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THE PSYCHO-PHYSICAL NATURE OF REALITY

FROM THE ORIGIN TO THE END OF TIME

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1. INTRODUCTION

In two earlier papers, "A Theory of Mind and Matter" and "A Theory of the Human Mind Based on a Merger of Physics and Psychology", a scientific theory has been presented which tries to clarify the relation of the subjective process in a human mind to the physiological processes in the associated organic substratum, primarily nervous system and brain. In very general terms the theory is based on a complementary[1] integration of physics and psychology achieved by aid of concepts and principles taken from information theory. "The mind is semantics encoded in *micro*physical symbols". The propositions are strictly compatible with quantum-mechanics and with all the complex facts of the biological (neuro-physiological) sciences.

The theory needs further development and has not yet won general recognition, but this should be a matter of time only; it exhibits all the simplicity of basic scientific truth. Experimental confirmations are available in the form of successful interpretations in generalized physical terms of all the empirically well-founded elementary properties of the human mind. Further, specific, more purely physical experimental checks are also possible and to be expected.

The theory, with its almost exclusive concentration on the problem of the human mind, appears to strongly suggest certain generalizations. These, however, soon leave the solid ground where experimental verification is possible and thus more nearly represent philosophical insights. In itself this is not astonishing, for the problem of mind and matter is historically a fundamental problem of philosophy. So, scientific progress with the solution of the problem for the particular case of the human mind can only be expected to disclose wider, philosophical, perspectives. The generalizations concerned have been mentioned, but not worked out, in the first paper mentioned above (and be left out of consideration in the second). It is the purpose of this monography to proceed with this task.

The type of philosophy to which this way leads is a philosophy of evolution. It is, even, justified to say that a really consistent philosophy of evolution comes within reach *for the very first time*. However, as in all philosophy, precision won't appear attainable. In many respects only vague and tentative conclusions will be possible. Still, remarkable and highly important insights into the nature of the fundamental polarities of truth and error, and of good and evil, will prove to follow from the analysis.

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[1] "complementary" in the sense of NIELS BOHR, ref. 4.

2. PSYCHO-PHYSICAL COMPLEMENTARITY

The solution of the exceedingly tough problem of the relation of the human mind to its organic substratum, primarily nervous system and brain, has been achieved by very careful evaluation of essentially one extremely simple and plausible basic assumption, viz. the hypothesis that human experience, in its personal subjective form, is in all its detail and variation, and within the scope of life for always, being recorded in the substrate nervous system in *micro*physical coding symbols.

This hypothesis appears to be remarkably powerful, even though it is not at all possible to make it much more precise, eg. to describe the process in physiological terms, or, even, to specify the exact identity of the symbols involved. In this respect there is at best a plausible further assumption: it is not improbable that the common small coding molecules of biology, the four or five nucleotide-bases adenine, guanine, thymine, (uracil) and cytosine, are again being used for this coding requirement.

Confronted with the accepted functional (neurological) process in the nervous system, the simplest mutual adaptation is obtained by assuming —as has been done—that the recording occurs decentralized over the entire system and that, per component cell, it physically concerns the elementary functional responses of such a unit to stresses generated by signals arriving at the cellular periphery: discharges (y) or inhibitions (n). Most probably, some reference to the pattern of synaptic excitations which provoked the response should also be implied.

In such a connection the record can be supposed to be complete in an exact sense: it shall eg. concern *all* discharge- and inhibition events of *all* cells contributing to conscious experience. Assuming as usual, that subjective experience is the counterpart of the characteristic functional process in the nervous system, *complete* recording of the elementary events per component cells becomes equivalent to recording of experience in *all* its detail and variation.

The power of the basic assumption presented results from the two properties involved, (i) that the record is complete and (ii) that the symbols used are microphysical. Due to the latter property the only physical theory possibly capable of providing a satisfactory description is quantum-mechanics, the fundamental theory of microphysical structures and processes. Then, the separate coding events in which the recording process can be resolved become deprived of mechanical reliability and predictible in terms of quantum-mechanical probability only. This, in effect, is the first important conclusion. Due to the feature (i), the record becomes, in the course of (life-) time, exceedingly complex; in each cell a large, strictly (aperiodically) organized aggregate of physical matter in which every single atom has individual significance and which is *unique* in the whole universe. Strictly

speaking, this condition even is incompatible with quantum-mechanics because of the requirement of this theory that it be possible to submit systems considered *to the experimenter* in large multiples of *identical* copies. The property in effect fails in virtually all experiments and considerations of ordinary physics. It thus becomes not only possible, but even necessary to generalize the existing theory. A very straightforward way to obtain a suitable result is as follows. By using the concept of *coding* in the relation between mental and associated neurophysiological processes—a very conventional proposition—a statistical approach second to that of quantum-mechanics has strictly speaking already been accepted: the approach of information theory (which as a matter of fact is also a purely statistical theory). The statistics is a correlation statistics in the symbol sequences of the "encoded messages". It is reasonable to require, that the second statistics be consistent with the first, the one imposed by quantum-mechanics. Now, a direct identification would in effect seem to be possible because both have fundamentally the same basis. The symbol correlations of information theory can be determined numerically by counting out the symbol combinations concerned in a sufficiently large "library" of the messages considered, eg. a sufficiently long record of earlier experience. Those of quantum-mechanics, on the other hand, are (at the perturbation level of the environmental heat-bath) basically determined by the physical structure prevailing. Now, in any well-organized recording process, experience is continuously being converted into lasting physical structure. Hence, both references are in effect essentially the same. Subjective experience at the same time becomes appropriately identifyable with the semantics of the messages.

