The Order of Qualities (1920)

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Qualities as emergents.

We come now to the order of finites with their distinctive empirical qualities. Empirical things or existents are, it has been more than once suggested in accordance with our general conception, groupings within Space-Time, that is, they are complexes of pure events or motions in various degrees of complexity. Such finites have all the categorial characters, that is, all the fundamental features which flow from the nature of any space-time in an empirical form —each finite has its proper extension and duration, is built on the pattern of its specific universal, in a substance of a certain sort and the like. What remains to be described is its possession of quality. The facts can best be described as follows. New orders of finites come into existence in Time; the world actually or historically develops from its first or elementary condition of Space-Time, which possesses no quality except what we agreed to call the spatio-temporal quality of motion. But as in the course of Time new complexity of motions comes into existence, a new quality emerges, that is, a new complex possesses as a matter of observed empirical fact a new or emergent quality. The case which we are using as a clue is the emergence of the quality of consciousness from a lower level of complexity which is vital. The emergence of a new quality from any level of existence means that at that level there comes into being a certain constellation or collocation of the motions belonging to that level, and possessing the quality appropriate to it, and this collocation possesses a new quality distinctive of the higher complex. The quality and the constellation to which I belongs are at once new and expressible without residue in terms of the processes proper to the level from which they emerge; just as mind is a new quality distinct from life, with its own peculiar methods or behaviour, for the [46]reason already made clear that the complex collocation which has mind, though itself vital, is determined by the order of its vital complexity, and is therefore not *merely* vital but *also* vital. If, to borrow the language of Mr. Lloyd Morgan,[1] with whom *on* this matter I believe myself to be in general agreement (would that my faith were founded on knowledge comparable to his), the processes of a particular level are represented as *a* processes a constellation of such processes is of such a kind as to be a new process *ab* with its quality B. That is, the thing which is based on that constellation of *a* processes has an emergent quality B, whose behaviour consists in *ab* processes; and though *ab* processes are also *a* processes they are not merely such, and are on a different level from the processes which are sufficiently distinguished from other forms of existence as being merely *a* processes.

Before proceeding to details, let me take a few examples.[2] Material things have certain motions of their own which carry the quality of materials. In the presence of light they are endowed with the secondary quality of colour. Physical and chemical processes of a certain complexity have the quality of life. The new quality life emerges with this constellation of such processes, and therefore life is at once a physico-chemical complex and is not merely physical and chemical, for these terms do not sufficiently characterise the new complex which in the course and order of time has been generated out of them. Such is the account to be given of the meaning of quality as such. The higher quality emerges from the lower level of existence and has its roots

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[1] Scientia, vol. xviii., 1915, * Mind and Body in their relation to each- other and to external things.

[2] I fear I cannot assume that I should have Mr. Lloyd Morgan with me in all that I say in detail, especially as concerns secondary qualities of matter.

therein, but it emerges therefrom, and it does not belong to that lower level, but constitutes its possessor a new order of existent with its special laws of behaviour. The existence of emergent qualities thus described is something to be noted, as some would say, under the compulsion of brute empirical fact, [47]or, as I should prefer to say in less harsh terms, to be accepted with the "natural piety" of the investigator. If admits no explanation.

To adopt the ancient distinction or form and matter, the kind of existent from which the new quality emerges is the 'matter' which assumes a certain complexity of configuration and to this pattern or universal corresponds the new emergent quality. But whereas up to the present we have been content to treat the quality as something which is correlated with a certain configuration of its basis, we can now, following the clue of the relation between mind and its body, identify the quality with its peculiar form of body. Quality is therefore the empirical fact which we accept, and *prima facie* there is no more difficulty in accepting the fact that a certain kind of arrangement of existents of a lower level should be qualified with a new quality, than there is in accepting (on the common unreflective view) the fact, that bodies under certain physical conditions look to us red, or certain other physical dispositions give what we call impressions of being hard or sweet. Quality belongs to things as mind or consciousness belongs to life-processes of a certain configuration.

Further discussion of the relation of different levels to one another may be deferred till we have attempted in some fashion to exhibit the various levels themselves in the light of the conception of emergent qualities. But a few observations are still in place, some of a more general character, some designed to remove possible misconceptions.

Time as the generator of qualities.

Empirical things come into existence, because Space—Time of its own nature breaks up into finites,[3] the lowest such finites being simple motions of different velocities or intensities of motion and different extents of it. Time and Space, either of them, creates differences in the other or breaks it up. But in a special sense Time is the author of finitude, for it is the transition intrinsic to Time which [48]in the first place makes motion possible, and secondly provides for the ceaseless rearrangements in Space through which groupings of motions are possible. Time could not do its work without Space; but, this being presumed Time is the principle of motion and change. It brings the future into present being and dismisses the present into the past. In the old Greek sentence it brings the unseen to light and buries it when it has appeared. Commonly it is personified in the figure of a scythe-man mowing down the old to make room for the young. This figure represents rather the transitoriness of things than the real nature of Time. "Nothing stands but for his scythe to mow." It forgets that the same Time which mows down the grass produces the new crop; and indeed when the simile, not intended to be pressed, is pressed, it seems to imply that conception of the world as a series of present instants, perpetually recreated, which as we have so often urged would destroy history and make even the present moment unintelligible. Time is in truth the abiding principle of impermanence which is the real creator. Or to descend from such high phrases, it is a kind of cosmic *gendarme* who makes stagnation impossible, and at once creates the movements which constitute things and keeps things in movement. *Circulez, Messieurs.* If it be true that Time is the mind of Space, or rather if Space and every part of it has something standing to it in the relation of mind to body, and that something is Time, then for us, as for certain Greek philosophers, soul is the source of movement.

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[3] I do not consider at present infinite existents. Whether there can be qualided infinites is discussed in Bk. IV. ch. i. pp. 363 f.

Space-Time anterior to material things.

