
Locke Versus Aristotle on Natural Kinds

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LOCKE VERSUS ARISTOTLE ON NATURAL KINDS

SOME years ago—not many—every student in philosophy would have had his or her attention drawn, as a matter of course, to some such supposed fact as the following: “The sentences ‘All gold is yellow’, ‘All tigers have stripes’, etc. can function *either* to express necessary, a priori, analytic propositions *or* to express contingent, a posteriori, synthetic propositions, depending on what the terms ‘gold’, ‘tiger’, etc. are taken to mean, i.e., on whether or not being yellow is included in the definition of ‘gold’, having stripes in the definition of ‘tiger’, and so forth.” Criticism of this doctrine existed but was generally confined to one of two considerations. Sometimes it was thought that Wittgenstein’s “family resemblance” argument had shown that it was possible for there to be a priori connections that are not necessary, like the connection between having rules, with winning and losing, and being a game (games do not necessarily have such rules, but having them, for those which do, is a part of their being games); or else it was thought that Quine or someone had cast serious doubt on the whole conception of the analytic/synthetic distinction, and so on the necessary/contingent, a priori/a posteriori distinctions.

Saul Kripke and Hilary Putnam and others have changed the scenery somewhat in the last ten years. The names ‘gold’, ‘tiger’, etc. have their meaning, it is said, not by being tied to an arbitrary definition or to an idea or mental concept, but simply by being the name of, or, more technically, by “rigidly designating,” a natural kind. Membership of the kind is determined by the presence of a presumed underlying common nature which may be unknown to us, rather than by the satisfaction of a definition consisting of a list of those properties which we happen to use as criteria for identifying things as members of that kind. Thus, in principle at least, a substance might satisfy *all* our criteria for judging something to be gold, and yet not be gold; or may fail to satisfy our criteria, and yet be gold. We might find a substance on Mars, to take Putnam’s example, which we call “water” because it satisfies all our criteria for

water (supposing at least that we are ignorant of theoretical chemistry) and yet it might not *be* water, because as a matter of fact it has a different chemical composition from water, it is not H₂O.

I take it that these last, by now familiar arguments and their corollaries (too familiar, I trust, for references or elaboration to be necessary) at least point in the right direction. I shall not say much about them directly, since I am more concerned with their historical antecedents. I do, however, hope that what I say will be some sort of contribution toward achieving a sharper conception of the philosophical issues, and also perhaps toward dispelling certain myths which surround the Kripke/Putnam move. With respect to the second point, proponents of the new view often give the impression that what they are overthrowing is an uncritically held and unsophisticated, if in a way natural assumption about meaning, an assumption which disastrously underlies the theories of Locke, Russell, and Frege, among others. At the same time there is some awareness at least that the new view is not so new as all that, since it is not at all unlike Aristotelian doctrine. This second consideration must surely raise the question, Why did philosophers fall away from the truth and revert to a state of naivety? The answer is clearly not "The Dark Ages," since Aristotle survived *them*. The correct answer is, roughly speaking, "The argument to be found in Locke's *Essay*." Locke was neither alone nor first in the field, but his argument is the most extended, elaborate, and sophisticated, and certainly the most widely read and influential of his time on the subject of natural kinds. Now it is hardly possible to read that argument with understanding and fail to be struck by the impression Locke gives that a part of what he is overthrowing is an uncritically held and unsophisticated, if in a way natural assumption about meaning, an assumption which disastrously underlies the theories of Aristotle and his followers.¹

That natural assumption, of course, is *something* like Kripke's view. In fact J. M. Mackie has found in one passage in which Locke offers to characterize the mistake what he, Mackie, calls "Locke's anticipation of Kripke."² But this is myth-making. According to Mackie, "Locke made, but set aside, a discovery about an ordinary use of language which has only recently (and inde-

¹ See, e.g., *An Essay concerning Human Understanding*, P. H. Nidditch, ed. (New York: Oxford, 1975), II, xxi, 6-7; III, ii, 5; III, vi, 48-50; III, ix, 12; III, x, 17-21; IV, vi, 4-5.

² "Locke's Anticipation of Kripke," *Analysis*, xxxiv, 6 (June 1974): 177-180, and *Problems from Locke* (New York: Oxford, 1976), pp. 93-99. Mackie discusses *Essay* III, x, 17-19.

pendently) been made again by Saul Kripke." It is supposed to have been Locke's empiricist assumptions about meaning which held up appreciation of the discovery for nearly three centuries. This scenario is without value. The passage is just one of a number concerned with Aristotelian doctrine and its supposed connection with ordinary, unthinking assumptions. What Locke attacked was shortly afterward explicitly defended by Leibniz, a number of whose remarks could readily find a place in Kripke's argument. The truth is that, approaching these issues from the rather special point of view of a concern with modal logic, and against the background of Russell's theory of descriptions, the modern obsession with proper names, and so forth, Kripke has arrived at a position in some respects very like earlier, widely held assumptions which owed little or nothing to his special concerns. To describe those assumptions, particularly as expressed by their archenemy, as "anticipations of Kripke," would be at best remarkably complacent about modern styles of philosophical thought. What Aristotle and Locke between them potentially have to offer is something much more valuable than faint "anticipations": an unfamiliar view of some difficult terrain and, at the very least, a deeper understanding of why Kripke was necessary at all. In fact we shall find that Locke's argument was much more metaphysical, and less dependent upon any assumption about meaning, than modern writers suggest. Locke's ideational theory of meaning draws at least as much support from the attack on Aristotle as it gives to it, a point which is explicit even in his initial exposition of the theory, before the attack on Aristotle has properly been launched (*Essay*, III, ii, 5).

The background to Locke's theory of natural kinds is something very roughly like this. Aristotle sensibly thought that the fundamental objects of science are *substances*, things with natures. To understand the nature or essence of a thing, what it is essentially, is to be in a position to understand its properties and behavior. Classification of natural substances as such would be classification in accordance with sameness and difference of nature. There are two broad types of natural substance—individual substances such as men, horses, and oak trees, and so-called "homoeomerous" substances, such as earth, water, or gold. All men, or all quantities of gold, have a common nature or essence. Indeed each particular *is* that nature, so Aristotle seems to think: the common nature embodied or instantiated in matter *constitutes* the individual, and individuals are somehow kept apart or distinguished by their matter. John is the form of man embodied in *this* matter, Mary the same form embodied in *that* matter. Scholastics, however, distinguished

the universal form of man from the particular forms that constitute John and Mary, thus avoiding the danger of making all human beings identical. On this later view the universal form is an idea in the mind of the Creator, like the general idea of a plough antecedently in the mind of the craftsman who makes a particular plough. On any version of the theory, form cannot exist in the world without matter nor matter without form. "Matter" is in itself natureless and indeterminate, even in respect of quantity.