The identification so defined appears to lead to a relation between mental and neurophysiological process which agrees with mutual *complementarity* in the sense of Niels Bohr[1]. The original example of this type of relation was that between microphysical particles and quantum-mechanical waves. It amounts, in the present case, to an integration of physics and psychology into one consistent psycho-physical discipline. It declares the approaches *of both* to their own subject matter as valid, not reducible to the other and yet in no point conflicting (except when forced into *causal* mutual dependency). The concepts of subjectivity, mental process and semantics in this way ob-

[1] The best way to define "complementarity in the sense of Bohr" is to consider the concept as characteristic for the way in which causal chains have been eliminated from microphysical processes. This has occurred by splitting up the description of such processes in two components, the one determining probabilities and the other the events to which they refer. The elimination of causality being absolutely fundamental, the relation between the two descriptions cannot be reconverted into a causal one; any corresponding attempt finishes up in flat logical contradictions. The definition also holds in the present case. The psychological description yields only probabilities – symbol correlation probabilities – in the material one. Causality in the sense of "being objectively determined by the past" is eliminated by the existence of the mental counterpart of the material process (see later).

tain a fundamental status equivalent to that of anything material; they become characterized by an *emotional*, purposive property representing the future *complementary* to the rational reference to the facts of the past in the progressing actuality of the present. This is effectively the ultimate feature eliminating reduction to strict causality. It limits the objective predictability of coding events to probabilities, but retains *coherence* in sequences of such events; "order similar to that of the letters in a book". The property cannot be rationalized and represented by some influence in physical space-time. Expressed as *exclusion of randomness*, it strikingly resembles Pauli's exclusion of identical sets of quantumnumbers (multiply occupied elementary cells in phase space). This is also a principle only to be imposed after all to electron systems of any (possibly macrophysical) dimension (eg. the electron gas in a piece of metal).

Referring the reader for details and elaborate justifications and applications to the literature mentioned, the thing to be attempted now is a widest possible generalization. To this end, one or two preparatory considerations are necessary if gross misunderstandings are to be prevented.

Firstly, the generalization will appear to be characterized by a very drastically extended use of the concept of consciousness. Starting from the subjective human-individual case, the idea is taken to refer to *the scene* on which our experience, our sensations, our adventures, wishes and hopes, our sufferings *occur* and which so to say *assigns* to them the property of being conscious. However, observing that the process displayed is clearly *open*, that is characterized by a concentration of clarity in a centre of the attention and an escaping periphery, our *individuality* is accepted to be actually associated with *the process* and *not with the scene*. This makes the reference "*our* consciousness" logically inadmissible and permits only the recognition of "our conscious *experience*" as something associated with us as individuals. This makes it possible to conceive *the scene* as a singular self-identical condition apparently accommodating multiple open processes which are all "in the same way" conscious because of the one self-identical scene but which are not necessarily *conscious of one another* because of mutual isolation or other limiting conditions. This construction permits a very extended use of the concept of consciousness without necessarily running into totally ambiguous mysticism.

Much interaction of individual human mental processes on the scene of consciousness is a kind of interindividual integration in the sphere of the high abstractions through exchange of communications. Occasionally, the interactions may become intense and the integration extremely narrow. The signs of unity which both subjectively and objectively may emerge in such a case suggest that the individualization of the human mind should not be taken to be a permanent absolute property. The only property which cannot be effectively exchanged are the primitive qualities in which our experience runs. Our senses are physically individualized. There is no *cer-*

tainty that our fellow human beings see "exactly the same" *red* as we do, that their pain is exactly the same as our pain, that their and our sound of music are mutually totally similar.

Under these circumstances it is very natural that we unhesitatingly assign consciousness to our fellow human beings, or, as it suits us to say, that we take the physical process in their nervous system as much to refer to the scene of consciousness as our own and so as much as our own to have a subjective mental complement. Any other point of view is madness.

For similar reasons is it silly to refuse consciousness to animals. With the highly developed ones, our cats and dogs, the apes, there still exist many forms of communication and mutual understanding in the field of the elementary emotions. More difficult do things become only with the lower animals, quite obviously because even the sympathetic modes of communication tend to vanish. In spite of this, it, however, does remain awkward even in this case not to accept the existence of a conscious complement to the still remarkably complex physical processes in what is quite obviously a primitive form of a nervous system.

The problem of who has a mind is quite well-known in psychology, where difficulties easily arise from the wish to be as rational and objective as is common in the natural sciences. It is probably fair to say that consciousness is allocated to an organism when signs are discovered of *emotion* in terms of feeling, suffering, a will, purposiveness or intention. The assumption is less to be checked against facts as against understanding. This is a sufficient ground, for it may safely be considered doubtful if *any* science is possible *not* pursuing explanation and understanding.

On this basis—the achievement of understanding, the recognition of obvious elements of emotion, and the identity (singularity) of (all) consciousness—the line of consciousness can be extended beyond the human-animal cases to other processes. We will do so immediately.

The philosophy to be developed in effect conceives reality as a whole, the entire universe and us, as one all-embracing, unique, process with two complementary images, (i) a mental image and (ii) a symbolic, physical image.

The mental image is assumed to refer to a singular scene of consciousness and to be organized in a decentralizing hierarchy with three levels. At the top, this hierarchy has the *cosmic* mind, responsible for what could be called the constitution of reality. The nature and contents of this constitution will be considered later on, but the idea of course intends to refer to certain "ground rules" of reality.

At the second, intermediary, level solitary "bioconscious" delegates of the cosmos are supposed to exist, charged with the creative development of life in still relatively large, unified processes exploring and exploiting the habitable corners of the universe. In any such process—life associated with any particular planet of any particular sun—an *implied* mode of animal consciousness shall represent the final, third level of the emotional power to

create of the hierarchy. It may culminate in a supreme creation, man (c.q. his equivalent elsewhere), a being capable of re-assessing the whole past and developing an entirely new view on, and way into, the future.