Some current conceptions are superseded by this statement. The first is the conception that things and events are in Space and Time, which are relations between things. We need do no more here than recall what has been said on this topic before. For philosophy this conception must be inverted, though we need not cease to use the language, if only because common speech does not imply by the phrase, things are in Space, that Space is a mere relation. For us Space-Time logically, and in fact, precedes finite things which are differentiations of [49]that stuff. This inversion, I may here recall,[4] is in principle one with that which was made by the late Osborne Reynolds, who treated Space as material and what we call material things as faults or strains in the uniform structure of Space.

This leads directly to the question, in what sense is Space-Time material. Matter has a popular and a philosophical meaning. As a philosophical term matter is correlated with form; and Plato regarded Space as the matrix in which things were made in the likeness of forms. For us the form or configuration of motion belongs not to Space but to Space-Time or motion, and form does not affect the matter from without, but belongs intrinsically to any finite piece of Space-Time. Space-Time then is the stuff which receives determination in the qualities it assumes as its complexity of grouping develops in Time. As stuff it is the recipient of quality in its various empirical or finite forms.

In the popular sense of the term, matter is a generic name for physical substance, and it is very difficult to say what is its distinctive quality. Let us call it for the present, materiality. Now Space-Time, though the stuff of material things and of all other things, is not material, if that means to possess materiality; it is anterior to such matter. But it is continuous[5] with material existence which is one of the earlier outgrowths from it. It is not attenuated matter, nor is even the spatial element of Space-Time attenuated matter. The only advantage which arises from speaking of it as material is that of helping to make clear that neither Space nor Time are mere relations between things or events, but if such impropriety of designation may be pardoned, they are themselves entities or rather Space-Time is an entity. Of the familiar types of existents, material existence is possibly closest to Space-Time and the stuff of reality may therefore most easily be conceived on the material analogy; for the [50]phrases 'stuff of things,' 'the matrix in which things are precipitated' are all physical descriptions. But if our hypothesis is sound, material existence is itself not purely material in the sense in which matter is opposed to mind. Matter like Space-Time contains an element of body and an element correspondent to mind which is its materiality whatever that may be. Thus while Space-Time is continuous with matter, so is it equally continuous with mind. For mind as an existent, not simply as the quality of mentality or consciousness, is a living (and therefore a material) body with the mental quality. My motive in anticipating the discussion of empirical qualities by the hypothesis that Time performed towards Space the office of mind, was, that by suggesting that something corresponding to mind was present from the beginning at the lowest finite level of mere motion, I might remove the prejudice against any attempt to exhibit all the forms of existence as a continuous series from Space-Time upwards through matter to mind.

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[4] Bk. I. ch. vi. vol. i. p. 173, note.

[5] I am using the word continuous in the popular sense. There is no break in the chain of finite qualified existents. The qualities as such form a discontinuous series, but they are connected spatio-temporally.

Misconceptions superseded.

Certain minor difficulties may next be removed. The conception, once at any rate so widely current, that the ultimate constituents of things are matter and motion, must be modified. Matter it is thought is not itself a form of motion, or comparable with motion itself. It is so difficult to conceive motion as stuff, without something which moves; we still suppose a something we call matter which changes its place in empty Space. But this difficulty vanishes when once we have learnt to think of motion as stuff, and as in fact the first form of animated body. For there is no reason to regard matter (whatever we may learn from physicists as to what distinguishes matter from other groups of motion), as other than a complex of motion, that is made out of the original stuff which is Space-Time.

This conception that matter is in the end a complex of motions and not, like motion itself, ultimate, requires more courage (or rashness) to suggest than the last of these general pleas that I have now to urge, that another scientific conception, the ether, becomes unnecessary except possibly as a convenience of expression or imagina-[51]tion. For the ether has fallen on evil days and he who impugns it runs little risk. Regarded once as a substance or medium filling all Space, it has become little more than a name for the possibility of the transference of energy. "It is not too much to say," writes Mr. Soddy, "that the idea of an *ether* has been invented by scientific men for the express purpose of accounting for the flow of energy across empty space and is at present little more than a term to express the medium in which these transferences occur."[6] But the same process by which force has been attenuated into acceleration seems to do away with ether as a medium and leave it as a name for the motions in which the transferences of energy consist. For the empty Space which this medium is supposed to fill is a figment. Space is already full of Time; that is, there is no such thing as Space by itself, but the system of motions which in their continuity make Space-Time, and in all this there is no vacuum.[7] There is no greater difficulty in conceiving the motions of light in Space-Time, that is as a complex within Space-Time, than in conceiving them to be motions of this alleged medium. And a medium which fills Space is now, it would appear, gratuitous and even contains a contradiction. For it fills Space which is already completely full with motion. Thus since the office of ether can be performed by Space-Time, either the ether is unnecessary or we can dispense with the idea of Space-Time. Since we already are familiar with Space and Time from everyday experience, it seems better to keep to them and to acquire a correct notion of them so that empty Space or empty Time shall be seen to be unrealities, than to invent a new medium which makes Space-Time superfluous. The phrase 'the ether of Space'[8] is therefore, so I must think, either a mistaken conception if it means the ether which fills Space, or else a pleonasm, for it can only mean the ether which is [52]Space, or more properly, since Space is nothing without Time, is Space-Time.

Matter.

The interpretation offered in general of the meaning of empirical qualities has been an extension downwards made without concealment, of what can be derived from considering mind, where we have an order of vital existence blossoming out in respect of a certain portion of the living body into an emergent quality. To verify the interpretation in detail is a task which requires special knowledge, which I do not pretend to possess. Roughly speaking, the different levels of existence which are more obviously distinguishable are motions, matter as physical (or mechanical), matter with secondary qualities, life, mind.

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[6] F. Soddy, *Matter and Energy* (Home University Library, London, p. 184).