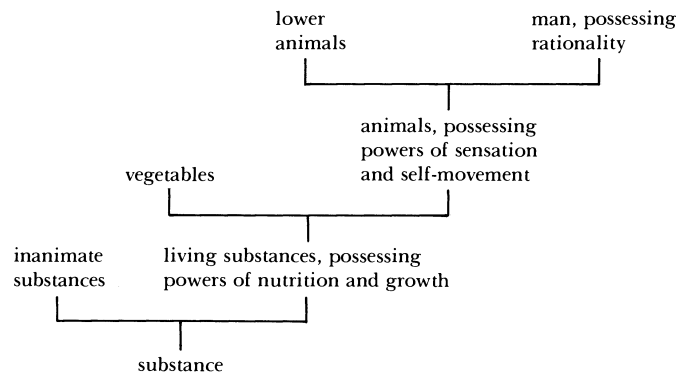
The New Philosophy of the seventeenth century, the view that all material objects are obedient to common laws of motion or mechanics, and that all material change is explicable mechanically, defined its relationship to the old by a delightfully simple move. The new view is that matter, so far from being indeterminate, does have a nature or essence. It is, in fact, a substance in its own right and, apart from spirit, it constitutes everything in creation. There is no need to postulate other universal natures—there are no specific or substantial forms, only the different shapes, sizes, motions, etc. of particular quantities of matter, and the sensible qualities and powers (i.e., the effects on observers and on other things) that are consequent upon these. Gold differs from water, an oak tree differs from a horse, not in substantial form nor in substance, but in structure, the particular modification of the minute parts. One dispute among the New Philosophers should, however, be mentioned: Descartes, Hobbes, Boyle, and others thought that they knew the essence of matter. Gassendi, Locke, and others believed that such claims were unjustified, and that an ideal mechanics had not been achieved and probably could not be achieved by human beings. Hence material substance is *extension* for Descartes, but *something we know not what* for Locke. On the other hand, Locke believed that Boyle's version of corpuscularianism—solid particles clashing in the void—was the best inadequate theory available and that the unknown truth must be something like it.

Now let us consider an Aristotelian's schema for scientific explanation, the theory of "real definition" embodied in the doctrine of the so-called "predicables," a doctrine deriving from Porphyry's rewriting of Aristotle's logic and at least as familiar a piece of the background knowledge of anyone interested in philosophy or science in the seventeenth century as, say, Russell's Theory of Descriptions is for philosophers today. That will enable us both to identify more precisely the target of Locke's argument and to explain the meaning of the technical terminology that he employs throughout. The five predicables were standardly illustrated in seventeenth-century logics by an example from the category of substance:

genus: *animal*
 species: *man*
 difference: *rationality*
 properties: *laughter, language, hands*
 accidents: separable: the *coldness* of some cold water
 inseparable: the *blackness* of crows

Scientific definition of a *species* is by *genus* and *difference*, and so the definition of the essence of man is 'rational animal'. Rationality, the difference, is "the principle thing in a man's nature," and the *properties* flow from the difference "as a natural emanation."³ *Accidents* are attributes that are not thus connected with the essence: the substance can in principle be without them even when it never is in fact, as crows are never without blackness. This means, not just that we can imagine a nonblack crow or a crow's turning white, but that we could fully understand a crow's nature without being able to infer its color. A white crow would not be deformed like a crow hatched without a bill.

The genus can itself be defined by genus and difference, i.e., by division of a higher genus, so that the ultimate or last species lie at the tips or twigs of an orderly hierarchical tree. The scientist aims at getting the tree right, basing his definitions on the careful observation of functioning. A definition that accords with the natural hierarchy, properly dividing a genus itself derivable from a higher genus by proper division, is called "simple" or "real." The following diagram represents the widely accepted real definition of *man*.



³ I quote from T. Spencer: *The Art of Logic* (London, 1628; Scolar Press facsimile, Menston, 1970), ch. xi, pp. 59f.

Such definition is opposed to two sorts of, as it were, pseudo-definitions: the "definition" of *compounds* (syntheta) and the *nominal* "definition" of simple terms.

Compound terms are class-names invented by combining items from different categories. Here are a few examples, some of which derive from Aristotle:

musician = man who is musical
 father = male animal with offspring
 palfrey = horse which ambles
 walker = that which walks
himation = fair man

'Himation' (actually the Greek word for a *cloak*) is a word coined as an example by Aristotle, and his purpose in coining it was presumably to stress the infinite possibility of constructing such terms, the arbitrariness with which they can be invented and defined. There are no natural kinds corresponding to them, and so no genuine or ontological essences. A sign or corollary of this is that the individuality of the individuals that satisfy such predicates is in no way bound up with their doing so: i.e., if a man ceases to be musical nothing substantial, not even a musician, ceases to exist. But a man cannot cease to be a man and to have the essence of a man without ceasing to exist.

Nominal definition, by contrast, may be of a natural kind, and may enable us to apply the name of a natural kind correctly by enabling us to identify the natural kind. Yet it is not scientific definition of the essence of a kind. For example, 'featherless biped with broad nails'⁴ is a nominal definition of *man*, since it is a description which fits man uniquely, but which fails to identify man's principal attribute.

A fully worked-out science thus consists for Aristotle in a set of real definitions from which the properties have been derived. Euclidean geometry can supply the model for such a science, although definition in geometry is not based on observation since geometry is concerned with *quantity* abstracted from change rather than, as is natural science, with *substance*. A genuine substance-term or name of a substance applies to the individual in virtue of its whole intrinsic nature, and a real definition is simply the explication of that unitary nature. Since properties too are implicit in the essence, the predication, whether of the species, genus, difference, or prop-

⁴Cf. *Essay*, III, vi, 26; III, x, 17; III, xi, 20.

erties of the individual, does not go beyond the subject. Hence it was a logical doctrine that only accidents are “adjuncts”:⁵ only the predication of accidents really adds anything to the subject. Accidents, however, fall outside the scope of scientific explanation. The scientist must thus form a conception of the substance which strips it of accidents, but the “naked substance” so exposed to thought is not, of course, thereby stripped of all attributes. So far from being, as the less perceptive modern commentators are inclined to assume, wholly natureless, the naked substance of seventeenth-century philosophy, whether Aristotelian or anti-Aristotelian, precisely is the properties and, above all, the essence exposed to view. Everyone agreed with Aristotle’s principle that the substance and the essence are one and the same.

Locke’s first argument against the doctrine of predicables is quite unoriginal, and is simply, in effect, the doctrine of abstraction functioning as a theory of universals. Essentially similar arguments can be found in philosophers as diverse as Descartes and Hobbes.⁶ The point is, as Descartes says, that all universals are simply modes of thought; or as Locke puts it, “General and Universal, belong not to the real Existence of Things” (III, iii, 11). Hence distinctions between universals, such as the distinctions among the five predicables (at any rate as applied to particular sorts of substances), are also mind-dependent. The hierarchy of genera and species, ascending to the various categories of being, arises only because the mind ascends by abstraction from man and horse to animal, vivens, body, substance “and at last to *Being, Thing*, and such universal terms which stand for any of our Ideas whatsoever.” Thus “this whole mystery of Genera and Species” is “nothing else but abstract Ideas, more or less comprehensive, with names annexed to them” (*ibid.*, §9). The “Rule, that a Definition must consist of *Genus* and *Differentia*” is rejected. The method of division of the genus by the difference merely extracts an arbitrarily chosen element from the abstract idea of the species, one property out of all those which are contained in the complex nominal essence (§10). A further point brought against the tree of Porphyry seems to be this: that hierarchy would have to be founded in the form or essence of the individual, since universals exist for the Aristotelian only in individuals. Consequently there must be a corresponding complexity or layering in the individual. Thus the Aris-

⁵ Spencer: *op. cit.*, p. 62.