The symbolic, material, aspect of reality (also) refers to one universal frame: physical space-time. Within this frame, the process subdivides into numerous subprocesses which, mutually, are frequently to a high degree independent but never completely so. Many of these are purely cosmical; pulsars, quasars, galaxies, clusters and systems of stars in course of transformation and development. They form what could perhaps be called "the system of the universe". However, on the crust of planets revolving at a convenient distance around a burning sun continuously discharging its radiation in the cold abyss of deep space, conditions may be such as to make entirely different modes of material organization and process possible, the modes of organic life. These modes should, invariably, exhibit the characteristic of involving very highly, "exhaustively", organized physical materials, "chromosome" macrophysical aggregates of countless atoms in an exact, aperiodic order. They possess a critical stability and serve as a kind of control centres of the process. In this control the individual atoms of the script still play a significant role. All this leads to essentially unsurpassable complexity. The chromosome centres succeed in maintaining their vulnerable existence through copying re- and duplication processes. In as much as these remain spatially interconnected in proportionally complex "physiological" interaction, they define forms of "multicellular" life, organisms capable of attacking and exploiting the opportunities existing in the bulk materials of their spatial environment. Organisms which interact in again entirely new ways; competitive and coöperative, aggressive and mutually sympathetic, parasitic and symbiotic, etc., etc. Born by duplication from parent complexity, growing to maturity in replicating execution of encoded instruction, performing their missions in the exploitation of environmental opportunities encountered, they are predestined to set free their own physical materials for reprocessing in possibly improved forms in final death.

The third type of sub-process is embedded in the preceding one. It is the neurophysiological offshoot of multicellular *animal* organic process organized to record, through the intermediary of sensory provisions, the experience of the individual in its cosmical environment, inclusive the interactions of fellow-life, and to control the organism's responsive action on the basis thereof. It naturally arrives at a similar type of exhaustive complexity as is implied in the organic processes of life under chromosome control through the lifetime accumulation of registered individual experience in all its wealth and detail.

At all three levels, the concept of *coding* of information theory should in some form or another fit the complementary relation. However, it is then certain that rather different coding principles are being used at the cosmical top-level against the second and third levels together. At the second and third level, individual physical atoms are definitely the basic symbols used.

The Hierarchy of Consciousness

First level	Cosmic Consciousness Subjective identity complementary to the physical processes of the universe Unique, constitutional
Second level	Bioconsciousness Subjective evolution complementary to the organic interaction processes of all life populating a habitable corner of the universe Solitary, though multiple
Third level	Animal and human consciousness Subjective experience complementary to primarily the neuro-physiological component of one corresponding individual organic life process multiple and social

Major intermediary symbols are the four or five nucleotide bases associated with the chromosome code script. Probably, the same intermediary symbols are again used in the recording control processes in the separate cells of nervous sytems and brain. The symbols are used to write out and conserve the development of life in one large unified process covering almost the entire crust of the earth, respectively to write out and conserve for one lifetime the experience of individual animals and human beings in its totality. They can be used for these purposes because they are *not* employed in a similar way at the top level. The atoms, as a matter of fact, have specifically been created at that level to serve the descendant modes of consciousness as coding symbols. Their free availability for this purpose is emphatically borne out by the almost complete randomness in the microphysical background of all material processes of a cosmic nature. This randomness, particularly represented by the chaotic agitation known as "heat motion", bears out *lack of* encoded intention or purpose. The individual atom has no meaning in such processes.

The process encoded in the nervous substratum of a human mind, that is human mental process or simply human experience, consists of a chain of events referring back to the same physical world (though populated by fellow life) which provides the basic coding symbols. However, in this subjective picture of the world physical matter manifests itself only in bulk, that is, essentially, in its cosmic form. So, the human being appears to exploit the vast freedom inherent in cosmical matter in two ways: (together

with his fellows) he engineers the bulk materials to things suiting his purposes and consciously he evaluates pertaining opportunities by using the coding potential of suitable atomic constituents of the same materials[1].

As a consequence of these conditions, the cosmos, the top-level process, cannot use exactly the same coding principle and must be assumed to project its purposes somehow directly into the bulk materials of the physical world. We will later on return to this point, but we won't succeed in clarifying it completely[2]. This basic property of the cosmic coding principle, combined with the nearly complete atomic chaos of the universe, however, does make it clear how a physical process of such dimensions can still be associated with a unified mind. The mental complement, in effect, can only contain the information processed (value created), and chaos is just *lack of* information or value. The information density of the universe is as low as its dimensions are large. The product is the unity of the cosmic mind. The same inflation phenomenon exists at the bioconscious level. There is also an enormous amount of randomness in the material displays of life, and moreover large amounts of duplicate information. The information density of this process is, therefore, equally not so large as it might seem at first sight. It is not altogether unjustified to say that it should be possible to read the whole essence of bioconscious effort, imagination, ... hope ... from one set of *human* chromosomes.

The decentralization of consciousness of the third level, ultimately in human beings, is to be considered as final because human beings, by social integration and continued effort, should be capable (as will be explained in detail later on) of retrieving gradually all the useful facts of the past. Their mission is restoration of unity in perfection.

The processes at each of the three levels of the hierarchy of consciousness have their own characteristic rates of creative progress. This rate is highest

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[1] This conclusion reveals an extremely fundamental self-reflexive property of physical matter which can possibly be worded as follows. With respect to the two mutually exclusive rules which the microphysical (atomic) constituents of physical matter can play, (i) acting as symbols suitable to back up the conscious pursuit of emotional purposes and values, and (ii) being background of a world of matter in bulk in principle ready to submit to human engineering action intended to shape this world to ultimately the same purposes and values, the relation from symbols to matter in bulk is following from the probability rules of quantum-mechanics by aid of the laws of great numbers of probability theory. Conversely, the relation (i) is possible because anything worth doing with matter in bulk is expressible in *words* (as eg. the pertaining engineering manuals show) and accordingly suitable to be complementarily expressed in symbols which have the sole objective property of exhibiting a certain statistics. Since any statistics required can be derived from probabilities available *a priori* (like those of quantum-mechanics), the microphysical constituents of matter can serve this coding requirement. The conversion of the one statistics into the other is a basic organization feature of the brain.

