

## *Origins Are Not Essences in Evolutionary Systematics*

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Natural selection explains why humans have eyes: eyes are useful for getting around in an illuminated world; without them we would get around a lot less effectively, at much greater risk, and with a great deal less appreciation of potential mates. One might think, therefore, that natural selection explains why *you* or *I* — humans as we are — have eyes. But the inference has been contested by a number of able philosophers, starting with Elliott Sober and going to Joel Pust.<sup>1</sup> The disputants divide as follows. Sober, Denis Walsh,<sup>2</sup> and Pust hold that though natural selection explains why humans as a species have eyes, it doesn't explain why particular humans have them. Let's call this position 'Anti-Individualism.' (Pust calls it the 'Negative View.')

Karen Neander<sup>3</sup> was the first to take issue with Anti-Individualism. More recently, I too argued

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1 Elliott Sober, *The Nature of Selection: Evolutionary Theory in Philosophical Focus* (Cambridge, MA: The MIT Press 1984) and 'Natural Selection and Distributive Explanation: A Reply to Neander,' *British Journal for the Philosophy of Science* 46 (1995) 384-7; Joel Pust, 'Natural Selection Explanation and Origin Essentialism,' *Canadian Journal of Philosophy* 31 (2001) 201-20

2 Denis Walsh, 'The Scope of Selection: Sober and Neander on What Natural Selection Explains,' *Australasian Journal of Philosophy* 76 (1998) 250-64

3 Karen Neander, 'What Does Natural Selection Explain? Correction to Sober,' *Philosophy of Science* 55 (1988) 422-6, 'Pruning the Tree of Life,' *British Journal for the Philosophy of Science* 46 (1995) 59-80, 'Explaining Complex Adaptations: A Reply to Sober's "Reply to Neander"', *British Journal for the Philosophy of Science* 46 (1995) 583-7

that explanations in terms of natural selection translate downwards from species to individuals, and thus explain why you and I have eyes.<sup>4</sup> Neander and I reject Anti-Individualism, and are thus supporters of Individualism.

Sound like a philosopher's controversy? I think so. In 'Evolution,' I argued that Anti-Individualism was committed to a 'highly metaphysical' proposition at odds with the methodology of population genetics. This infelicity gave me reason for rejecting it. (We'll examine the metaphysical origins of the doctrine in a moment, and see later why they are relevant.) In his recent article, Pust takes issue with Neander and me. Until Pust wrote, Sober (personal communication) felt some small pressure from Individualism, and had shifted, albeit microscopically, toward it—he thought that on a very broad conception of causation, there might be some reason to think that selection explains individual traits. He is now convinced that he was right all along.<sup>5</sup> So we are back where we were a few years ago, though with new arguments on each side. Such is the nature of progress in philosophy. The purpose of this paper is to offer some refinements of Individualism.

## I The Controversy: A Reprise

Pust rightly distinguishes (as does everybody else, but see especially Walsh) between two kinds of statements, quantified and singular. The quantified statements look like this:

Natural selection explains why *all* (some, most, 64% of, etc.) humans have eyes.

The singular statements look like this:

Natural selection explains why *I* have eyes (or why some other individual or set of individuals has).

Many proponents of Anti-Individualism believe that since the theory of natural selection is statistical in character, it can explain only *distributions*

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4 Mohan Matthen, 'Evolution, Wisconsin Style: Selection and the Explanation of Individual Traits,' *British Journal for the Philosophy of Science* 50 (1999) 143-50

5 Sober was the commentator on a paper given by Pust at the 2001 meetings of the American Philosophical Association, Central Division. I thank him (i.e., Sober) for sending me a copy of his comments, and for subsequent clarificatory correspondence.

of traits in a population, in other words, the facts expressible by quantified propositions. But explaining a distribution is not tantamount to explaining the position of individuals in that distribution (though, of course, some such explanations may translate downwards). Anti-Individualists claim that the sorts of explanation that natural selection provides do not translate downwards to individuals.

Elliott Sober (in *The Nature of Selection*) made the point in a way that is independent of the statistical character of the theory of natural selection. He offered the following analogy (which I paraphrase).

