Three Laboratory Études

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Abstract: *The three pieces presented here come from my experience of the Great Books Program at St. John's College, Annapolis, and more specifically from Mr. John White's Laboratory class. They were all written for him, and explore various philosophical problems I found of interest in the areas of observational and embryonic biology and physics we studied.*

Key words: *embryonic biology, intensive manifoldness, physics, temperature, life*

INTRODUKTION

1. "Intensive Manifoldness"

My first experience of the problem that was to occupy my thoughts consistently in my later years occured when I was still in junior high school. Studying elementary projective geometry, I came across a proof showing that each point on the straight line A'B', an image of another, shorter, line AB, corresponed to a point on the latter. But how was that possible? I regard my refusal to dismiss the whole matter with the simple explanation about the points not having size, the remaining uneasiness induced by the visible extending of the projected line on the one hand and the possible compression of an infinite number of points into a single one which "contains" them all on the other, as a true case of not understanding turned into a positive inquiry. In the process of it, I encountered many suggestions of what I soon came to believe was one thing: from the Platonic world of ideas to the term Driesch resorts to using in his explanation of morphogenesis, "intensive manifoldness."

Failing to find a cause of form production in the physical space, Driesch feels compelled to draw the "extreme," according to Spemann, conclusion that there must be something outside it to account for and direct epigenesis, the appearance of many differentiated parts organized as to their position in the whole. Indeed, even with every part containing the whole as information for its production in itself, the order in which the parts are put together, the actual/potential agent which determines the fate of each part by restricting its prospective potencies and invoking the one that corresponds to its role within the whole, cannot reside in any particular part. Nor can it be found extensively, physically, in any arrangement of "things" in the germ or the organism, and Driesch's attempt to test such a hypothesis (chemical being an instance of mechanical, i.e. physical) results in absurdity. Thus, non-spatiality becomes an essential characteristic of "intensive manifoldness," or, as Spemann remarks, the *idea* of the organism. This is a different non-spatiality, however, from the one we could talk about regarding the Aristotelean soul, the function which makes the living more than the sum of its parts. Whether we choose to go further and view the soul as just another, different part or not, it is still an element, which can be present or not. It shares with the material parts a certain concreteness, which distinguishes them both from the abstract idea corresponding to the whole organism on another *level*, containing it in a compressed form.

The "system of abstraction," the working term I came to use for this phenomenon of non-spatial existence, builds upon concrete reality, embodies the essence of things. It is also timeless, and Plato's presentation of a similar construction in the *Symposium* as a process greatly obscures it. Much as Aristotle would like to call that same thing a mere poteniality, it is more than that. It governs all specific occurrences, but itself, as an entity, is derived from them, so that neither can claim any sort of priority. (And hence the construction of Plato's system of ideas, which somehow leaves behind matter as not truly existing, is faulty.) After all, the "intensive manifoldness," which rules over the becoming of the organism, is at the same time deduced, abstracted, from its actual development.

PRESENTATION

2. Measuring Temperature

What I can say with the highest degree of certainty about my laboratory experience measuring temperature is that I was left with many more questions than I had had originally, in a state of greater unclarity: as if the experimentation had stirred up a sediment of ignorance comfortably settled below recognition. Next easiest, I might report that, indeed, it seems that we know nothing about thermometers, nothing essential at least. I had suspected before the class of funny and vastly different devices which includes clocks, watches and chronometers of having very little to do with time, despite the popularly held conviction of the contrary. In this case, however, we have developed a day-to-day understanding of what they do, which, although being likely to be relealed by a careful examination as only most remotely connected to time, is still good enough for Aristotle's weaver or carpenter, works. Not so with thermometers. Their very working is so questionable that it is almost impossible to interpret the "readings" we get from them. Yes, the length of the mercury column changes when it is brought into contact with various objects, which would suggest that it is affected by them, and affected differently, which would in turn suggest that certain differences in them have caused the differences in their effect on the mercury column. Further, the overall similarity of this effect (changing the volume of mercury, which appears as a change in column *length* within a tube, in every instance as opposed to turning it pink in one and dispersing it into little drops in another) points to a certain uniformity in the differences among the objects, to the sameness of the quality, different degrees of which have been found to be exhibited by them. From here, it is very easy to be led to assume that we are dealing with a magnitude and different *quantities* thereof, which could be measured or which are at least potentially numerically expressible (using whatever unit). How does a thermometer capture this quantity, however? In the most inadequate and imprecise way.

First, a specific length of the column (or more precisely, a volume that the liquid substance assumes) is directly indicative of only *its* state: that is, as the manual [the one of a number used in that class] seems to suggest, the thermometer always measures, exclusively or not, its own temperature, whatever nature we might presume this thing to have. In the interactive systems it is made a part of, it might be also telling of an equilibrium temperature, as characterizing the state of the whole system, and thus, by extension, apply to a quality of the body we are concerned with measuring the temperature of. But would it also apply to the state of the body *before* it was brought into the interactive system? In other words, would it make a difference whether we are using a cold or a hot thermometer in trying to measure the "temperature" of an object? If thermometers are able to evercome this difficulty, it is in no way that I can account for. [Rethinking the problem now, it seems to me that the difference the state of the thermometer brings into the "thermal equilibrium" system is too small and thus negligible.]