[2] Given that the laws of physics can be decoded from cosmic processes by careful experimentation, observation and deduction, the assumption is not too distinctly strange.

at the human level, where time is (if necessary) counted in seconds or less. It is intermediary at the bioconscious level where the life span of generations of organisms marks out a natural unit, and very low at the cosmic top. There, time seems to flow in millions of years.

The physical unity of the whole process results, as mentioned, from the common reference to the one uniform frame of space-time. In space, the animals and man perceive by aid of their sensory systems the environmental condition, their own "bodies", the signs of fellow-life and the results of their own efforts. The categories and the modes in which they perceive and respond are determined as instincts by the creative agents at the two higher levels. Psychologically speaking, the unity of the total process is thus further safeguarded by downward projections of instinct conditioning lower-level mental processes and, at the lowest level, observation faculties reporting about the entire bulk environmental condition in space.

The fundamental capability of consciousness—the reason why it exists—is the creation of new values from available facts. In the art of creation, the "facts" represent the total contribution of the past (that is of things achieved) to the present conscious actuality of the process, and the purposive values momentarily prevailing the existence of a future. The facts determine the rational aspect of the existing condition and the purposes and values the emotional one. The polarity is strictly fundamental; it corresponds with the polarity of time.

The creative, emotional, factor in a psycho-physical process makes it impossible to compute future phases from past phases, this in spite of the strict order which may exist. *Order is not a strictly rationalizable concept.* Conventional physical processes are (almost) purely rational because they convey negligible information and because they are related with facts which have their origin in the primordial past. They are non-creative, their future is mathematical implication of their past. In the long run, this future is always sad; sooner or later all features of interest inevitably dissolve into heat.

Because of the fundamental leadership of emotion in every act of creation, nothing conscious is ever strictly rational, nor purely emotional. This must hold for all human experiences, concepts, efforts, achievements, and so for all theories. Having recognized some emotion in reality itself, there is no basic objection against this situation. It is an advantage that the involvement of some emotion in even apparently purest rational constructions is properly recognized.

The essentially empirical origin of this philosophy can easily be retrieved by specializing to the problem of the interrelation of the human mind to its material substratum, primarily the nervous system and the brain. The coding relation resolving this problem writes out the conscious process in a pulse-interaction process of mutating, recording, exhaustively complex information stores located in the cellular units of the nervous system and brain. The operation generates *coherence* in the symbolic material process,

that is order commensurate with that of the complementary (mental) process. This is the "principle of the exclusion of randomness" valid both for third and second level psycho-physical processes. The principle constitutes the most unorthodox feature of the scientific theory. It very closely resembles Pauli's exclusion principle of quantummechanics (and may in effect be related to it). Both principles ignore physical space and refer directly to the process as a whole. The coherence reflects the emotional aspect of the process. It expresses the empirical fact that random mental processes are non-existent. It implies that the set of *possible* discharge and inhibition processes in a nervous system is not the random set which is behind purely quantum-mechanical descriptions of the events (if these were allowable), but the relatively very small ("null"-)set of coherent complements of regular mental processes[1].

The explicit resolution of the human coding relation, that is the accurate correlation of neurological events and subjective experiences, is impossible. It is exactly this property which makes the relation to a case of complementarity in the sense proposed by NIELS BOHR (refs. 2, 3, and 4). From the point of view of a symbol statistics, irrespective of how elaborate it may be, the encoded sense is the equivalent of an unattainable singularity. The second and third level coding principles are from any objective point of view infinitely complex. The only order detectible in the material (neurological) process is some limited *statistical* order. These statistics are the correlation statistics (SHANNON, ref. 8) of the coding events imposed by the semantics of the complementary counterpart. It is, by the central postulate of the scientific theory, identifyable with the achievable a-priori statistics quantum-mechanically defined in the microphysical recording substratum.

Fundamentally, the perspectives of a statistical extrapolation of coding processes are dim due to their uniqueness. This is, even, the reason why a fundamentally statistical theory like quantum-mechanics cannot be supposed to be applicable to such processes without suitable generalization. The effective method to extend the weak predictability based on statistics is the *psychological* one. This method may carry prediction far beyond the nar-

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[1] Anyone demanding that it shall be possible to conceive all forms of material order as issues of physical forces acting in space-time is assuming erroneously that emotion will ultimately prove to be rationalizable instead of being *polar* to rationality. and that order is a rational condition instead of an integration product of rationality and emotionality. The latter error is brought about by the existence of degenerate periodic forms of material order, which have the remarkable but misleading property of still releasing emotion in the human mind when sensorily perceived. This is clearly due to the obvious defeat of chaos in such cases (which is emotionally significant). Equivalently, the error can be taken to be due to the assumption that the future is *completely* determined by the past (obviously false with the advent of quantum-mechanics) or that the elementary human intuition of a largely *free* will is a fake as "provable" by some alleged system of scientific deduction. In this case, the final discordance of deduction with the elementary intuition is actually issue of misfit in the deduction chain, eg. the inappropriate account of the atomicity of matter in classical physics).

row limits which physics (and with it physiology) is compelled to respect. However, being based on the information stored in the system, it cannot prevent the explicit use of emotional elements (eg. the concepts of purpose and intention) in its interpretations[1].