Imagine a classroom full of children who are able to read. If reading was a condition of their being admitted, membership in the class cannot be an explanation of their being able to read. "The selection process explains why the room contains only individuals with trait *F*, rather than containing other individuals who lack *F*. However, it does not explain why Sam has trait *F* (rather than not-*F*)." (*Nature of Selection*, 149; 'Natural Selection,' 385)

Now, the moral of this example does not transfer straightforwardly to the case being discussed. Sam was able to read before he ever got into the class, and this is why membership in the class does not explain how he came to be able to read. However, I did not have eyes before selection for eyes occurred; indeed, I was not even born at that time. So it is not immediately obvious why selection should be disregarded as a cause of *my* possessing this trait. (I'll supplement Sober's argument in a moment, in a way that is meant to remedy this shortcoming.)

In 'Evolution, Wisconsin Style,' I tried to undercut Anti-Individualism by means of this example:<sup>6</sup>

Imagine a sheep farm on which reproduction and selection are discrete events. Once a year, members of the flock are randomly paired off to mate. Once the offspring are born, we have selection day. 60% of the sheep that possess trait *C* and 40% of the rest are set aside and retained on the farm; the rest are shipped off to be sold. (145)

This procedure selects *C* in greater numbers than non-*C*. If *C* is a genetically determined trait, and the procedure is repeated year after year, then with the passage of time, it will come about that all the sheep on the farm will possess *C*. Now, consider a sheep, call her Suzy, born a couple of generations after *C* had gone to fixation. Why does she have *C*? Because there was no alternative: her parents could not have mated with any

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6 I also argued that Sober's own arguments did not suffice to make the case for Anti-Individualism. Since Pust does not repeat or rely on those arguments, they are not relevant here.

other partner that would have produced offspring without *C*. And what brought it about that there was no alternative? Selection. So selection seems to have caused Suzy to have *C*, and hence it seems to explain this individual fact.<sup>7</sup>

Now, as I noted in 1999, this argument is vulnerable to the following counter. A sheep born of different parents than Suzy's is not Suzy. Thus, even if one of Suzy's parents *could* have mated with somebody else, and thus produced a non-*C* sheep, this non-*C* sheep would not have been Suzy. Thus, though it is possible that there could have been a non-*C* sheep in Suzy's generation, and selection explains why there wasn't, it is still false that *Suzy* could have been non-*C*. Since Suzy's *C*-ness is necessary, selection made no difference, and doesn't explain it. For this reason, Individualism, which wants to hold that selection *did* make a difference to some individual organism's having *C*, must deny a doctrine known as 'Origin Essentialism,' which holds that, as I put it, 'a particular sheep must come from the parents it did come from.' Or as Pust puts it, 'a given individual could not have had different biological parents from those it actually had.'

We are now in a position to appreciate how Sober's argument concerning Sam's reading carries over into the evolutionary case. Anti-Individualists individuate Suzy by means of her ancestral lineage. Further, they see natural selection as preserving certain lineages and destroying others. The lineages preserved because of their possession of *C* already had *C*. The lineages destroyed did not. Just as Sam was able to read before he ever got into the classroom, Suzy's lineage had *C* before it was selected. 'Origin Essentialism' is Pust's way of making this point. Suzy's lineage is to be viewed simply as a part of her, not as something detachable from her.

## II Individualism and Concrete Causation

Pust locates the difference between Individualists and their opponents entirely on their attitudes towards Origin Essentialism (OE). But this is not right. There is another point at issue. Individualists can point out that the statistical character of explanations in terms of selection notwithstanding, a concrete selectional history consists of individual events. These events are mutations, births, matings, deaths, and so on. The selectional history of a trait just consists of these events: the reason why

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<sup>7</sup> This argument occurred to me during a conversation with Bernie Linsky. It might well have been his, with no added contribution from me.

a particular trait got established in the population is that those that lacked this trait died out. Their demise might be explained statistically; nevertheless, each mutation, birth, death, etc. in the selectional history of the surviving trait is a concrete individual event. This is why it is odd to say that the selectional history does not explain the possession of traits by individuals. Perhaps the Theory of Natural Selection, understood as a general proposition containing no reference to individuals, does not explain why I have eyes. But it does not follow that the history of selection on Earth does not explain it — all that follows is that the *Theory* of Natural Selection is about statistical trends, and not about particular histories, even though its causal underpinnings lie in those particular histories.