[7] Above, Bk. I. ch. ii. vol. i. p. 65.

[8] The tide of a well-known volume of Sir Oliver Lodge (London, 1909).

Perhaps this assumes too much for a rough enumeration, for the position of the secondary qualities of matter is under dispute. Now it is just at the earlier levels that the interpretation is most difficult. All I have to say on the subject is very little, and that little is encumbered for me with perplexities arising from two sources. One is the state of physical knowledge at the present moment. The great discoveries in physics which are changing the face of our notions about material things have not yet run to their completion. The other is a personal and more oppressive difficulty which lies in my own incompetence even to resume this knowledge, still less to deal with it and use it independently. I do no more than suggest that there is nothing in present knowledge as I understand the position to conflict with the interpretation which I am proposing to extend to all levels, and that there are many indications in its direction. It is not indeed the business of the philosopher, but that of the man of science, to trace the history of things. The philosopher may hope to point out if he can the general and outstanding features of the advance, as supplying a connection between the orders of finites; and I am hopeful that in spite of its defects what I have to say may be useful in this sense. But I do not seek to excuse myself on the plea that a philosopher who may by tradition be expected to know something of psychology cannot be [53]expected to be a master of all the sciences. For on the contrary it is my belief that the metaphysician who is to make the greatest advances will be one who, like the seventeenth-century philosophers, is familiar at first hand with the notions of the fundamental and simple forms of existence which are treated in physics and mathematics.

The enumeration or levels given above was, I said, a rough one. In the first place, it is not certain to my mind that matter with its chemical properties and its affinities is not a distinct level from physical matter. But the enumeration is probably most faulty at the beginning. From mere simple motion to matter is a far cry. It is by no means clear that matter is the next level to qualityless motion, that is to motion or groups of motion which have no other quality than to be motion. (For as we have seen it is indifferent whether we treat motion as the most developed category or as the first kind of quality. Finite motion is the category motion in finite form.) On the contrary it is most probable that there are intervening levels. The dissolution of the atom into elements in the electron theory shows physical matter to be an immensely complicated thing, and highly organised. He would be a bold man who would assert that the electron though our present ultimate may not be itself a complex of something simpler. These things are for the physicist and if they belong anywhere belong to the distant future. But of greater importance is that it is not yet absolutely certain whether matter is distinct or not from electrons. There would be nothing extravagant in supposing that electricity or light, for instance, were a substance anterior to matter in the proper sense. Rather, as I understand, it is probable.

The first question we have to ask is whether electricity or matter (supposing them for a moment not to be different in kind or level) deserve to be called finites with a distinctive quality, so as to be marked off from mere motion as a distinctive constellation of motions. I assume that this is so. But if so and if our interpretation be correct, their qualities should be expressible in terms [54]of motion. And of this there are, I understand, certain indications. Let us take inertia or mass and energy as at least items in this distinctive character of materiality. Electrical mass is said to vary with velocity, and to be itself due to the relation between the moving system and the energy of the surrounding 'ether.' Kinetic energy is a function of the mass and its velocity, and as to potential energy (a conception metaphysically so difficult), it is again as I understand referable to kinetic energy in the surroundings of the system,[9] and if so ceases to present metaphysical difficulties. Thus, to say nothing of matter proper, it does not seem very farfetched to suggest

[9] Cp. Sir J. J. Thomson, Matter and Ether, Adamson Lecture (Manchester, 1908).

that the electron itself may be a complex of motion, with which its electrical quality is correlated or rather identical.

There remains the question whether matter is something specifically distinct from electricity, or whether electricity is itself material and matter only a compound of electrons?[10] If it were so, the atom would not be on a different level of existence from the electron, but as compared with it might be like more complex forms of life as compared with the unicellular organism, displaying greater complexity of structure, but not of such an order as to lead to the emergence of a new quality, but still remaining on the same level of existence with the same distinctive quality. For on each level there may be variations within that order of existence which exhibit secondary differences so great as to be called in common parlance differences of quality or kind.

This is all that I can venture to say upon this most fundamental subject. If it is asked further by what steps it is that mere motion under the guiding hand of Time leads to the emergence of the material complexes of motion which we find in the world of things; how a specific motion like that of light is generated, with constant and maximal velocity, and how atoms come into existence as combinations of electrons with or without the [55]distinctively material nucleus, with relatively constant constitutions; I can only reply that I do not know, and that it is not for the metaphysician to say, in the absence of indications from the physicist himself. Yet it is difficult to refrain from hazarding conjecture by way of asking Question. And so I dare to ask if there may not be in these ages of simpler existence something corresponding to the method pursued by nature in its higher stages of natural selection; however natural selection is to be interpreted whether as operating upon insensible variations or upon large mutations. Whether that is to say, nature or Space-Time did not try various complexes of simple motions and out of the chaos of motion preserve certain types. The ground which justifies us in asking this question is that the beginnings of things present phenomena analogous to those of life; for instance, in the 'organisation' of the atoms; in the law that the physical and chemical elements observe certain periods or cycles which are connected with the number of the atomic weights, or "that the properties of an element are shown to be defined by a whole number which varies by unity from one element to the next";[11] in the observed transformation of atoms into atoms of other properties; all phenomena which suggest growth of a certain kind. If it were so the history of life and mind, and we may add societies, would not be so isolated a feature of things as it seems. But all this is rather a question which might be answered by those who know, if they do not dismiss it at once as fanciful, and is not asked as having any further pretension.

Secondary qualities.

The primary qualities of things are the empirical modes of categorial characters, such as size, shape, number, motion of various sorts. Mass, inertia, and energy, we [56]have treated as belonging to a higher level of existence than the elementary categorial characters. Though they are the nearest derivatives from the primary qualities they stand according to this view on a different footing from the primary qualities proper, and if called primary qualities, we must add primary qualities 'of matter' or of the material level of existence, merely to point the contrast with the secondary qualities of matter. They are in fact the distinctive features of materiality. In one sense it is clear that shape, size and motion and number (the traditional primary qualities)

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[10] Cp, Soddy, toe. cit. p. 177.