Quantum-mechanics thus becomes an asymptotic specialization of the more general psycho-physical theory. It becomes effective as soon as the process submitted does not convey significant information; that is when the methods of psychology do not indicate the existence of a mental complement. This is always so when the property of exhaustive complexity fails. Transitions in the microphysical background of such processes are random within some imposed statistical frame.

The strange fact that the distribution of the coding process behind a human mind over the entire nervous system does not hurt the unity of the process may receive some further consideration. The solution of the apparent riddle is simply that the spike interaction mode of the cellular units of the nervous system rigidly conserves information. A psycho-physical system or process is determined by the information aspect; it is this quality which (in a third level process) is consciously extended, maintained and defended against the cosmic chaos, and spatial distance, separation or decentralization do not form insurmountable limitations in this respect. The identity of such systems disappears only with the degradation of the information which they control. It stretches to where their voice is still heard .... Information is an *extremely* fundamental entity.

One might call a psycho-physical system "well-organized". In such a system the probable coincides with the valuable. This permits the generally effortless maintenance of the valuable. It is not *space* which is hostile to the valuable, but only *chaos*. At some distance from the location of the system the valuable quickly loses its probability (at least generally) and the only thing probable becomes *chaos*. A psycho-physical system rather looks like a spatial *condensation* of supreme organization ("well-organizedness") in a dominantly *chaotical* (spatial) environment.

Similarly, the wide spatial dissemination of the centres of complexity in the process of life over the entire earth is irrelevant to the unity of this second level psycho-physical process. In addition to the re- and duplications respecting the prevalence of the information aspect, the competitive and adaptive interaction modes characterizing this process appear to *organize* the information as principles of its *logic*. This point will in due course receive ample attention.

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[1] To illustrate the circumstantially enormous predictive power of psychology in comparison with physics, consider the trivial case of an experiment designed to check the answer obtained to a question "where will you be to-morrow at noon?" Psychology predicts that the experiment will generally *confirm*. Most human beings are reasonably reliable. No physicist or neurophysiologist could by any amount of (brain-) analysis achieve a prediction of in any way comparable reliability on a similarly long term. The psychological prediction does imply an irreducible reference to intention...

3. THE ORIGIN

Now, we will start the exploration of the issues of our main philosophical postulate. We will do so by trying to develop some idea of the origin of existence, of the physical universe, of the top-level creative process. This will prove difficult because of the near-complete lack of empirical data on the evolution of the cosmos. The idea of evolution in this domain is at present a widely accepted, even popular one, but pertaining considerations contain very little substance and are scarcely more than superficial references to certain supposed development lines of stars and systems of stars. This is of little use to our present purpose. The only approach which promises some fundamental result is the epistomological one. This approach is fortunately quite naturally adapted to the association of the process with consciousness.

The propositions of the preceding chapter offer the following points of view in behalf of an epistomological reconstruction of the origin of existence:

a. they characterize the processes representing existence as evolutionary in an extremely fundamental sense, namely as *cumulatively creative.* Applied to the cosmos, this logically implies that this process, seen in retrospect, should simplify "rather" continuously, that is apart from the effects of implied errors, incidents and accidents. With the mental and physical complements inseparably interconnected, this must hold for *both* the physical *and* the mental aspect.

b. there can't exist any form or feature of mental process, of idea, concept or imagination, which *somewhere* has not a confirmation in an encoding material complement, and which could claim to be *independent* of the physical world. Consequently, it is inadmissible to imagine the physical process in the universe reduced to almost nothing at a hypothetical creative origin and to assume that this residual state still had to respect some elaborate system of logic and abstract truth. To the origin, *nothing* can pre-exist, and so the origin must have exhibited *barest primitivity,* both materially and mentally. This conclusion is closely related to the preceding one and fully compatible with it.

c. Consciousness is a fundamental singular, identical where-ever it exists.

These simple starting points already suffice to eliminate an apparently radical and elementary assumption, viz. the idea that existence might have started with "absolutely" nothing, with absolute emptiness. This assumption does not satisfy the principle *b* above; it implies the premise that it would only be the *physical* world which disappeared at the origin, but that time would still flow and one plus one still equal two. If *nothing* exists, neither does a reason why ever anything should. Absolute emptiness ex-

cludes itself, it is self-contradictory, it implies neither expectation nor hope.

We have, in effect, already decided to approximate the origin of existence differently, namely by trying to conceive or imagine the very simplest *conscious* condition possible. Given the identity principle *c*, we might legitimately try the suggestion which human introspection seems to present: the state intended might be "mere (conscious) awareness". Awareness, a condition which by intuition is fundamentally *emotional*, a condition of totally elementary stress. At the origin, awareness of something possible against nothing existing?

One point of strength of this idea is that it advances the polarity of reason and emotion, foundation of anything psycho-physical, to primordial originality. It does so without having had, even, to release the flow of time, for to awareness time scarcely exists, and certainly no measurable time.

Of course, the idea presupposes that there will be some sense in trying to approximate the condition envisaged in *words*, the subtle abstractions of our highly complex mind. In the same connection, it is not reassuring that there is, even, a terrible discrepancy at purely physical level. The physical symbols in which our mind records its achievements, as a matter of fact, are complex and late products of cosmical and biological evolution not possibly existing at the origin. So, what we are doing is *hoping* that primordial simplicity will nevertheless be reconstructable as an *implication* of the highly complex.

The situation shows up similarity to one existing in mathematics. This sophisticated discipline can only be property of a highly developed and talented mind. One of its fundamental problems is that of its own foundations, its most elementary intuitions, its absolutely simplest notions. Again, the analysis can of course only be performed in words. In spite of their use in liberal multiple, a solution is yet to be reached ....

Interestingly enough, the similarity just mentioned could be more than just a mere similarity. In mathematics there is positively s reference to something primordial, for the science has almost unlimited applicability and in a process of evolution this should mean that its *universal* origin must have preceded anything else.