Pust's way of individuating individual organisms seems, on the face of it, to demand some kind of Individualism. How can one insist, on the one hand, that I am individuated by my lineage, and deny, on the other hand, that crucial events in the history of my lineage are not responsible for my traits. Minimally, it is the selectional history of my lineage that accounts for its preservation, and I would not have existed if it had not been preserved. Similarly, even if it is true that Suzy might not have existed but for the succession of selection events described above, it is surely true that those events are partly responsible for her existence, and hence for her possession of *C*. Sober is right to say that selection does not explain why Sam reads. But it does explain why Sam reads *in this particular class*. In the case of biological organisms, having one's lineage selected is tantamount to being selected for existence itself. Just as selection explains why Sam reads in this particular class, it explains why I exist with eyes. But the 'exists'-qualifier is redundant here: if selection explains why I *exist* with eyes, it explains why I have eyes *tout court*. It seems, therefore, that Anti-Individualists overlook the fact that the statistical relations of population genetics demand a causal underpinning in concrete individual events.<sup>8</sup>

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8 See Mohan Matthen and Andre Ariew, 'Two Ways of Thinking About Fitness and Natural Selection,' *Journal of Philosophy* 99 (2002) 55-83, section IX, for a discussion between statistical trends and concrete processes. The argument that is given there is quite general. In 'Evolution, Wisconsin Style,' I claimed, with insufficient generality, that Anti-Individualism could be defeated in the particular case of sexual reproduction. Tim Lewens, in 'Sex and Selection: A Reply to Matthen' *British Journal for the Philosophy of Science* 52 (2001) 589-98, points out that the argument need not be so confined.

### III Origin Essentialism and Intuition

Let us return now to Origin Essentialism. Pust concedes that I was the first to note, explicitly and in print, that Anti-Individualism depends on this doctrine.<sup>9</sup> (Sober did not raise the issue, and Neander only hinted at it obliquely.) What is new in Pust's article is simply that he takes issue with my dismissal of OE. Given this, one would expect him to argue in support of this form of Essentialism. In a way, he does. But his argument consists, in its entirety, of a quotation from Saul Kripke, followed by this remark: '[T]he strong intuition to which Kripke's informal remarks point suffices to justify the claim that OE is true' (201, my emphasis). He also observes that just because a doctrine is 'highly metaphysical,' as I said OE was, does not mean that it is false.

I must confess that I am not convinced by this. I'll try to show that *in this context at least*, Origin Essentialism has unacceptable consequences. It implies, for example, that (barring a mutation somewhere back in my lineage) I *could not* have had blond hair. After all, my parents were homozygotically black-haired. And this means that without different parents, I could not have been blond (and with different parents, I would not have been me). Of course, *they* could not have been anything but homozygotically black-haired. If they had been, they would not have been they. This traces back to their parents. *They* could not have been.... Again, I *could not* have been haemophilic. For this would require that there would have to have been a haemophilia gene in some ancestral matrilineage. Which would have meant that this ancestral lineage would not have been the one it was, and consequently that I would not have been me. If I am individuated by my lineage, and this is what Origin Essentialism says, I cannot have avoided the genetic influences at work in that lineage. So OE is committed to a seemingly extreme form of genetic determinism.

With regard to Origin Essentialism, the reader might well, like Pust, trust Kripke's intuitions further than mine. I would sympathize with her in this — the argument from authority carries some weight when it comes to adjudicating the claims of intuition. However, in empirical matters nothing should turn on intuition alone, even where metaphysics is concerned. What I want to argue is that the kind of determinism we have just encountered puts severe strains on the anti-essentialism that is characteristic of 'population thinking' in evolutionary biology.

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9 Pust did arrive at this dependence on his own; earlier drafts of his paper were in circulation before mine was published.