[11] This number is to be identified with the atomic number of the elements [that is the number of the elements when arranged in order of increasing weight], and also with the number of units of electrical charge in the atomic nucleus." This is the law discovered by H. G. J. Moseley. My information is taken from the obituary notice of him by Sir E. Rutherford in Proc. Royal Soc. 1916-17, vol. xciii.

are not *qualities* at all. They are determinations of the thing, but are misnamed qualities because the secondary characters, colour, temperature, taste, and the like, are qualities, and the primary features are ranged into one class with them as a contrasting group within the class. It is the secondary qualities, in their strict sense of qualities whose position has now to be interpreted. In popular or non-philosophical notions, they are regarded as belonging to the thing itself. As belonging to things themselves, they may be reflectively regarded as corresponding to certain disturbances, of whatever kind, in or amongst the material particles, which disturbances are then notified to our senses by certain movements of the media, so that we apprehend these qualities. For example, when white light strikes a 'red' body certain processes are set up in the body, the nature of which I will not take upon myself to describe, in virtue of which all the other components of the light are absorbed, and only the movements of a certain wavelength are transmitted. The disturbances are initiated in matter, and whether the medium be itself material as air for sound, or liquid for taste, or sub-material as the 'ether' for light or heat, it is not the movements of the medium itself which are apprehended as possessing quality, but the material thing from which the movements of those media proceed.[12]

Thus it is the ochre which is yellow, or [57]the vibrating string or the flute with its contained column of material air, which sounds. The movement in the 'ether' which makes the passage of the light is not coloured. It is the bell which sounds, not the air between the bell and our ears. When the poet says to the skylark that "all the earth and air with thy voice is loud," he means only as the context shows that the sound fills the air as moonbeams overflow the heaven. The ether wave is only seen when it illumines some material mote in its path, or the air set vibrating by a tuning fork is heard when it sets another tuning fork into sympathetic vibration. Thus it is a matter of comparative indifference whether the medium is material or sub-material. A material medium as in sound, or taste, or smell, introduces complexity into the statement without altering its general truth. For the air itself which is material may be the material body, or a part of it, which is the source of the sound as well as the medium of transmission; as in the case already named of the air in the flute or organ pipe.[13] Moreover, difficulties arise in respect of combination-tones, which are believed to be produced commonly within the ear and not externally. These difficulties are touched on in the note.[14]

Such may be taken to be a reflective statement of common speech, which itself is not reflective, and it is accepted here as furnishing the data which await interpretation. But it is not the view which has been current in [58]philosophy and science in virtue of a long tradition from the days of Galileo. All that matter possesses in itself according to this view is the primary qualities, whether of the matter in bulk or of its insensible particles (macroscopic or microscopic primary qualities). What exists in the thing is certain movements. They affect our senses in appropriate fashion through the medium, and the quality of colour or sound is thereupon

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[12] Strictly speaking, this goes too far. What we see or hear is a place which is coloured or sounds. Further experience shows the place to have also the other characters of the ochre or bell. (Compare later, chs. vi. and vii.)

[13] Even tuning forks give at least the octave, if not other partials. The octave partial from a fork originates, not in the fork, but in the air as a result of certain physical processes." H. J. Watt, The Psychology of Sound (Cambridge, 1917), p. 19, note i.

[14] But see Watt, he. cit. p. 55. "There is in recent years a growing trend of opinion towards the belief that the secondary tonal phenomena of combination tones, variation tones, and interruption tones, not to speak of beats, are not subjective, but rather like all audible tones, due to pendular components of the sound wave as it enters the inner ear."

Let us, however, suppose that such tones are subjective, whatever the account be of the physical internal stimulation which produces them ; the sound still remains non-mental. The physical stimulation throws the auditory centre into a neural and mental excitement of the kind to which the sound heard corresponds. The sound heard would still be physical though not really present where it is heard (see later, chs. iv. and viii.).

apprehended by the mind. These qualities are then as in the matter, movements, but for the mind, sense-qualities, and the sense-quality would not exist except for the mind (or according to a later version of the doctrine, except for the physiological sense-organ). I cannot accept this interpretation, which depends to my mind on overlooking the distinction between the apprehending act of mind which is provoked by the medium and the non-mental external object which in this case is the *sensum* or *sensibile*. The sense-quality owes nothing on this conception to the mind itself (nor for that matter to the physiological organ), which is but the means or instrument whereby an external sense-quality belonging to the thing itself is revealed. The colour, though it does not exist as colour in the absence of light, exists as colour in the absence of the eye. If I am asked how I can venture so light-heartedly to question a doctrine so authoritative, I can only answer here, for the subject belongs to a later stage,[15] that at least in its accepted form the doctrine cannot stand. For since Berkeley's day no one can doubt that primary qualities are on the same footing in their relation to the mind as secondary ones, that if the latter are mental objects only so also are the former; that it is no more possible to understand how spatial and temporal characters should look and feel so than how colour and heat should look and feel so. Both or neither must depend on the mind. If neither depends on the mind the distinction of movement and colour belongs to things; if both do, there still remains within the mental objects the distinction of kind between primary and secondary ideas. These questions arise later. And in the next place [59]my concern is not so much to controvert an existing doctrine, however firmly rooted, as to indicate an interpretation of facts which shall fall in with a comprehensive hypothesis and in this way supply indirectly the justification both for the general hypothesis and for the interpretation of particular facts; and this implies anything but lightness of heart in the performance.