⁶ See, e.g., Descartes: *Principles of Philosophy*, I, 50; Hobbes: *Elements of Philosophy*, I, ii, 14.

totelian must “think Nature to be very liberal of these real essences, making one for body, another for animal and another for a horse, and all these essences liberally bestowed upon Bucephalus” (III, vi, 32).

Now it might seem that in this attack Locke is simply appealing to what is in effect a theory of meaning, namely, the doctrine of abstract ideas, as something established. Yet it should already be possible to see that his argument hinges on the denial of real universals and on the intuitive ontological principle that everything that exists is particular. That, if accepted, is enough to refute Aristotelianism, and the doctrine of abstraction functions less as a presupposed premise of the argument than as a rival theory compatible with that principle, or even as an explanation of the Aristotelians’ mistake: in their theory of specific forms, genera, and essences, they take distinctions of thought for real distinctions, abstractions for realities. I shall not spend much time pursuing this issue, which is something of a digression from my main concern, but it is important to grasp the general character of the liaison between abstractionism or anti-realism and mechanism in the seventeenth century. For that purpose it may be helpful to consider a possible objection to the anti-realists’ strategy, namely, that they had no right to claim that they had replaced real universals by similitudes arbitrarily picked out by the mind. This objection need not rest on the somewhat blank logical ground that resemblance must be in some general respect, but arises because the new metaphysics seems to have given a universal essence or nature to matter as such. That transformation of Aristotelian natureless matter is the meaning of the doctrine that matter is itself a substance. We therefore need to understand why the proposed essence of matter could be taken to have a quite different ontological status from that attributed to the Aristotelian essence of the species.

The difference lies in what might be called the “perspicuity” of matter’s essential attribute. Aristotelian essences are “occult,” consisting in powers or functions such as, in the case of man, rationality. We have to conceive of them, that is to say, through an intermittent actualization, i.e., as the law or tendency governing the behavior of the kind. As explanatory principles they are vulnerable to those jokes about the “dormitive powers” of soporifics. Mechanism on the other hand, promises to explain all universal law and dark potentiality as mathematically derived from independently grasped attributes which are totally actual and directly perspicuous to the mind. The paradigm for such an attribute is a thing’s deter-

minate extension.⁷ Thus, whereas, on the Aristotelian story, the nature that two human beings or two pieces of gold have in common is irreducibly general, for the mechanist, in contrast, what makes two spheres or two cubes of matter behave in similar ways is not a common universal nature but a perspicuous resemblance. There is nothing in each case but extended substance within geometrically similar boundaries.⁸ Increasing doubt about the capacity of physics to live up to this ideal of perspicuity helped to cause the later difficulties for dogmatic mechanism. In fact, neither the fundamental properties now ascribed to primary particles by present-day physics nor, therefore, the particles themselves could be either empirically identified or conceived independently of the general laws governing the behavior of those particles. Crudely, the ontology of rationalism is true, but that of mechanism is not. In other words, contrary to Locke's doctrine, there *are* real universals, if not irreducibly at the level of the Aristotelian species.

However that may be, we are now equipped to consider the rest of Locke's argument, an argument which is generally considered incoherent and contradictory, but which to my mind places Locke beside Aristotle as the other major, classic philosopher of natural kinds.

I have already mentioned one way in which Locke's mechanist ontology lies behind his logic and theory of classification. There is another. The mechanist's world is one in which all differences are differences of degree, and everything is in principle indefinitely mutable. For all differences and changes are ultimately just differences and changes in the spatial quantity and ordering and motion of the parts of things. Crudely, the particular complex perceptible things in existence, particular men, horses, oak trees, quantities of gold etc., constitute a vast plurality of machines among which there may be natural structural resemblances, but no two of which, for all we know, are precisely alike.⁹ How we should rank them on the basis of our observational knowledge is a matter to be more or less pragmatically determined. We should do so in a way which

⁷ Hence the capacity to shock of the skeptical suggestion that there is something occult even in extension: cf. *Essay*, II, xxiii, 23.

⁸ Boyle provocatively raises the question whether Aristotle himself really advanced the doctrine of substantial forms at all, since he was so fond of illustrating the matter/form distinction with such examples as a bronze sphere. See Robert Boyle, *Origin of Forms and Qualities*, second edition (Oxford, 1666), p. 72 (cf. pp. 42f).

⁹ The analogy of a machine's structure whose elements contribute to joint effects was explicitly used with respect to the structure of chemicals, as well as to that of biological individuals: cf. Boyle, *op. cit.*, p. 54.

marks all the differences that are important to us and which fits our language for the purposes of communication.

Locke takes the dual function of the Aristotelian specific essence to be: first, that of determining the boundary of the species by being present in, and only in, its members; and, secondly, that of explaining or giving rise to the properties of the species (in the technical sense of 'properties'). The presence of the essence or form Locke takes to be, for the Aristotelian, an all-or-nothing business, and hence the supposed boundaries of the species are "precise." Locke does not quarrel with such a notion of precision; for it is an extremely important and explicit principle of his philosophy, as of Frege's, that precisely bounded classes are a prerequisite for universal knowledge.¹⁰ He holds that what sets a boundary to the class is always what he calls the "nominal essence," i.e., the abstract idea that embodies our criteria for the application of the kind-name or sortal. What explains the properties of the species so defined, on the other hand, is corpuscularian structure (or at least something like it, if Boyle's theory is less than the whole truth). Those aspects of the structure of the individual members of a species which they have in common and in virtue of which they all possess the defining properties of the species, comprise what Locke calls the "real essence" or "constitution" of the species. The distinction between nominal and real essence derives, of course, from the Aristotelian distinction between nominal and real definition.

It is tempting to conclude from all this that Locke does not deny that each of the duties purportedly performed by Aristotelian essences is performed by something, but that he simply divides the labor between his two "essences." Yet that characterization of his position, however beguiling, is likely to mislead. For Locke really believed that nothing on earth could possibly perform the function that the Aristotelians ascribed to their specific essences or forms. Although the Aristotelian essence and Locke's nominal essence both define the boundary of the species, the former does so ontologically. If it also does so, for those who know it, epistemologically, as a criterion, that is quite accidental. But the Lockean nominal essence is intrinsically an epistemological essence and nothing more, a criterion by reference to which we mark off the members of the species. The boundary marked is a precise one which owes its existence to our drawing it: reality itself simply could not, in Locke's view, supply such a boundary. Reality can supply resemblances, but resemblances do not constitute natural boundaries.

¹⁰ Cf. *Essay*, IV, vi, 4; III, vi, 50; etc.