#### IV The Anti-Aristotelian Premise

Let's look now at some of the consequences of that population thinking. In contradiction of Aristotle's theory of species, evolutionary biology maintains that for (just about<sup>10</sup>) any given intrinsic characteristic *T* that some present day humans possess, it is possible for some past, present, or future human to lack *T*.<sup>11</sup> A species is a mutually interacting group of individuals, and though there are forces that push the group towards uniformity, there are also forces that mitigate in favor of heterogeneity, or at least don't interfere with it. Thus, even if it so happens that every member of a species possesses a certain trait, it is still possible that there have been or will be members of that species which lack that trait. This is why no intrinsic trait is essential to species-membership; species have no intrinsic characteristics as essence. Let's call this the Anti-Aristotelian Premise.

Thus far, the Premise is compatible with Origin Essentialism. OE makes a claim about *individual* essences, that is, about what is essential to individual organisms. To wit, it claims something like the following:

- (1) If *y* and *z* are the parents of *x*, then **necessarily**, if *x* exists, *y* and *z* are the parents of *x*.

Even if we take parentage to be an intrinsic trait, this is compatible with the Anti-Aristotelian Premise, which makes a claim about the essences of *kinds*, and says merely that

- (2) For all kinds *K*, all intrinsic traits *T*, and all individuals *x*, if *x* is a member of *K* and *x* has *T*, then **possibly** there is a *y*, such that *y* is also a member of *K* but does not have *T*.

(1) demands that particular individuals have the same origins in all the worlds in which they exist. Because of what having the same parents entails, *I* and other homozygotically black-haired humans cannot (barring a last-minute mutation) have lacked black hair in another world.

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10 We need not insist that *every* characteristic of humans — DNA-based genetics, sexual reproduction, vertebrate structure — is unessential. It is enough for the anti-Aristotelian to argue that even the conjunction of all essential characteristics is insufficient to define any species. I'll ignore this for the sake of simplicity.

11 In 'Biological Universals and the Nature of Fear,' *Journal of Philosophy* 95 (1998) 105-32, I argue that certain *relational* characteristics, such as membership in a population, and certain relationships with other individuals, might be essential to all members of species *qua* members of that species.

But the Anti-Aristotelian Premise does not demand that any one of us be black-haired in some other possible world. It simply demands that since I am black-haired, there must be a world in which a member of my kind, i.e., *Homo sapiens*, is not black-haired. But this does not have to be me. Somebody else with different parents can serve.

But now consider an extreme case. Suppose that we have a trait *T* directly determined by a gene *G*, where *G* has gone to fixation in the human population. Then, ignoring the possibility of mutations, Origin Essentialism implies that:

(3) For every (actual) human *x*, it is **not possible** (barring mutation) that *x* should lack *T*.

The reason is that in order to lack *T* a human would have to have parents without gene *G*. These do not exist in the actual world. Consequently, every possible non-*T* individual has parents that do not exist in the actual world. Thus, none of these individuals is identical with anybody in the actual world. Now suppose what is generally true in such circumstances, namely that there is an alternative trait *A* directly determined by an allelic alternative gene *G'* such that *G'* could have gone to fixation instead of *G*. (Note that we are envisaging here not just the simple possibility of *some* human possessing *A*, as demanded by the Anti-Aristotelian Premise, but the more demanding case of *all* humans possessing *A*.) In other words,

(4) It is **possible** that every human should lack *T*.

Superficially, (3) looks incompatible with (4), but it is not. For what (4) demands is that in some non-actual world, *W*, every individual lacks *T*, whereas (3) demands that no *actual* human being lack *T* in any other possible world. These two demands are compatible provided that no actual human being occurs in worlds like *W*. Thus, to accommodate the possibility of alternative traits becoming fixed in a given population, we need to posit disjoint populations of humans across possible worlds. When *T* goes to fixation, one set of lineages is eliminated; when *A* goes to fixation, a disjoint set of lineages is.

The problem is that, given the most plausible ways of identifying species offered by evolutionary systematics, Origin Essentialists are obliged to hold that, under a certain version of these circumstances, there are no *humans* in world *W*. Thus they have to deny what looks, to biologists, like quite a plausible premise, namely (4).