Accordingly for me the sensible character of what we apprehend in the object, that is of the sensum, stands to the movements in the thing, that is to the primary determinations which underlie it, in the relation of consciousness to its underlying vital process. The secondary quality is the mind or soul of its corresponding vibration or whatever the primary movement may be. Thus while we cannot say that the ether vibrations of a certain wave-length are red, we can say that the movements in the material thing, in virtue of which the ether transmits to our eyes only vibrations of a certain wave-length, are red. Secondary qualities are thus a set of new qualities which movements of a certain order of complexity have taken on, or which emerge with them; and the material movements so complicated can no more be separated from the secondary quality (which is not merely correlated with them but identical with them) than the physiological processes which are also psychical can be what they are in the absence of their conscious quality. Thus a movement or process or act occurring in a material thing if it is of the right sort, is red or sounds or is fragrant; such bodily acts have no longer merely categorial and material characters but possess secondary quality. The movement which may be thought of as being a complex of primary determinations is revealed to sense as a sensum with its so-called sense-quality. The philosopher may learn from the poets as well as from philosophy or science, and in regarding colour, for example, as the mind or spirit or soul of its primary movement I may appeal without scruple to Meredith's *Hymn to Colour* for support to this conception, and shall afterwards appeal to it again in a more important connection. In this great poem colour is a kind of spirit of which we catch transitory glimpses in [60]moments of its rarest manifestations.[16] Or we may refer still more appropriately to a sentence

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[15] See below, ch. v. pp. 138 ff.

[16] Meredith however still holds the depreciatory view of Time. He says of colour, "thy fleetingness is bigger in the ghost than Time with all his host. * The stanza I think of more particularly is :

of Pater's in his essay on Botticelli in *The Renaissance* which Mr. Bosanquet to whom I am indebted for it, quotes so effectively.[17] "Colour is a spirit upon things whereby they become expressive to our spirit." The words are used and quoted by Mr. Bosanquet in a different connection from ours. But they can be adopted here in their literal sense.

'Permanent secondary qualities.'

The conception that a secondary quality is the mind of its primary substrate may be carried further. Hitherto we have been speaking of the quality of the sense-datum, that is, of a primary process which though substantial like all movement is. transitory. Now the colour or taste of a thing usually means not a transitory but a permanent quality. Such permanence may be secured in things by the continuance of the light, or the solution of the stuff in liquid. The thing maintains in this case its colour or its sweetness as the mind maintains its activity of thought or vision. But in the dark the leaf is no longer coloured; it is green then, only in that it is in its primary determinations such as to take on the secondary quality with the incidence of light. When not active as a sensum or sense-datum, the sensible quality slips into a disposition which is on the primary level. It awaits the entrance of the conditions which are to complete it and convert it into that constellation of primary movements which possesses or carries colour. Precisely in the same way in the absence of the completing conditions which evoke consciousness, the mind slips into a physiological or psycho—physical disposition, which is only potentially [61]conscious, but is actually unconscious. Thus the permanent secondary quality of a thing postulates the permanence or continuance of activity and the quality is such continuing activity. Taken by itself the thing possesses the quality in the potential form, in the above explanation of that phrase.

One remark may be added, already hinted more than once and here again repeated only in passing, which follows from the relation of the secondary quality of, say, colour to its primary basis. It is not true that the extension of a material thing is impossible without secondary qualities, as Berkeley taught. If we see extension always coloured, that is because we see it and not because it is extended. Mere extension is not enough for colour. It is true that colour is always seen occupying extension. But the colour is a determination of the extension of it and the extension is not a property of the colour.

Life.

The quality of mind we have regarded as an emergent from the stage of living existence with its distinctive quality of life. Mind as a thing is a living being with the mental quality or consciousness. Following this clue we may interpret life as an emergent from material existence. I pass over here as beyond my competence the question whether life is the next level of existence to matter, or whether chemical process is not an independent intermediate level between physical existence and vital: whether, that is to say, chemical matter is not so distinctively different in the way of complexity from mere physical matter that 'chemism' is properly a new quality emerging from physical existence. Such a question is one which can properly be answered only by the expert, from whom philosophy has to take its material. I am content here to follow the usual habit of thought and lump together physical and chemical processes as merely material. Life then would be an emergent quality taken on by a complex of physico-chemical processes belonging to the material level, these processes taking place in a structure of a certain order of complexity, of which the processes are the

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Of thee to say behold, has said adieu./But love remembers how the sky was green,/And how the grasses glimmered lightest blue;/How saint-like grey took fervour : how the screen/Of cloud grew violet ; how thy moment came/Between a blush and flame.

[17] Principle of Individuality and Value, p. 63.

functions. A living process is therefore [62]also a physico-chemical one; but not all physico-chemical processes are vital, just as every mental process is also physiological but not all physiological ones are mental. Moreover, just as mental processes belong only to a part of the vital structure, so in life we are dealing with a body which performs processes and exhibits features purely material. Thus an organic body has weight, it exhibits the physical processes of nitration, of pressure of blood upon the walls of the arteries and the like. The total of physical processes which take place within the body, though all subserving life, is not all of it coextensive with that limited set of processes which are identical with life. "We must not," says Mr. J. S. Haldane, "mistake measurements of the balance of matter and energy entering and leaving the body, for information as to the manner in which this stream passes through the living tissues."[18]