The foundation of our system of classification, then, is not “Forms or Molds, wherein all natural Things, that exist, are cast, and do equally partake” (III, iii, 17), but the objective resemblances between things, the contingent fact that “Nature in the Production of Things, makes several of them alike.” This fact Locke regards as undeniable and “obvious” at the level of observation, and he accepts too (perhaps too readily) that phenomenal resemblances are an indication of underlying structural resemblances.¹¹ It is important to realize, as critics have often failed to realize, that Locke’s recognition of natural *resemblances* is not a concession of any kind in the argument against natural species, against natural *boundaries* independent of our concepts. It is true that it is on the basis of these observed resemblances that we form abstract ideas “and set them up in the mind with Names annexed to them as Patterns, or Forms, (for in that sense the word Form has a very proper significance)” (III, iii, 13). But the system of “species” thus conceived is a necessarily inadequate system imposed by us on natural anarchy. Complex machines may differ from one another in indefinitely many ways, and by indefinitely small amounts or degrees. However we divide the biological or chemical worlds, there will be living creatures and stuffs with attributes that cut across the classes we have formed. Thus Locke can find the traditional notion of a great chain of being, which was normally conceived of as a hierarchical order of distinct species, itself congruent with the anarchic mechanist vision: “There are Animals so near of kind both to Birds and Beasts, that they are in the Middle between both . . . There are some Brutes, that seem to have as much Knowledge and Reason, as some that are called Men . . . and so on till we come to the lowest and the most inorganical parts of Matter, we shall find everywhere, that the several Species are linked together, and differ but in almost insensible degrees.”¹² Since a species—i.e., on Locke’s view a class of structurally and phenomenally similar individuals—may always crop up with some of the properties from one genus, and some from another, so may particular individuals with respect to species. And wherever we stop, we might always have made more divisions.

¹¹ *Essay*, III, iii, §13. Cf. III, vi, 36–7. Mackie takes these two passages to be admissions that there are natural kinds: *Problems from Locke*, p. 88 fn 26.

¹² III, vi, 12. Cf. §22 *et passim*. For the influence of this sort of conception of the “great chain” on eighteenth-century biology see Arthur O. Lovejoy, *The Great Chain of Being* (New York: Harper, 1960), ch. viii (although the present view of Locke’s argument differs from Lovejoy’s). Lovejoy quotes Bonnet: “If there are no cleavages in nature, it is evident that our classifications are not hers,” a remark entirely in the spirit of Locke. Its implication is that nature *has* no classification, since natural classes imply natural cleavages.

The absence of any natural basis, in the form of *boundaries*, for the classification of individuals existing at the same time is matched by anarchy over time. It should be remembered that the Aristotelian essence determines ontologically not only the boundaries of the species, but *ipso facto* the boundaries of the particular individual. The particular substance actually consists in, is identical with, the specific essence or form embodied in its particular matter, to which the form gives definition. Hence there is no question of the particular substance changing kinds. Change in the individual is change in its "accidents." Any more profound change involves the replacement of one specific form by another, and so the destruction of *that* individual. Hence there is a distinction in the Aristotelian system between "alteration" and "substantial change," the latter of which involves substantial corruption and generation. This doctrine, as we shall see, is vulnerable to criticism, but it is not just an archaic quirk. On our ordinary, present-day notion of a natural kind or species, there does seem to be some sort of "logical" barrier to an individual thing's changing its kind, and no barrier to its having natural attributes other than those closely associated with, or explained by, its kind. It is thus a highly significant feature of the Lockean picture that each individual "machine" is regarded as indefinitely mutable, at least in principle: whatever its structure or constitution, it "may be changed all as easily, by that hand that made it as the internal frame of a watch."¹³ Often it is changed by less powerful hands, the hands of the chemist, for example, or in the natural course of events. That is why the chapter "Of General Terms" ends as it does. Its final paragraphs explain that universal truths are concerned with abstract ideas, not with independent and eternal real essences. They are eternal and immutable truths only because they are hypothetical. In the world of particular substances, "All things that exist, besides their Author, are liable to Change; especially those Things we are acquainted with, and have ranked into Bands, under distinct names or Ensigns. Thus that, which was Grass to Day, is to Morrow the Flesh of a Sheep; and within a few days after becomes part of a Man: In all which, and the like Changes, 'tis evident, their real Essence, i.e. That Constitution, whereon the Properties of these several things depended, is destroy'd, and perishes with them" (*Essay*, III, iii, 19). Thus if we say that quantities of matter or material things belong to kinds, we must admit that they constantly shift

¹³ *A letter to the Bishop of Worcester, The Works of John Locke* (London 1823), vol. iv, p. 91.

their Kind, according as they satisfy now this and now that nominal essence (cf. §13, p. 416, ll 5ff). The real essence of a kind is not a universal substantial nature which as it were withdraws from the matter, but is simply those underlying structural features which no longer exist when the qualities constituting the nominal essence no longer exist. Such changes may be interpreted by us, from the point of view of our system of classification, as the generation and destruction of substances, but really nothing substantial is created or destroyed, just structure. I will say more about this point.

Now let us look at some of those features of Locke's argument which have caused difficulty for its interpretation. There are passages in which he might seem to be saying, not that underlying ontological boundaries to species are impossible, but only that, if there are natural boundaries at the level of minute structure, they can have relevance neither to our actual scheme of classification, since we do not know them, nor to our methodology in natural history, since it is beyond our powers to discover them. Yet it is not difficult to see that some at least of his remarks upon which such a construction has been placed have been misinterpreted. First, to say as he does that members of a species defined by a nominal essence have, or probably have, corresponding similarities at real-essence level—so that we can talk of a corpuscular real essence of the species—is not to concede that the real essence could, independently of any human decision, determine ontologically the *boundaries* of the species. Locke is simply saying that, if we select some set of observable qualities to serve as our nominal essence, then no doubt behind this arbitrarily selected phenomenal resemblance will lie a structural resemblance indirectly picked out by the same arbitrary procedure of selection. He explicitly makes the point that, even if we knew the "real essence" in this sense, all the problems about boundaries would rise up again: "For what is sufficient in the inward contrivance to make a new Species?" Locke's standard example or analogy is the "species" of watches whose "inward contrivance" is known to watch-makers: "But if any one will make minuter Divisions from Differences, that he knows in the internal frame of Watches; and to such precise complex *Ideas*, gives Names . . . they will then be new *Species* to them, who have those *Ideas* with names to them." The business of drawing boundaries and making divisions is arbitrary, at whichever level of difference it is conducted. The same goes for *man* as for *watch*: a normal man as evidently differs in structure ("the wheels, or Springs . . . within") from a changeling as a changeling from a drill, but "whether one, or both these differences be essential, or specific, is only known to

us, by their agreement, or disagreement with the complex *Idea* that the name (*scil.*, e.g.) *Man* stands for" (III, vi, 39).

