These then stand the test of experience and collective criticism, and are either discarded or retained, perhaps with further modification. Thus, just as the most sensitive and accurate and finely-tooled artifacts of our modern technological civilization are the end-products of a process that started with blunt sticks and jagged stones, so too are our theories of logical inference, of numbers and sets, and of fundamental particles and forces end-products of a process of individual perceptions and manipulations, and communal exchange of information, that started with warning calls, threatening gestures, and much billing and cooing.

This branch of evolutionary epistemology forces us in its turn to try to be clear about the notions of truth and meaning, of reference and existence, of communicable knowledge and belief, so as to reconcile the *fallibilism* implicit in the evolutionary perspective with our synchronic intuitions about the *specificity* of reference and meaning in present, lived languages, and with our intuitions about *warranted assertability* of statements in present, accepted theories.

It leads us to wonder afresh about the evolution of language itself — perhaps the most important accomplishment of our species from the standpoint of contemporary analytical philosophy. I note with interest the resurgence of theorizing on this topic in recent years. Linguistic meaning, *pace* Grice, is finding its place once more in the generally non-intentional flow of information. MacDowell, and more recently Millikan and I, have argued that the Gricean hump of reciprocal belief and intention is a not a pre-requisite for linguistic meaning. Where I differ from MacDowell and Millikan is in holding that while this is all very well for syntactically unstructured languages, any account that can make it plausible how a syntactically structured language could have evolved within a community would require that the individuals concerned be past the Gricean hump in grasping what others believed and intended. I believe also that close attention to the kind of meaning that could be conferred on expression by the selective forces operating for their retention in an evolving language is such as to support a Dummettian anti-realist account of constructive logic as the correct logic. At the same time, however, openness to an evolutionary perspective cautions one against too severe an epistemology of linguistic understanding. Dummett may, from this perspective, be too stringent in his requirement of full manifestability of grasp of meaning in observable behaviour. Some kinds of meaning may be graspable on the basis of long selection for the ability to go beyond the observable evidence in salient ways. Something more like a behaviourally inscrutable realist understanding of recognition transcendent truth conditions might thereby be approximable from below, as it were. The details would be too complex to detain us here, and I am not sure that they can be worked out satisfactorily; but I imagine this line of thought might be worth pursuing in support of the kind of realism that MacDowell proposes: one which is not committed to bivalence of truth, but which does allow for the unknowability-in-principle of some truths.

I can summarize, therefore, by saying that I see fertile connections between biology (or at least, an evolutionary cast of thought) and all

the main areas of philosophy: methodological questions about explanation and reduction; questions about fact and value, the nature of altruism and the emergence of norms; questions about cognition and the plausibility of a type-type materialism in the theory of mind; the realism-idealism dispute and the tenability of a coherentist, fallibilist epistemology; and the current debate also over the nature of communicable meaning and justified logic. The philosophy of biology spreads out and draws all these questions into the same web; it makes one aware of the need for *system* in one's philosophical response to natural science. And more than ever, in an atmosphere of ideological charge and counter-charge, it invites one to undertake the usual and valuable task of all philosophers: to delineate concepts, examine the evidence for and deductive structure of theories, forestall illicit applications, and detect non-sequiturs in the ensuing commentary on the human condition.

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