It is thus a certain constellation or complex or collocation of physico-chemical processes which behaves vitally, and the presence of such constellations which makes the structure to which they belong an organism. To call it organism is but to mark the fact that its behaviour, its response to stimulation, is, owing to the constellation, of a character different from those which physics and chemistry are ordinarily concerned with, and in this sense something new with an appropriate quality, that of life. At the same time, this new method of behaviour is also physico-chemical and may be exhibited without remainder in physico-chemical terms, provided only the nature of the constellation is known—provided, that is, we remember, as Mr. Lloyd Morgan so rightly insists, that there is already a constitution in the organism, a certain collocation, to return to my own phrases, of movements, which may be called the moving structure, to indicate that it is not merely anatomical but physiological. Until that constellation is known, what is specially vital may elude the piecemeal application of the methods of physics and chemistry. Accordingly [63]I am prepared in this sense to believe that they may be right who maintain that biology must be treated as a special science, dealing with its own particular subject of organic life which is distinguished by its own delicate capacity of self regulation. This is the position of Mr. Haldane; who at the same time admits to the full the triumphant contributions which have been made to the understanding of life by the physico-chemical method. There seems to me no more difficulty in believing this than in believing that psychology is a special science dealing directly and at first hand with mental process, though all mental process is identical in the end, when once the constellation is known, with its correspondent neural process. If the study of life is not one with a peculiar subject-matter, though that subject-matter is resoluble without residue into physico-chemical processes, then we should be compelled ultimately to declare not only psychology to be a department of physiology, and physiology of physics and chemistry, but, if we are consistent, to be a chapter, like all other sciences, of mathematics, which deals with motion and Space and Time. But in pleading that life is still *also* entirely physico-chemical, as a complex of processes or structures belonging to that level, I fear I am forgoing the support of such so-called neo-vitalists as Mr. Haldane.

How the new emergent quality of life is to be characterised in detail it is not for me to say. Organisation is of course insufficient, for even atoms are highly organised and crystals are often instanced as cases of organised things below organisms. Self-regulation has been mentioned above, and organisms exhibit in addition the property of plasticity in their responses, and, once more, the power of self-reproduction. But these characters are after all but the different ways in which the distinctive quality of life exhibits itself, or

[18] J. S. Haldane, *Mechanism, Life, and Personality* (London, 191*), p. 36.

which are summed up by it, and for our purposes no advantage is gained by substituting the details comprehended under life for the simple quality of life itself.[19]

[64]

Entelechy.

Life is thus intermediate between matter and mind. It is also material in that it is expressible (and we may hope may be expressed hereafter) in material terms, but it is not purely material. Life is not an epiphenomenon of matter but an emergent from it. On the other hand there seems to be no need for postulating in its case any more than in the case of mind a new substance, a directing principle, or, as Prof. Hans Driesch calls it an 'entelechy' or 'psychoid.'[20] The new character or quality which the vital physico-chemical complex possesses stands to it as soul or mind to the neural basis. The directing agency is not a separate existence but is found in the principle or plan of the constellation. The considerations which have led Mr. Driesch to his conclusion are well known and their weight is undeniable, and it is most of all the empirical considerations which carry weight; such as are derived from the phenomena of regeneration of lost parts or from the striking facts that "in the earliest stages of embryonic development the cells of the embryo may be completely separated from one another or their mutual arrangement may be completely altered by mechanical means and yet one of the separated cells or the disarranged collection of cells may [65]develope in a perfectly normal manner" (I quote Mr. Haldane's summary[21]), though if the animal grows from only half the embryo it will be only half the normal size. I am not in a position to discuss these facts technically. But is there anything in them which is inexplicable when the initial constellation is considered? Instead of straightway postulating an entelechy to act as a guide, it would seem to me more reasonable to note that a given stage of material complexity is characterised by such and such special features, and that these are part and parcel of the nature of the principle or plan of the new order of complex. It is quite true that no merely material complex will regenerate itself or reproduce itself or grow up into a small perfect specimen from half the stuff of a full-sized one. But the fact is that the new complex is no longer purely material, though it is also material. By accepting this we at any rate confine ourselves to noting the facts, observing loyally the differences of these existents from existents of a lower order; and do not invent entities for which there seems to be no other justification than that something is done in life which is not done in matter. Why should not matter whose quality has budded out from Space-Time bud out in its turn into a new quality, the ultimate stuff being throughout the same and the proximate stuff of life being matter?

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[19] Mr. Haldane s view, besides the volume cited, is expounded in many papers. It is largely founded on, or enforced by reference to his experimental observations of the delicate regulation of the respiration in response to minute variations in the air. One of the most attractive of these statements is to be found in an address on The Place of Biology in Human Knowledge and Endeavour in the Transactions of the South-Eastern Union of Scientific Societies (1915). See his recent Silliman Lectures for fuller statement. The most recent is contained in a Symposium in Proc.Arist. Soc. y 1917-18, vol. xviii. N.S. between Messrs. Haldane, D Arcy Thomson, Chalmers Mitchell, and Hobhouse (now reprinted in a separate volume with other papers). Unfortunately Mr. Lloyd Morgan s view is not represented in this discussion. It is the one with which in the above interpretation I venture, not on grounds of scientific knowledge but on general philosophical grounds, to feel general agreement. This view is expounded in his Instinct and Experience (London, 1912), ch. viii. * Finalism and Mechanism. See also A. S. Pringle-Pattison, *The Idea of God* (Oxford, 1917, Lect. v.). It should be added that Mr. Haldane's so-called vitalism altogether repudiates both the earlier vitalistic theory and Mr. Driesch s new form of it.

[20] Science and Philosophy of the Organism (Aberdeen, 1908-9). Also his Problem of Individuality (London, 1914).

[21] Lot. cit. p. 29.

The antitesis of mechanical and vital.