With all this spelled out (and we shall consider another argument of Locke's that crosses the *ts*) there is little question but that in the few places where Locke seems explicitly to make the concession that natural boundaries *might* exist (as in III, vi, 30—twice), he does so (as is borne out by closer inspection) purely for the sake of argument. The only remotely tenable alternative view, one not supported by the context of these passages, is that he suddenly felt compelled by extreme skeptical doubts to allow that everything he has been talking about may after all be quite beyond our comprehension. That the first diagnosis is at least reasonable is evident from those passages in which he carefully isolates "the usual supposition" of *Aristotelian* essences, in order to prove that, *even if such essences existed*, the boundaries they set to species could not be known.¹⁴ To read the "concession" in this argument as the concession of a genuine possibility, when it is offered in the same breath as allegedly conclusive ontological refutations of *Aristotelian* doctrine, would clearly be absurd.

The subtle epistemological argument against substantial forms is worth examining. Locke argues, not simply that, since we know nothing of such forms, our ordinary classification must be on another basis,¹⁵ but that, if a system of distinctions along the borderlines marked out by *Aristotelian* real essences were to get off the ground, these real essences would have to be known; and yet they could not possibly be known. It is important to realize that, as Locke himself would very well know, the first lemma of this latter argument needs proof, because it was no part of the *Aristotelian* case that we normally use the real essence as a criterion of application for the term. On the contrary, except in the case of artefacts,¹⁶ it was commonly supposed that we normally do not know it; although of course if we do know it the task of classification may be made easier. How then are we supposed to distinguish members of the species? It was thought that we could identify the "properties" of the species by induction from individuals, and then, by philosophical reflection, pick out the peculiar "difference." The purpose of identifying the real essence was explanation, not classification,

¹⁴ Such passages are III, iii, 17; III, vi, 14–19; and III, vi, 25.

¹⁵ Such an argument does of course occur, as at III, vi, 25, where the point is made that, even if (*Aristotelian*) science *could* discover real essences, "they have not been Philosophers, or Logicians, or such who have troubled themselves about *Forms* and *Essences*, that have made the general Names."

¹⁶ For Locke's commentary on this exception, see III, vi, 40.

and it was simply and not unreasonably presupposed that we can identify members of the same species at least fairly well on the basis of more or less obvious points of resemblance. That is why a distinction between nominal and real essence or definition is already built into the theory that Locke is attacking. A nominal definition, as we have seen, consists of a nonexplanatory list of attributes peculiar to the species and so suitable as criteria of recognition. Locke, of course, was ready to argue that any specified candidate for the role of Aristotelian real essence would turn out to be a non-explanatory nominal essence, and that the explanatory role in respect of the associated “properties” could be fulfilled only by corpuscular structure or something like it (II, xxxi, 6 *et passim*). But his purpose within the epistemological argument is to attack the assumption that we could even begin to discuss the question of the (Aristotelian) real essence of “this species” which we have already identified through its properties or from examples. How would we know which attributes of the particular things or of any single thing before us were *properties* rather than *accidents*, and therefore “so annexed to it, that any one of them being away, we may certainly conclude, that that Essence is not there, and so the thing is not of that Species?” (III, vi, 19). Locke agrees that if we knew *either* the properties *or* the essence, we should be able to distinguish members of the species: but we could not know the properties *unless* we knew the essence. It is really the boundary between property and accident that is in question in Locke’s critique of the Aristotelian notion of how we identify species, and Locke’s demand is for the Aristotelian to explain this boundary, and how it could be known. Unless it is known, no species has been identified, and so the question of what “its” real essence is cannot arise. If it were said that we can identify a species by means of an ordinary word such as ‘gold’, Locke’s response would be that this is either to make use of an existing nominal essence in his sense, which imposes a boundary on reality for us (*ibid.*), or, worse still, to assume that there is some precise boundary marked out by a mere word in general use, i.e., by that loose and imprecise usage without clear and distinct ideas which he calls the “civil” use of language, and which he contrasts with the precise or “philosophical” use necessary for universal science or the systematic study of anything at all (cf. III, ii, 4; x, 22, etc.).

If, on the other hand, it is said that we can identify the species by means of a single individual, as the species, whatever it is, that that thing belongs to, Locke challenges the Aristotelian to apply the distinction between properties and accidents to the individual. The

individual member of a species cannot by itself determine the boundary, since “there is scarce any particular thing existing, which in some of its simple Ideas does not communicate with a greater, and in others a less number of particular Beings” (III, ix, 13f). “No one has Authority to determine the signification of the word *Gold*, (as referr’d to [*scil.* that sort of Body the Ring on his Finger is made of]) more to one Collection of *Ideas* to be found in that Body, than to another” (*ibid.*, §17). It is true that a corpuscularian sense can be given to the notion of the “real essence” of a particular individual—in a way, Locke suggests, a sense that more closely accords with the original meaning of the word ‘essence’. In that sense the “real essence” is the “very being of any thing, whereby it is, what it is,” the underlying “internal constitution” of the particular (III, iii, 15). But “it will be found a quite different thing, to argue about *Gold* in name, and about a parcel of the Body it self, v.g. a piece of Leaf-Gold laid before us.”¹⁷ Locke is rejecting the notion that an individual belongs to one and only one kind: that is, he rejects the distinction between generic and specific names, and the notion of an ultimate or last species, the species to which uniquely the individual is indissolubly tied. For if we consider the “real essence” to be the underlying structure of the particular, without reference to a name, it has to be considered as a whole; and then it will appear that *all* the qualities and natural attributes of the thing, whether classed by us as “difference,” “properties,” or “accidents,” flow equally from the “real essence.” Indeed, “particular Beings, considered barely in themselves, will be found to have all their Qualities equally *essential*; and every thing, in each Individual, will be *essential* to it or, which is more true, nothing at all” (III, vi, 5).

Thus Locke is prepared to direct more or less the same criticism against the suggestion that there might be real *corpuscularian* boundaries to species as he uses against the Aristotelians: i.e., that the property/accident distinction can be applied only relatively, in relation to a nominal essence. This central point is made clearly and emphatically at the outset of the chapter on the names of substances, where the focus is brought to bear on change: i.e., changes within the individual. First, there is a famous appeal to experience in support of the contention that no observable attribute is necessary to the particular: “Take but away the abstract Ideas, by which we sort Individuals . . . and then the thought of anything *essential* to any of them, instantly vanishes . . . ’Tis necessary for me to be as

¹⁷ III, x, 19. Cf. Mackie, *Problems from Locke*, p. 97, where this remark is surely misinterpreted.

I am: GOD and Nature has made me so: But there is nothing I have, is essential to me. An Accident, or Disease, may very much alter my Colour, or Shape; a Fever, or Fall, may take away my Reason, or Memory, or both; and an Apoplexy leave neither Sense, nor Understanding, no nor Life" (*ibid.*, §4).