If we start from the proposed "awareness of (the stress between) nothing realized and some indefiniteness or infinity possible", then the number concept—the very heart of mathematics—is actually already used. In the self-identity of awareness the number *one* would seem to be hidden, and *zero* and (perhaps) infinity are almost explicitly manifest.

Shouldn't the natural numbers, one, two, three, ..., be rated at least contemporaneous to anything *discrete*, eg. to any of the *discrete particles* of physics?

The continuation of this line of thought makes it desirable to insert a brief reflexion on how human mathematics is influenced by the philosophical principles adopted. Then, let us firstly realize, that the mathematical concept of number must be based on some assumption that the sequence of

intuitions 1, 2, 3, ... can be arbitrarily extended by indefinitely repeating the operation

$$(n + 1) = (n) + (1).$$

Now, this assumption becomes virtually untenable when mental processes are *not* independent of the (symbolic) physical world, as postulated. If the counting has been started at the very origin of existence, it may by the end of time (according to cosmologists some 10^{10} years later) reach the number 10^{18}, assuming that every count takes one second. This is, to our bold mathematical collegues, still an entirely negligible fraction of all natural numbers which exist, of infinity. With their claim outside the scope of fact, they are, clearly, assuming idealistically that counting *should* be indefinitely extensible. The mathematics to which it leads is formalistic mathematics. There is a branch, or a "kind", of mathematics which, admittedly, distrusts claims of this type, as we now see with quite some justification. This is intuitionistic mathematics. The conclusion would seem to be that the difference between the two kinds is basically *emotional.* This would imply that it won't be possible to *prove* which one is right. The only solution would be to try.

Secondly, if *any* concept inevitably has an emotional component, we might wonder what emotional element is involved in the same number concept, traditionally exemplary for its "pure" rationality. The answer is not really difficult. The emotion concerned must reside in their *purity.* There is, in effect, a most striking, and useful, perfection in the unity of the number *one*, in the measures expressed by its companions *two*, *three*, ... The natural numbers excel by perfect clarity, absolute truth to themselves, unlimited applicability. That this accepted perfection really implies a touch of emotion becomes more clearly noticeable with the very, very large numbers. With them, positive effort becomes necessary to keep that same feeling of perfect clarity upright. It as a matter of fact becomes tempting to preferably drop the whole idea of perfection in such a case! The reason is, that it becomes totally unclear what they could ... signify, what *purpose* they could serve. This undermines the concept.

At this point, we will return to our interrupted consideration. We propose that it is reasonable to think, that the number concept is only representative for a wide and general class of intuitions, the class of notions and rules defining what we characteristically call "logic", what we believe to be "innate laws of thought", "obvious" intuitions of valid relation and order. An argument assigning primordial descendence to *this whole class* can in effect be developed as follows.

Everything which we subjectively experience has been argued to be adventure spelled out by the faithful physical symbols of our brain. This is a material system, seat of a material process, which is preorganized by the precedent bioconscious process of life, all life. Under this control, it has evolved to an extensive network of nerve-cells which, in their nuclei, carry the aperiodic foundations of the records of all decisions (to fire or to restore

equilibrium without macrophysical effect) to be taken in the course of life. The counterpart of this pre-organization is the frame of instincts of the mind. These are the metapsychologic properties of the mind which not only condition our elementary behavioral patterns, but also the qualities, the colours, the shapes, the categoric identities in which we perceive and experience the external world.

Now, this biological pre-organization is maintained in terms of units which again exhibit pre-organization, though a comparatively simple one. This pre-organization stems from the cosmos. It was there that the hydrogen, oxigen, nitrogen, phosphoric, sulphuric, ..., atoms from which our brain is made were melted together as code symbols ready to serve (later) mental processes. In addition, the rules by which these symbols integrate to nucleotide-bases, to amino-acids, to the small coding molecules on which all life is based, must be counted to have their origin in the cosmos. The logical consequence of this is that life, as a bioconscious process, must also have "instincts", offprint of the *cosmical* pre-organization of the recording symbols employed in the chromosome centres of its elementary units, the biological cells. Further, the use of again the same symbols in the recording process behind the human mind should give rise to instincts, in-instincts say, in this mental system. These in-instincts, then, are the characteristics of human mental process which are directly determined by, or resulting from the cosmical identity of the complementary symbols used, and, perhaps, by the universal spatio-temporal frame in which these symbols exist[1] (and which, equally, should have a cosmic primordial origin). If such in-instincts could psychologically be recognized in the mental equipment of man, the whole reasoning would obtain a form of confirmation. Now, this can be done.

First, consider that the biological instincts of the human mind result from a pre-organization in the nervous system which has the property of "exhaustive complexity". As the category of mutual identity is not easily and realistically applicable to physical structures and systems which have this property, it shouldn't be easily applicable to the associated instincts either. Hence, we should expect that biological instincts show up some degree of variability from one individual to another. The behavioral patterns concerned should exhibit individual modulations. We may hold this to be confirmed by the extremely wide interindividual variations which human mental properties and abilities do display. Contrary to this, the cosmical constituents of the material substratum of our mind are pre-organized systems still so simple, that *strict* identity, in a rigorous quantummechanical sense, does exist. And the spatio-temporal frame in which the whole material world exists, is universal. So, the in-instincts of the human mind, the instincts with a cosmical origin, should equally exhibit strict inter-individual

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[1] It is tempting to conceive physical space-time as complementary to, the symbol of, consciousness. The one is the universal scene of the physical world, the other the universal scene of anything mental .....

identity. So, the problem of finding them amounts to disclosing *strict* identities in different individual minds. The only complication which might be encountered is that the very simplest developments with a biological status could conceivably also be so simple, that approximate interindividual identity might occur. This would make it difficult to discern between true in-instincts and very elementary biological instincts.