Two causes appear to prejudice this inquiry and to stand in the way of a satisfactory interpretation. One is the false or at least ambiguous antithesis of the mechanical and the vital, or of mechanism and life. When life is identified with mind, the antithesis becomes still more acute. But 'mechanism' or the 'mechanical' means two things which may be confused. It may stand for the behaviour which is distinctive of matter pure and simple or it may stand merely for determinate behaviour. Now it is possible for a thing to be mechanical in the sense of acting in a way determined infallibly by its structure and not mechanical in the sense of being purely material. Half the reason for holding [66]that life (or mind) is an entity independent of its body and working through it is that no machine can do what life or mind does. The question must be asked in what respects is mind different from a machine? A machine is a structure which effects certain results. Now a living thing is not a material machine. Yet in so far as its structure enables it to perform certain vital processes, to react in certain ways to stimuli, it behaves determinately in accordance with its structure. The structure allows for a certain latitude of the response within limits, but the response is within those limits as determinate as if the structure were purely material. In this sense of mechanical the organism is mechanical and we could understand it to be so, provided we knew the constellation of its structure. On the other hand, it is equally true that if we regard the organism as behaving according to the laws determined by its own peculiar structure, a material machine may, since it also obeys the laws of its structure, be said to be alive, and in many ways this is a helpful conception. The difference of the material and the organic 'machine' lies in the comparative rigidity of the one and the plasticity of the other. Plasticity is not realised by matter but waits for life. But if we could secure the right sort of machine it would be an organism and would cease to be a material machine. We have no right therefore to confuse the definiteness of mechanism with its materiality, and on this ground cut off the continuity between the material structure and the emergent order of vital structure. The true antithesis is that of the vital and the material and not of the vital and mechanical.[22]

The other cause is the dogma that mind or life (so far as life is taken to be the same as or allied to mind) presents us with a soul for which there is no precedent in the lower forms of existence. Life and matter seem [67]to be parted by an impassable cleft. To account for the facts of life and mind we need at least an entelechy. Now supposing the case were really so, we should still, in loyalty to the facts, be obliged, I think, to content ourselves with the interpretation that life is the quality distinctive of a certain material constellation. The mystery of it would remain deep. But it has ceased on our hypothesis to be so unintelligible. For though matter has no life, it has something which plays in it the part which life plays in the living organism and mind plays in the person; and even on the lowest level of existence, any motion has its soul, which is time. Thus matter is not merely dead as if there was nothing in it akin to life. It is only dead in that it is not alive as organisms are. Compare matter with Space-Time; there is as much reason for assuming an entity or entelechy 'materiality' distinct from the motions which are the behaviour of matter as to assume an entity 'life' or 'mind' distinct from the basis of life in matter. Always under the caveat that Time and materiality and life and mind are empirically not the same and not merely different degrees of one and the same thing, we are compelled to the conclusion that all finite existence is alive, or in a certain sense animated.

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[22] This confusion of the determinate and the material also vitiates Mr. Haldane s work, otherwise so moderate and careful in its statement. I should, however, add that I am not concerned with his conception of philosophy and indeed I do not see what a theory of knowledge has to do with the matter.

Summary.

Mind is the last empirical quality of finites that we know, and we have seen it to be an emergent from the level of living existence. We have thus verified, how faultily no one can be more painfully aware than I myself, on the inferior levels what was more easily discernible on the highest. Quality is something empirical which in every case but that of motion is seen to emerge from a level of existence lower than itself; and as to motion it is to be described indifferently as empirical or categorial, for it is the meeting-point of the two. Each new type of existence when it emerges is expressible completely or without residue in terms of the lower stage, and therefore indirectly in terms of all lower stages; mind in terms of living process, life in terms of physico-chemical process, sense-quality like colour in terms of matter with its movements, matter itself in terms of motion. More-[68]over, everywhere this result appears to be secured as it is in our own persons. There is a body or material of the lower level, of which one part is so complicated as to be endowed in fact with a new quality, which performs to it the office of soul or mind and may be called with proper caution its mind, body and mind being identical in this portion of the body in question. Life we have seen is a selection from a larger whole of physico-chemical processes. A secondary quality like colour belongs to one part or grouping of primary qualities in the material body to which it belongs, other parts of which may be occupied by other secondary qualities, and others by mere matter without secondary qualities; according to the conception reached at an earlier stage that a thing or substance was a volume of space-time occupied in diverse parts so as to fill its contour by qualities.

Using symbols we may put the case briefly thus. A complex of processes on a level L with the distinctive quality l becomes endowed, within the whole L—thing or body, with a quality l' and the whole thing characterised by this quality rises to the level L'. The processes with the emergent quality l' constitute the soul or mind of a thing or body which is on the level L. The mind of a thing is thus equivalent only to a portion of that thing. Hence, when in us the mind in the proper sense of that word apprehends its bodily organism through the organic sensations, we have one portion, a highly developed one which carries the mental quality, apprehending a part of the whole body which is at the lower level. Another corollary is the obvious one that a thing or body at the level L' is as it were stratified and, besides containing processes which have the quality l', is built up on processes of all the lower levels down to the spatio-temporal one itself.

Thus the soul of each level is the soul of a body which is the stuff of which it may be called the form. There is a close connection between this conception and that of the universal (or as it was called in Greek philosophy, the form). The universal is, as we have seen, the pattern of construction of the particular. So [69]far as the neural complex has a certain pattern of complexity it has the mental quality. But we cannot say that the quality belongs to the universal in any sense in which it does not belong to the particular. The universal simply emerges with its quality on the higher level of existence. Owing to the historical associations of the word form it is better therefore to keep to the simpler designation of a quality as a quality rather than as form of its body.

The body or stuff of each new quality or type of soul has itself already its own type of soul, and ultimately the body of everything is a piece of Space-Time, the time of which is the soul-constituent which is identical with the body-constituent. Beginning with spatio-temporal finites, there is a continual ascent to newer and more developed existents, so that the course of Time issues in the growth of ever new types of 'soul,' and in this way all existence is linked in a chain of affinity, and there is nothing which does not in virtue of its constitution respond to ourselves, who are but the highest known illustration of the general plan; so that there is nothing dead, or senseless in the universe, Space-Time being itself animated.

'Minds' of various levels differ in kind.