Seconly, assigning mumerical values to the measurements, making them in this way resemble measurements proper, is far too arbitrary to mean anything. Indeed, in constructing thermometers, our computations of the temperature of a given object were found to agree [as performed during the class experiment], but that was only because we used ratio scales, thus making the peculiarities of individual thermometers under construction negligible and relying rather on an assumed permanence of the temperature of boiling water. Still, therefore, a success in producing equal numerical readings gives us nothing in terms of precision, which science professes to aim at: as the [same] manual truly indicates, the created scale could be credited only with ordinal significance. Or, again, the "degree" numbers are fake; it is not possible to use them meaningfully in any operations performed with numbers.

Skipping a lot of steps in what is but a lab report, which should by all means be there in an exposition of greater coherence [and not trying to supply them even now, but then again a long time has passed and I have drifted quite away from my laboratory days], I will try to hint at an exploration-eligible direction towards a better solution of the problem of measuring temperature. It seems to me that there might be something there, amidst the thickets of unresolved difficulties. As a starting point on this road the entity might serve that was first vaguely hinted at by the observation of the process of water boiling and ice melting and later became somewhat apparent in the mixing experiment [all performed in that laboratory class], and that proved much more reliable, convenient to work with than dubious “temperature”: the entity that got to be called heat. The fact that it is preserved, being transferred from one object to another, points to its possessing a continuity of existence; its behavior in this respect certainly resembles that of a thing, whether we choose to call it substantial or not. A slightly shifted perspective, however, shows us its being dependent on substance: although it *could* be transferred, and in this transfer be viewed as, in a sense, independent, it is always transferred from one *body* to another (or liquid, or gas). It appears as characteristic of matter, opposing – and by all means intimately related to – its other characteristic, the characteristic of being able to resist changes in the direction and velocity of its motion, inertia, whose quantitative expression we are used to refer to as mass. And if, using weight, we could measure the mass of an object with some precision, discovering a method of measuring the heat (energy) this object possesses would enable us to come up with a better determination of its temperature, it being some kind of relation between those two, as Mr. Goldberg [Joshua Goldberg, one of the active participants in the class discussions] pointed out in class, expressing the state of a THING HEAT*ED*. Such a measurement would indeed provide us with a quantitative proper representation of this state (the state of a thing heated); would be a true measurement of temperature, the further implications of which, and of the understanding of temperature it would reflect, would then call for exploration.

DEDUCTION

3. The Way of Life

There seems to be an essential instability about life; it could almost be defined as “half-painful balancing, or scarcely balancing, [...] upon the point of existence,” as Thomas Mann does in *The Magic Mountain*. The individual organism is constantly changing, every cell of it is different; taking a person, and the words of Plato from the *Symposium*, “for all we call him the same, [...] every day he is becoming a new man, while the old man is ceasing to exist.” One could argue that the instability is “form-preserving,” for the orgainsm persists, lives on – as such, apart from the cells. But even the form that is preserved develops, there is growth and also decline, so that life itself goes on like a “feverish process of decay and renewal,” a process of continuous birth and death.

Furthermore, the same instability seems to be present in organic matter, which is the basis of life. Certainly, the more complex a substance is, i.e. the closer to life, the more it is subject to easdy disintegration. The most stable elements, if we adopt a broader chemical view, are the most sterile. Also, working in the other direction, consciousness, which is based on life, exhibits a similar quality. We find it in the wonderful argument of Erwin Strauss’s “The Upright Posture”: an opposition to, counteraction with, gravity/nature; “a dangerous equlibrium, threatened by fall and collapse.” It appers indeed essential for life to be invloved in this instability; it stands in its center, depends on it and perpetuates it.

Thus, eternal life is an impossibility, a contradiction in terms. “All imperishable things are actual,” says Aristotle (*Metaphysics*, Book IX, chapter 8); they have never been born, for birth is the actualization of a potentiality, the transformation of non-actuality into actuality for the thing born. Life stands between birth and death: it starts with birth, which, being the upsurge to actuality of a hitherto dormant potentiality, is at the same time, as a fellow student of mine rightly noted during a class discussion [in the same class], the potentiality for death newly set in. It *is* death in that it causes it; death is unthinkable without birth.

Yet, with all the cycles of creation and destruction, with all actuality-potentiality transformations, in the midst of the instability, life possesses a remarkable permanence. *It*, as a process, persists, beyond even the species level. Life springs from life, and is very "concerned" with ensuring its preservation, on this abstract level. There is no eternal life, but Life is eternal [science has yet not quite figured out the problem of its "origin"]: It combines a permanence and an instability: instability as a mode of being and behind it a permanence, at the same time (but in different ways) never obtaining and always present. The situation is that of an ever-changing system which stays the same nevertheless and, my guess is, is a fundamental characteristic of existence, the necessary mechanism that reconciles a tranquil unity and a hectic multiplicity.

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