## V Defining Species: The Method of Collection

How are species identified? Because of the Anti-Aristotelian Premise, they cannot be identified, as Aristotle thought they were, by the intrinsic characteristics common to their members. Under these circumstances, species must be defined relationally and by ostension.<sup>12</sup> We define the human species by picking out a particular human being and stipulating that everything that stands in a certain complex lineage-determined relation to *that* individual is a human. The choice of the defining relation is dictated by the theory of biological systematics, and I shall not try here to specify it completely. At first sight, however, it might seem that it ought to include the following:

### *Common Ancestry*

$x$  and  $y$  belong to the same species if they have a common ancestor,  $z$ , provided that  $x$ ,  $y$ , and  $z$  all closely resemble each other with respect to reproductive physiology and behavior.

### *Common Descendancy*

$x$  and  $y$  belong to the same species if  $x$  and  $y$  can contribute genes to a common descendant,  $z$ , which closely resembles  $x$  and  $y$  with respect to reproductive physiological behavior.

Note that by contrast with some other ways of stating lineage-related conditions, the above conditions have the following desirable consequences.

- A. Organisms of the same sex can belong to the same species, because they can have common ancestors and descendants, even though they cannot mate with one another.
- B. Organisms of different eras can be accommodated without difficulty. Fourteenth century Paul belongs to the same species as twentieth century Peter (a) because they might have a common ancestor, (b) because some ancestor of Peter might have been able to have a common descendant with Paul, and (c) because it may now be possible for Peter and Paul to have a common descendant.

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12 See Brent D. Mishler and Robert N. Brandon, 'Individuality, Pluralism, and the Phylogenetic Species Concept,' *Biology and Philosophy* 2 (1987) 397-414; Kevin de Queiroz and Michael J. Donoghue, 'Phylogenetic Systematics and the Species Problem,' *Cladistics* 4 (1988) 317-38; and my 'Biological Universals' for relevant discussions of the species category.

- C Sterile individuals are accommodated by the common ancestry condition.
- D. Organisms from ancestral populations, for example, ancient humanoids, will not count as humans, because they do not closely resemble current humans with respect to reproductive physiology and/or behavior.
- E. 'Swampman,' the much-discussed philosopher's example of a synthetic molecule-by-molecule replica of a human, will count as human because of the common descendancy condition, though he is born to no human parents.

We can now state:

*The Method of Collection*

By using such lineage determined relations as common ancestry and common descendancy, we start with an arbitrary individual and collect all the other organisms related to him by the above stated conditions. Species are defined by repeated applications of this method.

For example, if we start by ostending Joel Pust, include all the individuals to whom he stands in the relations of common ancestry and descendancy, then all the individuals to whom individuals in this expanded collection stand in the right relations, and so on, and keep going until there are no more individuals left to be collected, we will get the species to which Pust belongs. Every individual we pull in by repeated applications of this procedure is a human, and nobody else is. I'll call this method of definition the *method of collection*. If the lineage determined relation is defined adequately, it will make no difference which individual one starts with; the same collection of individuals will be collected for each species.

## VI The Method of Collection and Origin Essentialism

Defining species by the method of collection implies that there are no *tigers* or *humans* on 'Twin Earth' because there is no overlap or contact between lineages there and lineages here. (Twin Earth, remember, is the philosopher's mythical other planet in which all Earthly conditions are duplicated with some very small changes.) Twin Earth contains tiger-like creatures indistinguishable from tigers here, and human-like creatures that similarly cannot be distinguished from Earthly humans.

Moreover, these creatures may even have descriptively exactly the same evolutionary history as their Earthly counterparts. Nevertheless, Twin Earth 'humans' and Earth 'humans' belong to different species, by the above theory of species-classification. Since such pairs of organisms can never come into contact, they do not count as conspecific by lineage-determined relations. No pair of organisms, one drawn from Earth, the other from Twin Earth has a common ancestor. No such pair can interact so as to produce a common descendant. Thus, the method of collection will not pull Twin Earth individuals into the human species.