But is it possible to find out what is surely strictly identical between our mind and someone else's? The minds of our fellow-men do not seem to be directly accessible to us, and there does not seem to exist a way of ascertaining whether their red is identical to our red, their sweet identical to our sweet, their hunger to our hunger, etc. In this respect, the situation is, in effect, at least very intransparent. But the question can be answered on the basis of experience, in a way which essentially is empirical. Experience in fact shows, that we may safely assume that strict identity does exist for exactly the class of mental elements considered earlier; the elements of logic, the elementary numerical and geometrical intuitions, the elementary categories of order and relationship. Not that it would be easy to ascertain how the identities concerned have exactly to be formulated, but the fact that in a quarrelling and disputing world mathematics has unanimously admitted impersonal validity empirically proves that the ingredients and the integration rules involved must have the identity sought after. So, they might be considered to belong to the in-instinctive materials of the human mind. The deduction refers them straight back to the primordial phase of existence as a whole, source of the coding values of the elementary symbols of the physical world.

Evolution, as a strict fundamental principle, implies further references to the primordial (timeless) phase of reality. In the light of human logic, now reasonably sure to have a cosmic origin and thus to have universal validity, and given the polarity of emotion to reason, evolution can only be a fundamental feature of reality if there exists a primordial law securing conservation of conscious creations as factual ingredients to later creations. Evolution as a fundamental law implies conservation, cumulation, extension and progression preventing what has been achieved from immediately leaving the scene again as vain and lost adventure. Again it is difficult to establish precise formulations. It may seem strange to relate conservation to a phase of existence which would seem to be (still!) timeless. However, for conservation time-order of *succession* is enough and *measurable* time not a logical requirement.

Unfortunately, we feel unable to develop these vague insights to greater precision. It is a great handicap that it has, at this moment, not yet been possible to develop an empirically founded theory of evolution valid for cosmical process, for the physical universe. Equally discouraging is it, that our physical experiments do not yet allow us to understand the organization of the physical world below the already highly complex level of the

quantum-mechanical atoms and molecules. Are the rapidly expanding data referring to the sub-quantumphysical nuclear, high-energy level pointing to an organization *more primitive* than that revealed by quantum-mechanics?

These considerations at least leave it no problem why the physical world, seemingly a creation of a next, first-past-primordial phase of cosmic evolution, conforms so neatly with mathematics (as experience proves). The facts belonging to mathematics, or, say, transcoded to and extended by the human mind in human mathematics, represented the only pre-existing form of order. *Everything* past-primordial, that is every process which we may anywhere encounter, will necessarily prove to comply with mathematics. The only (practical) condition is that it be simple enough to permit the formalizations required. Even processes which through gross misadaptation to our (late!) biological senses are, eg., *visually* unimaginable will surrender to mathematics, like the electron in Dirac's equations.

Nor is it too difficult to understand, that mathematics may psychologically be defined as the science of the "purely" abstract. Abstraction is the mental process which eliminates from some recorded piece of human experience all things irrelevant to some purpose. Applied to the whole surveyable record of our experience with the world with the purpose of finding the ultimate common elements, the very canvas onto which everything is embroidered, and thus stripping from every case every feature, quality or property in any way specific, the uppermost original is naturally retained. This is mathematics.

Some very original significance may also accrue to the feature of delegation which manifests itself in the hierarchical organization of consciousness. Within the constitutional frame in which mathematics has its universal base, the exploitation of the infinity of the possible has been transferred to delegate condensations of consciousness, leaving it to them in the form of a tremendous field of *randomness*. This delegation almost looks like a logical implication of the measure of randomness created.

The randomness mentioned most obviously manifests itself in the heat chaos of the microphysical symbols of the universe. These (atomic) symbols, however, should not be counted to the first primordial phase. They are not-so-simple and they bear witness, through the implied periodicities, of the co-existence of *measurable* time. The mathematical concept of "set" might suit a more original condition[1]. A set, in effect, is in its most general definition a collective of almost entirely indefinite "elements", things for which almost anything may be substituted. Thus returning to mathematics, the only problem is how to associate conserving symbols with such imaginations. The notion of "symbol" does seem to imply concreteness, independent unity. What material concreteness can have preceded the atoms?

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[1] a set subject to change with time, and energized by random restlessness.

Possibly, we are here touching the effective difference between "nature", the cosmos, as a mathematician, and a human mathematician. The latter has in contradistinction to the first not to care for the symbols needed to specify his operations. He may use a sheet of paper and a pencil. In his mind, the elaborate substratum of his brain furnishes similar facilities at liberty. So, even though he may have realized that symbols are *essential* to his work, he may still disregard the problem of making them available. Not so the cosmos. The creation of primordial mathematical truth was loaded with the additional burden of having to create at the same time symbols suitable as complementary conserving servants. This observation may be helpful to attempts of digging deeper into the basic secrets of the physical world.

This must be the end of our attempts to penetrate to the origin of existence. Now, we will for one moment forget our intention to pursue evolution in its development with time and leave our imagination free to rush ahead to the counterpart of the origin, the end. This will help to demonstrate the harmony inherent in both the preceding and many considerations to follow.

We have started our reconstruction with postulating absolute priority of the polarity of reason and emotion. Poles kept separated by *time*, with the rational pole at minus near-infinite and the emotional one at plus near infinite. Variable with, seen from the present, *down* the axis the facts, the past, and *up* the objectives and ideals, the future. Downward may our imagination proceed by abstraction, the mental process harking back the totally original. Just so, would it seem, can our imagination proceed upward, into the future. This may be done by purification and idealization, by those mental operations which shift our purposes ever farther away from the present, ultimately to the vicinity of the end. Imaginations reaching beyond the provisional, the defective, the sick, the ugly, the stupid and false, to the vague promises of the distant future where ideals can pre-exist in purety, where our deepest longings can find fulfilment. Imaginations which lead with fair clarity to a *single*, identical, emotionality, identical to existence as a whole and to *all* consciousness. Imaginations revealing the true promise of existence ... perfection.