Now he turns to the real essence, "that particular constitution, which every Thing has within it self, without any relation to any thing without it": i.e., the intrinsic or "internal" structure which is the foundation of its properties. Yet 'particular', Locke implies, must here be construed as *specific*, and 'thing', as *sort of thing*: "But Essence, even in this sense, *relates to a Sort*, and supposes a *Species*: For being that real Constitution, on which the Properties depend, it necessarily supposes a sort of Things, Properties belonging only to *Species*, and not to Individuals."¹⁸ Locke gives the example of *gold*, defined by color, weight, malleability and fusibility: the real essence is the structural foundation of "these Qualities, and their union," while whatever other qualities this underlying constitution regularly gives rise to, such as solubility in *aqua regia*, are properties. "Here are *Essences* and *Properties*, but all upon supposition of a Sort, or general abstract Idea . . . considered as immutable: but there is no individual parcel of Matter, to which any of these Qualities are so annexed, as to be essential to it, or inseparable from it." In other words, real essences could not determine species ontologically because real essences are relative to nominal essences. The predicables do not apply at the level of species *de re*, but only *de dicto*.

These arguments, which for the sake of their importance I have presented at some length, are perfectly clear and, moreover, plausible. The argument of §4 appeals to experience, but that of §6, which does not, shows that such an appeal is unnecessary. For, on the corpuscularian hypothesis, both complex individual objects (think of them as discrete, unified machines) and parcels of stuff (i.e., matter) are in principle indefinitely mutable structurally, and therefore perceptibly. An object that boringly retains a set of determinate attributes throughout its existence does so *per accidens*.

Since these arguments contain the nub of Locke's doctrine of a world in flux, let us look at a line of his thought which is sometimes interpreted in a sense hardly compatible with them. First, suppose that someone makes something which he claims is gold. It is like gold in all obvious, perhaps even in all known respects. Yet

¹⁸§6. Cf. II, xxiii, 3: "the particular internal Constitution, or unknown Essence of that Substance," where the substances in question are "particular sorts of Substances," not individuals.

suddenly it is found that in one, perhaps startling respect, it is unlike “natural” gold. Apparently one such test (called, I believe, the “cuprolation” test) was discovered in early times and afterwards regularly used to unmask pretensions to aurification. Yet, centuries before Locke, some had argued that, since the defining qualities were all present, gold had indeed been made: slightly peculiar gold, but not mere imitation gold.¹⁹ Such an argument was never very plausible, and men have for a very long time thought of gold and other substances in such a way that two parcels of pure gold must be presumed to have all natural attributes in common apart from shape, or being hot or cold, being liquid or solid, and so on. “Accidents” are cut to a minimum.

Locke’s official answer to the question about the imitation gold would be that, unless the cuprolation test had been included in the nominal essence or definition of ‘gold’, it is gold.²⁰ Yet he is clearly aware of the unorthodoxy, even paradoxicality of that answer. Moreover, he is well aware that systematic experimental evidence of differences between instances taken to be of the same stuff would show not merely that the accepted classification is not based on known scholastic essences, but that it needs improvement. Indeed, he consciously associates himself with the positive program of Boyle and the Royal Society for improving classification: things should be sorted, as Boyle put it, “as they deserve.”²¹ The question is, how both Locke and Boyle could think things may deserve to be sorted one way rather than another, and yet deny that there is a right way to sort them determined by objective boundaries between kinds.

The answer to this question is readily to be found in the *Essay*, in the elaborate explanation of how and why we should improve and remodel our definitions in the light of experience, an explana-

¹⁹ I rely for this detail on the memory of an interesting talk by J. Needham, on “aurification” and “aurifiction” in ancient China.

²⁰ Cf. III, vi, 35: “Should there be a Body found, having all the other Qualities of Gold, except Malleableness, ’twould, no doubt, be made a question whether it were Gold or no.” Locke gives his reply: the answer depends strictly on our nominal essence; and in any case we *are* prepared to allow nonmalleable gold, since “eager” gold “will as little endure the Hammer as Glass it self.” So there!

²¹ Boyle: *op. cit.*, p. 62: there is “a vast multitude of Portions of Matter endow’d with store enough of differing Qualities, to deserve distinct Appellations; though for want of headfulnesse and fit words, men have not yet taken so much notice of their lesse obvious Varieties, as to sort them as they deserve, and give them distinct and proper Names.” At the same time Boyle warns us that the business is arbitrary (p. 41, etc.). Cf. *Essay* II, xxix, 7, etc.

tion which self-consciously avoids the implication of natural boundaries. The topic of the “rectification” of our nominal essences is treated under the headings of “clear and distinct ideas” and the “imperfection of words.”²² These discussions have to do with a method for raising language above the confusions of its “civil” use, so as to give it scientific or “philosophical” precision and consistency. Men too often “content themselves with some few obvious, and outward appearances of Things, thereby readily to distinguish and sort them for the common Affairs of Life.” Biological species are distinguished in some men’s minds by not much more than shape, and chemical species, by color (III, vi, 29f). Indeed we commonly think about kinds of substances so vaguely that sortal names have no precise, settled meaning for us at all. We pick up a variety of such names, supposing them each to denote a distinct kind of thing, without appropriately distinct ideas (II, xxix, 7; III, xi, 24; IV, xii, 14). Such confusion, so Locke continually tells us, both promotes and is compounded by the doctrine of real species named by the sortals in our language (III, ii, 4f; II, xxxi, 6f; III, x, 17–21; etc.). We lazily and thoughtlessly suppose that there is such a real species as “liquor,” for example, and argue about it without ever getting clearly before our minds just what is to count as liquor and what not (III, ix, 16). What is called for, Locke thinks, is a combination of decision and “natural history.” We need to recognize both that there is always something arbitrary about the choice of the nominal essence and that it can be done well or badly, depending “upon the various Care, Industry, or Fancy of him that makes it” (III, vi, 29). It is for this purpose, the avoidance of confusion, that Locke proposes his Natural History dictionary: to remedy the “mistake, that the signification of common Words, are certainly established, and the precise *Ideas*, they stand for, perfectly known; and that it is a shame to be ignorant of them” (III, xi, 25).

In short, Locke believed that the chief trouble with the classification of his time was its sloppiness and that one of the chief barriers to its improvement was an uncritical attitude to ordinary language. His remedy was a program of agreed, precise definitions based on careful observation and experiment, adequately distinguishing substances that we find we need to treat as distinct. Only for this reason does he agree that “to define their Names right, natural History is to be enquired into” (*ibid.*, §24). He is not endorsing what I

²² See especially chapters II, xxix and III, ix–xi.

take to be the correct view that classification involving even such "clear and distinct ideas" could well suffer from the fault of not distinguishing what more observation would prove to be *ontologically* distinct species. To interpret him as if he were, is to import into his argument contradictions and tensions that do not exist there. Indeed, the whole argument is aimed at refuting the correct view and explaining it away as an error natural enough for men to make, "especially such as have been bred up in the Learning taught in this part of the World" (II, xxxi, 6). Mere observation of differences could only show that two parcels of "X" have as *much* right to be treated as of different species, as a parcel of "X" and a parcel of "Y" (cf. III, vi, 8, 13, and 39).