What happens across possible worlds? Obviously, it is not possible to interact with organisms across possible worlds to create common descendants. Where populations overlap in different worlds, the method of collection depends on bridge individuals. Starting from some human in this world, the method of collection might pull in a human who exists in *W*. Within *W*, this individual, already collected into the human kind, stands in the above-mentioned lineage determined relations to other organisms there. Repeated applications of the method within *W* will pull in these and all the other humans there. So the method of collection works. However, suppose the humans in the actual world and the human-like creatures in *W* don't overlap at all. Then there will be no bridge individual that we can use to cross over to *W*. Consequently, there will be no humans in *W*.

If Origin Essentialism is right, the method of collection will make it essential to the human species that certain individuals be members. The lineage conditions ensure that, regardless of which arbitrary chosen individual human you start with, some of the first humans are always included. For if *x* is the bridging individual to world *W*, then *x*'s ancestors will be included in *W*. But according to Origin Essentialism, the parents of *x* are always the same, no matter what possible world you are in. Thus in every possible world, in which there are humans, there exists some subset of the founding human population. I'll call this Origin-Essentialism-for-Species (OES), and distinguish it from Origin-Essentialism-for-Individuals (OEI), the latter being the condition we have been calling OE up to now.

On the supposition that Origin-Essentialism-for-Species is true, the method of collection becomes a very strong constraint. Suppose, for instance, that a certain genetically determined trait *T* had drifted to fixation in an ancestral non-human population; i.e., before humans ever even existed. Intuitively, it seems that it would have been possible for humans not to have had this trait: for as we have seen all that is required is for some alternative trait *A* to have drifted to fixation in the ancestral population. However, we have seen that accommodating this intuition demands that the human population of worlds in which *A* drifted to fixation is disjoint from our own. Consider a possible world *W* in which

this was the case. In *W*, all the *T*-lineages have been eliminated; only the *A*-lineages remain. But the *T*-lineages started the human species off in the actual world. In *W*, these are not available. Consequently, in accordance OES, the human species does not exist in *W*. In other words, given the method of collection, Origin Essentialism for Individuals, i.e., the parentage condition, entails that there are no humans in this other world. Thus, given the most plausible way of identifying species, OEI entails that *humans* could not have been different in certain respects, although evolutionary biology seems to insist that they could have been. In fact, origin essentialists must surrender a distributional fact here. For it isn't just the possibility of *my* being *A* that they rule out in the scenario just stated, but the possibility also of *any* human being *A*. What is needed to accommodate this last possibility is a less constraining way of identifying organisms across possible worlds. But relaxing parental-origin constraints on the identity of individuals leads to the reinstatement of Individualism.<sup>13</sup>

## VII Different Domains For Different Theories

Where are we now? In section II, I argued by means of the sheep farm example that the C-trait of a particular sheep Suzy was explained by selection. But we saw that this claim depended on denying Origin-Essentialism-for-Individuals (OEI). Pust objects to this denial on the simple grounds that Kripke 'points to' strong intuitions in favor of OEI. My rejoinder is that whatever the intuitive merits of OEI might be, it commits the method of collection to Origin-Essentialism-for-Species (OES), and thus leads to unacceptable consequences. Intuition may well favor OEI over the method of collection; indeed, the method of collection is pretty counterintuitive. However, this method arises out of theoretical propositions in evolutionary systematics, and it stands or falls on its merits with regard to establishing sound classificatory practices, i.e., practices which (a) are *objective*, and (b) identify groupings that played a unified causal role in evolution. Of course, the method of collection might be mistaken: that will be determined by the progress of science in the long run. But metaphysical intuitions are irrelevant to the issue.

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13 In earlier versions of this paper, I failed to distinguish between OES and the method of collection, and thus I claimed that evolutionary systematics was committed to OES. This was a mistake: the claim here is that OES is an undesirable proposition spawned in evolutionary systematics by OEI.

This argument can be supplemented by an argument from population genetics, the science that describes the transmission of traits from generation to generation. In this science, the distributions of traits is predicted by means of probabilities of various genotypes being generated. Now, origins are important to population genetics because the method of reproduction will influence what kinds of traits can be generated. Human genomes have a chromosomal structure that draws on both parental genomes. The way in which parental genes are recombined will influence the structure of the resulting genome, and its influence on traits. Origins matter in this way, but population genetics does not give any importance to the *identity* of the parents. All that it is concerned with is the probability of given genotypes occurring. To graft the view that organisms are individuated by their lineages onto population genetics is gratuitous and saddles it with metaphysical considerations extrinsic to its explanatory agenda. Population genetics will, no doubt, be concerned with origins in *some* way, but not in a way that leans as heavily on the identity conditions for individual organisms as OEI does.