It will now be clearer that, as was insisted before, the minds of various levels are not merely minds with varying degrees of what is mind in the distinctive sense. Life is not a consciousness with something of its powers left out, nor materiality consciousness with still larger omissions and imperfections. The difference is one of kind or quality and not of degree. Nor are we to suppose with Leibniz that the minds of lower orders of being, for example living beings, are monads like our minds which preside over the living beings. Such a supposition was natural if our mind is itself thought to be a monad. But if we begin with what comes first, Space-Time and its constituent point-instants, which may be called monads, we realise that our minds themselves are but special complexities of Time. That special complexity carries with it the quality of mind, and it is identical with its bodily neural equivalent. A lower complexity of Time carries the quality life; a still lower one materiality or colour. [70]Always these qualities which perform the mental office towards their bodies are themselves complex, and in their order of growth the higher complexity arises out of a lower complexity. Thus the time-complexity contained in a material body as such with physical, and let us assume chemical, modes of behaviour becomes in life the foundation of a still greater complexity of time-configuration; and similarly in the emergence of mind out of life. So much the more important is it to urge that in declaring all things down to point-instants and Space-Time itself to be fashioned on our plan, what we really mean is that there is a more fundamental plan of which we are only the highest known empirical illustrations; and that therefore it is truer to call mind the time of our body than to call time the mind of its space.

The higher emergent has been described as based on a complexity of the lower existents; thus life is a complex of material bodies and mind of living ones. Ascent takes place, it would seem, through complexity. But at each change of quality the complexity as it were gathers itself together and is expressed in a new simplicity. The emergent quality is the summing together into a new totality of the component materials. Just in this way, as our thoughts become more and more complex, some new conception arises in the mind of a discoverer which brings order into the immense tangle of facts and simplifies them and becomes the starting-point for fresh advances in knowledge; or in social affairs some vivifying idea like democracy arises to create as it were a new moral order, in which again distinctions and divergences arise which demand in their turn a new practical key. Somewhat in this fashion complexes of one stage of existence gather themselves for a new creation, and additional complexities mean new simplifications.

Corollaries.

It follows as part of this relation of the higher level to the lower, as an empirical emergent from 'material' already endowed with its own quality, that the empirical qualities of the 'material' are carried up into the body of the higher level but not into its new quality. Life is [71]based on material existents which have colour or smell or weight. But life is not itself coloured, nor, except in a metaphor, sweet. The living thing has colour in respect of its body but in respect of its distinctive life it has not. Mind has no secondary qualities, nor even has it life, but only as identical with a living thing has it life. The thing called mind has not in respect of its mentality the lower empirical qualities. Energy is an empirical quality of matter and does not belong to mind or life. Yet it is easy to interpret the phrases 'vital' or 'mental energy' as the energy of the material equivalents; and in this way, be it observed, the difficulties of the application of the principle of conservation of energy to life and mind disappear. For we have no need to think of any entity soul interfering, with its own peculiar energy. Contrariwise the categorial characters are carried up into the emergent existent. For everything is a complex of space-time and possesses the fundamental properties of any space-time, which are the categories.

Hence though life is not coloured it is extended and in time, and this we have seen to be true of mind as well. It is a substance and exhibits causality and the like.

This difficult relation is made clearer by referring to what obtains in our own experience, and extending the conceptions used in describing it to other levels of existence. Our minds enjoy themselves, we have agreed to say, and contemplate external things on the level of life and lower levels. The brain which carries mind with it comes in the end to be thought of as an object contemplated. Thus the same thing which as contemplated is a living thing enjoys itself in its distinctive quality of mind, and enjoys its mind under all the categories. We can thus more easily understand how a thing which is not mind but has something which performs to it the office of mind can be at once a member of a lower level and 'enjoy' itself according to the mode of enjoyment proper to its 'soul' in its distinctive character. Its mode of enjoyment need not be 'minding' as with us, but living or, shall we say? materialising. It is for itself as it experiences itself directly in enjoyment. Its basis in its [72]body or matter is one of the class of objects it contemplates. The twofold way in which our minds are minded and our brains thought of, and in this sense observed, enables us to overcome the apparent difficulty of denying that the empirical characters of the basis enter into the emergent though the categorial ones do, while at the same time we assert that there is only one and the same existent, which is on the higher level but also belongs to the lower one, and is accordingly differently experienced. To the other things on its own level it is related as we are related to one another. Certain special difficulties in this statement I pass over for the moment, for we are definitely trenching on questions belonging to the theory of knowledge, without which it is now hardly possible to proceed a step further.

It remains to add that upon any one level there may be several qualities which yet are of the same order. This is the case of the secondary qualities of matter, which apparently are all specifically different. On the level of life or mind we have the different types of plants or those of animals. Now in these two cases, the quality of life or mind seems to be one and the same, and the difference to lie in the bodily structure of the various types. There are on one level degrees of perfection[23] or development; and at the same time there is affinity by descent between the existents belonging to the level. This difference of perfection is not the same thing as difference of order or rank such as subsists between matter and life or life and mind. But the various secondary qualities seem to be different in themselves and to have different bodies. It may be, however, that amongst them too there are degrees of development or perfection, so that they may be found in the end to be affined as the animals are or, to take the other instance, as the chemical elements are.

A further question which is directly raised by the whole interpretation of new qualities as emerging from a lower basis is how far such new qualities can be predicted. The discussion is better deferred till we can raise the [73]question of human freedom. Meanwhile it is enough to observe that there is only one respect in which the world is predictable with sufficient knowledge, and that is the spatio-temporal. A calculator given the state of the universe at a certain number of instants or at one instant with the law of its change could, given sufficient powers, calculate what the spatio-temporal condition of the world would be at any given later instant. But he could not on our interpretation predict what qualities would be evoked by the complexes he predicts in Space-Time, unless he lived to observe them.

Samuel Alexander, "The Order of Qualities," *Space, Time, and Deity*, vol. 2 1916–1918, (New York: The Humanities Press, 1920), pp. 45-73.
http://www.giffordlectures.org/Browse.asp?PubID=TPSTDY&Volume=0&Issue=0&ArticleID=2

[23] For the notion of perfection, see later, ch. ix. B, p. 264.