It is true that, in the course of this argument, Locke goes so far as to say: "If the formal Constitution of this shining, heavy, ductil Thing (from whence all these its Properties flow) lay open to our Senses, as the formal Constitution, or Essence of a Triangle does, the signification of the word *Gold*, might as easily be ascertained, as that of *Triangle*" (III, xi, 22; cf. III, ix, 21; III, x, 18). Yet this means, not that we would then perceive the objective boundary of a species, but that we could then fix and agree on a nominal essence consisting of a relatively few mechanical properties, as in the classification of machines with observable working parts, or indeed of geometrical figures: there would not be the same room for confusion as there now is, when we have to select defining properties from an indefinitely large number of powers. So too his discussion of the inadequacy of our ideas of substances (which contain neither ideas of all the observable properties of the substance nor ideas of the structural attributes that constitute the real essence) is irrelevant, apart from the passing digs at the Aristotelians, to the question of naturally bounded species: he is there concerned with the inadequacy of our ideas of what falls within the boundaries that we impose on reality (II, xxxi, 6-13).

To say that Locke opposed the correct view is not to disparage him. Given an existing system of classification, especially in chemistry, which was imprecise, arbitrary, and, on the evidence of careful experiment, massively coarse; given the absence of any clear hypothesis, such as the hypothesis of identifiable elements and chemical combination, which could serve as the basis for an alternative system; and given the genuine difficulty of combining the notion of precise specific boundaries with the assumption of comprehensive mechanical laws governing corpuscularian matter or something like it; Locke's approach to the problems of classifica-

tion, coherent as it is with a systematic epistemology and theory of meaning, is full of intelligence. In some respects we might compare his situation with that, say, of a sociologist who feels that his discipline makes too much uncritical use of imprecise and undefined jargon. Such a terminological reformer might reasonably hesitate to propose a program of discovering and carefully naming supposedly objective sociological "kinds," as if the phenomena he studies were neatly packaged by reality; nor could he seriously urge the general acceptance of a body of precise but quite arbitrary arm-chair definitions. His proposals must contain, as Locke's do, all three elements of general agreement, reference to reality, and motivated selection and decision.

Nevertheless biology and chemistry are different from sociology. Living creatures and stuffs, in their different ways, do come packaged by reality, if less neatly than Aristotle supposed. We *can* ask the question, "How many species of living creatures are there?" and Locke was wrong to say, as he does, that the question could intelligibly be interpreted only as a question about language (III, vi, 13). In biology we have been able to make do, in effect, with the primitive notion of a kind or "tribe," a naturally bounded group of individuals, identifiable by their broad and more or less striking resemblance, but also distinguished from others by more or less variable peculiarities at the level of fundamental structure, by origin and by group behavior, in particular by their capacity (and tendency) to interbreed. The notion has been deepened, as an explanatory one, by genetic and evolutionary theory, but not significantly modified. It may here be worth reflecting on a distinguished modern biologist's view of natural species:

It is necessary to classify any large assemblage which we wish to study so as to reduce it to order and to divide it into a series of groups which may be identified by some logical system. This is true whether it be composed of butterflies, words, or the figures of heraldry. There are usually many ways in which a classification can be made, but that adopted for animals is based upon relationship . . . for it (relationship) reflects a wider and more important aspect of reality, the course of evolution, than does an arbitrary arrangement made for some particular purpose. Indeed, since it does reflect this wider aspect, it will undoubtedly be, in general, the most satisfactory system. Moreover, when expressed as a diagram, it becomes a genealogical tree and, if it be successful, we can make a generalization of the utmost importance about it: that all the animals included in any group, whether it be a great one like the insects or a small one like our common White But-

terflies (the genus *Pieris*), are more closely related to one another by actual descent than they are to any other organisms upon earth.²³

Professor Ford goes on to make the point that “the scope of these groups is necessarily somewhat arbitrary, but the most natural of them is the species.” By ‘natural’ he means objectively natural, not merely that it is most natural *for us* to draw a boundary at the level of species. Very roughly, the element of arbitrariness in the case of the wider groups or kinds consists in the necessity of selecting not, as Locke argues, observable or structural criteria of application for each kind-name, but degrees of cognateness for each *type* of kind. The wider kinds are groups of narrower kinds, whereas a species is a group of individuals that breeds and, at least to that extent, lives as a group, so that its boundary is independent of human choice. In the case especially of plants, where such a boundary is often less clear, some arbitrariness may enter into the moves made toward tidiness in their case, but it is a far cry from the radical arbitrariness that Locke took to infect all classification.

From the point of view of semantics it is significant that the boundaries of the biological kinds are much rougher than the Aristotelian model could well allow, although admittedly Locke assumes for his argument a more rigid link between the “properties” and “essences” of substances than his opponents always proposed. Their “properties” were typical of the species, but not every member of the species had to instantiate actually all the properties of the species. Injury before or after birth might prevent the characteristic expression of the essence. Locke, however, adheres to the less flexible geometrical ideal, and continually recurs to the topic of monsters and changelings, the physically and mentally deformed, arguing that a different essence from that of the normal man would have to be ascribed to the monster lacking characteristic human properties, “since it is as impossible that two Things, partaking of the same real *Essence*, should have different Properties as that two figures partaking in the same real *Essence* of a Circle, should have different Properties” (III, iii, 17). Yet the Aristotelian believed that the essence of man may, at least, be present in a “changeling,” in spite of the evident absence of rationality. Given

²³ E. B. Ford: *Butterflies* (London: Collins, 1975), p. 70. Cf. *Essay* III, vi, 23, where Locke underestimates relationship as a criterion: “must I go to the Indies to see the Sire and Dam of the one, and the Plant from which the Seed was gather’d, that produced the other, to know whether this be a Tiger or that Tea?” In excuse, he was opposing the view that origin is the sign of the presence in the individual of the common essence, not that it is the significant consideration in its own right, a point of view which seems to have occurred to him no more than to Aristotle (or Kripke).

that the changeling has an extra chromosome, which is right, Locke or the Aristotelian? Neither: the changeling is a member of the family, other members of which, in any case, do not share precisely the same genetic structure. The error in the view Locke attacks (whether or not Aristotle himself committed it) is the assumption that membership of the species must depend on the all-or-nothing presence of an immutable constituent nature. Locke has his own reasons for requiring similarly precise boundaries, set by the nominal essence. Thus it is tempting to conclude that his general ideal of precision in thought is an important reason why he rejects the assumption that there are biological species fit to bestow meaning on their names. Contrary to his principle (cf. III, vi, 50; IV, vi, 4), reality can supply the boundary to the denotation of a word by supplying a rough boundary. That is hardly surprising, since even conceptual boundaries, as Wittgenstein has shown, do not have to be precise.

The same diagnosis, however, can hardly apply to the chemical kinds. They are closer to basic physics, and consequently it is the ideal of precisely resembling instances itself which has borne fruit. Apparent differences between members of the same kind would normally be explained as due to impurity. Our understanding of their chemical nature allows some "accidents," however, such as heat and cold, freezing and boiling, but that upholds the intuitive judgment that such transitory structural states are irrelevant to the kind. Consequently, not only did Locke misjudge biological reality, but it also seems that the discovery of elements and chemical combination (which Boyle was himself feeling toward) has confirmed the ordinary or primitive view of natural kinds with independent sharp edges, refuting Locke's alternative picture of a chemical world with no "chasms or gaps." So it may seem safe to relegate his arguments to the history books. Yet the dispute is a bit of history worth taking the trouble to understand. It is, for example, no uninteresting accident that Locke focuses on the question of boundaries between species (as Kripke and Putnam do not) or that his argument concerns the category of substance above all (as those of Kripke and Putnam do not). These two points are connected, and I believe that an exploration of their connections can transform the issue of natural kinds. In other words, there are different categories of natural kinds, and the semantics of kind-names differs significantly according to category.