Now what are we to do about the apparent conflict between OEI and the method of collection? My own view is that the cleanest and most satisfactory solution is to abandon OEI. This is because I give little credence to intuition. Part of my reason for discounting it is that in different contexts, one might want to emphasize different intuitions, and it is often arbitrary to insist on one over another.<sup>14</sup> There is, however, an objection to this procedure. It is that both OEI and the denial of OEI are metaphysical positions, neither of which is implied by population genetics. Why is it preferable to adopt one proposition rather than the other in a context in which one is discussing population genetics?

My response is that ontology is theory-relative. This can be illustrated by the way in which one makes ontological distinctions among individuals within a theory. The Ship of Theseus presents us with a case of this kind. Pre-theoretically, one might have been inclined to identify this object with the planks, nails, etc. that compose it. However, in the context of the intuition that the Ship survives the replacement of its planks and nails, this identification becomes problematic. One standard way of dealing with the problem is to proliferate one's ontology by making a distinction between the Ship and several composite objects consisting of planks and nails. Each of these temporally extended objects is a sum of

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14 See Richard Cartwright, 'Some Remarks on Essentialism,' *Journal of Philosophy* 65 (1968) 615-26. I am indebted to a conference presentation by L.A. Paul, 'Essentialism,' for the references. Her paper suggested the line of thought that follows, though it is different from her own.

certain temporally non-extended objects — object-stages, as they are called. We define temporally extended object types by putting conditions on what sums of object-stages we will count as members of that type. Before we encountered the problem of the Ship of Theseus, we might have been inclined to insist that two stages would have to consist of the same planks and nails in order to count as stages of an object of a kind we countenance. But the proposition that the Ship survives such replacements convinces us to change our criterion of ship-identity. By doing so, we introduce a new kind of entity over and above those envisaged in the ontology of planks and nails.

Without wanting to endorse this strategy unqualifiedly, I simply want to point out that people deeply moved by OEI might take a similar line. For instance, they could distinguish between the merely biological entity discussed by population genetics and the *sheep*, Suzy, that coincides with it. They could say that while the biological entity is not origin-sensitive, Suzy is. David Lewis has shown us how to work this strategy in his writings on possible worlds (for instance Lewis, 1986). Just as we consider a temporally extended object to be a sum of its temporally non-extended parts, so also we might consider an object to be a sum of its counterparts in all possible worlds. The biological organism might be regarded as belonging to the same composite as do other organisms with different parents in other possible worlds: the identity conditions for organisms might rest on some genotype condition, for instance, the parents being regarded simply as a dispensable means of creating that genotype. The identity conditions for Suzy, being origin-sensitive, might be regarded differently. This ontology introduces a new entity over and above those to which population genetics is committed.

What is the provenance of these new entities? How are we to judge whether they really exist? Again, one might follow David Lewis:

those philosophers who preach that origins are essential are absolutely right — in the context of their own preaching. They make themselves right: their preaching constitutes a context in which *de re* modality is govern[ed by] match of origins. But if I ask how things would be if Saul Kripke had come from no sperm and egg but had been brought by a stork, that makes equally good sense. I create a context that makes my question make sense, and to do so it has to be a context that origins not be essential.<sup>15</sup>

Lewis's point is that all such contexts come with ontological posits of their own. My point, following him, is that Origin-Essentialism-for-Individuals has an ontology of its own — whether this theory is any more

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15 David Lewis, *On the Plurality of Worlds* (Oxford: Blackwell 1986), 252

firmly founded than the stork-based ontology is a question for its proponents to answer. In any case, the OEI ontology is not incompatible with the origin-insensitive ontology of population genetics; it just describes a different domain of objects. There is no reason, therefore, to impose an irrelevant metaphysics on population genetics or on evolutionary systematics on the basis of considerations extrinsic to these disciplines.<sup>16</sup>

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