Perhaps, however, the importance of Locke's arguments can be briefly indicated, as well as by anything, by a few remarks on the relationship between the individual and the species. Aristotle ad-

vances an ontological theory which links the two indissolubly together, and his logic accords with his ontology. Locke, in rejecting that theory, concludes not unreasonably that Mechanism supplies no ontological or logical barrier to prevent any given individual from becoming a member of any species whatsoever by coming to acquire its characteristic features. There is no doubt something wrong with Locke's view, since there does seem to be something more than physically odd in the supposition that a horse should become a cow (cf. III, iii, 13). Moreover, Locke is unable, or rather is expressly unwilling to distinguish, as the Aristotelian can, "simple" substance-terms from "compound" terms predicable of substances: i.e., words like 'man' and 'horse' from words like 'baker' and 'palfrey'.²⁴ Yet the Aristotelian ontology is unacceptable, whereas Locke's mechanism is sufficiently like the ontology of modern physics for there still to seem no reason in principle why a horse should not (say) have its DNA so changed by some experiment with X-rays that it grows just like a cow—not just superficially but at the deepest level of structure. If it would then still be a horse (a deformed horse) and not a cow, that perhaps illustrates what has been suggested above (but is not said by Kripke or Putnam): that membership of a biological species is determined above all by origin and relationship.²⁵ And that may be why (despite Aristotle and Dummett²⁶ a dead horse too is a horse.

A related opposition which is well worth exploring exists within the *Essay* itself: the opposition between the conception of the individual that is assumed by Locke throughout his argument about species and the official theory of identity appended to the Second Edition. That theory suggests in the interests of immortality that individuation is relative to classification and therefore that there is after all a tight link, albeit merely conceptual or con-

²⁴ Cf. IV, viii, 6, where Locke's immediate point is that "A man is a rational animal" is capable of being regarded as necessary only in the same way as "A palfrey is an ambling horse" is normally taken to be necessary: i.e., by nominal definition. He is wrong, because rationality is at best a criterion nonrigidly associated with the (Aristotelian) "simple" term 'man', whereas ambling is rigidly associated with the "compound" term 'palfrey'.

²⁵ It should be said that even origin is not a rigid criterion, for mutation and evolution create fuzzy borderlines so that not everything that comes out of the womb is thereby a clear member of the parental species. The right origin is, however, a necessary condition of membership; but it is a *faux pas* to regard origin as an "essential" property, i.e., as part of the "essence" of the species, since it is simply a relationship to other members of the identified and named natural group. Being neither an intrinsic nor even a truly universal attribute, it not an attribute of the right kind to constitute an "essence."

²⁶ Michael Dummett, *Frege: Philosophy of Language* (New York: Harper & Row, 1973), p. 572.

structed, between species and individual. The doctrine of that chapter, which itself has a fascinating history, is the ancestor of modern conceptualist theories of identity or individuation and of the obscure if orthodox notion that a component of the sense of sortal words is something called a “criterion of identity” which must be grasped if individuals are to be counted or identified. Proponents of this notion should seriously ask themselves what is supposed to be wrong with the ontology of Locke’s First Edition argument. There the individual thing has the boundaries and unity of a complex but discrete and coherent “machine”: but the mechanist analogy must be pressed home totally, to the point at which every process that takes place within the “machine” or to which it contributes is seen as its operation. It operates even in being physically coherent, for coherence is not merely a spatial, but a dynamic interrelationship between the parts. Thus, as we have seen, Locke’s individual man may lose all the Aristotelian generic and specific “differences,” reason, sense and life itself, but still exist as a mechanical unity, a naturally coherent thing. Certain powers drop away from the individual, certain processes cease, but the individual continues to exist. The process of life is replaced by the process of decay. It is only when the individual (or enough of it) ceases to cohere as a discrete physical unity that it no longer exists. Given the argument of the previous paragraph, such a model is compatible with the point that the individual cannot cease to be a member of its species. Like a deformed horse, even a dead horse is properly called a horse, for it owes its current coherence and structure largely to its origins. But, however that may be, what Aristotle and Locke (in the First Edition) both presuppose is that the naturally unified individual thing can in principle be identified or picked out antecedently to its being “identified” as a thing of this or that kind—if, as Locke could add, it happens to belong to a “kind” at all. I have read many arguments that purport to refute this natural and perspicuous presupposition, but none that seem to come at all near to doing so.

In this paper I first made suggestions as to the historical and philosophical importance of Locke’s critique of Aristotelian species, including its relationship to modern theories like Kripke’s and Putnam’s. Then followed a simplified and glossed but, where necessary, detailed account of certain logical doctrines associated with those aspects of “Aristotelian” (not necessarily Aristotle’s) philosophy of science which must be understood if Locke is to be understood. Next came a more detailed and referenced analysis of Locke’s

arguments and philosophical motives. Finally, I made an attempt to say something specific, although necessarily brief and programmatic, about the philosophical gain, both for the philosophy of natural kinds and for the theory of identity, from getting the history right.

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BOOK REVIEWS

Socrates: Philosophy in Plato's Early Dialogues. GERASIMOS XENOPHON SANTAS. Boston: Routledge & Kegan Paul, 1979. xiv, 343 p. \$25.

Socrates is the first practitioner known to us of systematic, critical, rational argument on ethics. But he is not merely an analyst and critic. His own moral position appears to us both incredible and admirable—for who can believe that all the virtues are just one and the same virtue, or that all we need for right action is knowledge of what is right, and who can fail to admire Socrates' conviction that it is always worth while to be just whatever the cost? The task of the philosophical critic is to understand each of these different strands in Socrates, and see how they fit together. We want to know what his methods of argument are good for, what sorts of positive claims are justified by his arguments, and how far he has arguments to support his own moral convictions.

Professor Santas sets out to answer these questions in his detailed and useful work. The first part considers Socrates' arguments about obedience and disobedience to law. The second part consists of three chapters on Socratic method, and the third part contains three chapters on related topics in Socratic ethics.

Santas analyzes some texts and arguments in detail. His discussion of Socrates' questions begins with a list of 78 of them, and classifies them with the help of Nuel Belnap's theory of questions; his chapter on definitions begins with a list of 41 Socratic definitions. His chapter on "Socratic Arguments" analyzes "more than seventeen arguments that Socrates constructs" (178). Each argument is reformulated in numbered steps, and sometimes reformulated again in logical symbols, before its validity and (usually, but not always) its soundness are discussed. (Irving Copi's rules of inference and quantification rules are listed in an appendix.) Sometimes the analysis is helpful. It exposes some important questions about the *Lysis*; it clarifies (in chapter 1) Socrates' views of obedience and disobedience to law.