A confirmation of this conclusion essentially equivalent to a proof can be obtained in the following elementary way. Imagine a loving father or mother confronted with the question what condition he or she considers most supremely essential to his or her happiness. This question has only one superbly simple and convincing answer: "that my children be happy ...". This condition, however, logically passes on from generation to generation and so propagates itself naturally into the indefinite future. The purest human desire on happiness thus *requires* that the end possibly be perfection, or anything existing is false and fake. Existence can only ... be ... under this terminal condition.

With this insight in mind, we may notice that our purposes are, some-

times, quite pure by their very nature. The impression of perfection is, so to speak, permanently tangible in mathematics. Apparently, this exceptional science has its purposes straightforward located in perfection. Thus, this science can be regarded as the integration of facts from the origin with ideals approximating the end. It is therefore that mathematics is so universally true. Its facts are common to all minds capable of performing the abstractions involved, and so is the splendor of its ideals. Mathematics is mathematics only if it is both correct and beautiful.

The circumstance that the highly original facts of mathematics can be integrated, in the human mind, with ideals of extreme purety, proves that the primordial constitutional principles of existence are compatible with the ultimate promises. Consciousness has not deceived itself in a *hopeless* task. The constitution created is sound, . . . redemption in perfection does wait at the end . . . *if only the effort required can be raised.*

Herewith, in spite of all limitations and handicaps, a number of very fundamental philosophic insights naturally extending and completing our scientific knowledge have been obtained. Of course the reasonings employed can be condemned as bare speculations, vague fantasies about matters outside human reach, emotional, unscientific and private views. Generally, however, such critics will be found to themselves relegate emotion to a kind of basically awkward by-product of complexity in a condition of some quasi-order gambled together by blind chance. Strictly speaking this view does not surpass the wisdom of the Grand Academy of Lagado as reported by Gulliver (a source reference which is generally omitted). The recognition of the fundamental and irreducible polarity of reason and emotion is *doubtless* far superior to this type of belief.

Again, the insights reached are all reasonable consequence of the single fundamental insight that existence is to be considered as a conscious creation complementarily written out in the lasting symbols of the physical world. To us, this insight also appears as doubtless correct.

To finish, we will summarize the conclusions reached as follows:

1. The origin of existence must have been a conscious state of barest simplicity. To this condition, "mere awareness" may provide an approximation.
2. The original "awareness" may have been close to stress between the "possible" and "nothing realized". Any such assumption would seem to put the polarity of reason and emotion right at the very origin. Reason becomes respectful acceptance of the past, emotion the attraction of the promise of the possible, the future.
3. With any mental or physical property failing at the origin (save bare awareness), the primordial condition cannot have implied measurable time. Hence it is impossible to draw up a time-table of the primordial past. Seen from the present this phase must seem to condense into a

timeless constitutional phase of existence. Any reconstruction of this phase can at best lead to a *succession* of creative events.

4. The complementary emotional values of the elementary constituents of physical matter have their origin in the primordial phase. They generate corresponding in-instincts in all *delegate* organizations of consciousness (which unexceptionally use them as basic coding symbols).
5. So reason—further utilization of the facts from the past as they really are—is the basis of all logic, from the cosmic origin to the human present. In the same way, emotion is the introduction of novel purpose, the creation of new facts, in the pursuit of perfection; the common justification of all effort and hope down from the origin up to the human present.
6. The past, even the remotest one, holds its useful facts available in retrievable records of the material world. Their new use may extend and modulate the purposes originally associated.
7. The human mental process of abstraction, pushed to its limits, harks back the supremely original, the facts of the primordial (timeless) past. Just so do purification and idealization, pushed to their limits, reveal the ultimate promise of existence at the end of time, perfection ....
8. Mathematics is the successful human attempt to approximate perfection on the basis of retrieved primordial facts alone. This is the reason why it is universally valid.

4. THE PHYSICAL UNIVERSE

The reconstructions from the preceding chapter do not yield a picture of *physical* conditions at the end of the primordial phase; that is when the first strictly periodic processes had inserted in time a basis for its measurement. What symbols have been used to write out the constitution of existence? We won't succeed in answering this question.

As already mentioned, human sensory categories should not be used. At the time concerned, life was still in an incredibly distant future, hence also sense-organs. As a matter of fact, there was not yet anything existing which could have been seen, heard, touched ....

Proof that the sensory categories are positively inadequate is provided by quantum-mechanics. This theory does acknowledge the existence of *particles*, but do not try to approximate them in perceptional terms. That is impossible. In this case some kind of solution has been developed by logical deduction from extensive experimental data, that is by logical deduction from large quantities of systematic observations. The process keeps the elementary observations themselves at a large distance! The experiment is imperatively needed because, for reasons soon to be discussed, the epistomological method breaks down completely with respect to such questions.

The immense dimensions which cosmic process is presently known to have may be a source of further complications. It has become clear that human creation is depending on material events in the recording nervous system and brain which are controlled by quantum-mechanical probabilities. One could wonder whether this interconnection of creation and probability isn't more original. Could cosmic creation, in spite of the present insignificance of the individual atom in cosmic processes, perhaps still have evolved through events to which quantum-mechanics would tend to assign probabilities? Imagine, for instance, some (early) condition of the universe *missing* some microphysical, atomic or molecular, structural element of which present quantum-mechanics could show that it could have originated under the circumstances considered through a tremendously improbable, but nevertheless possible, transition somewhere locally in the depths of space. Then we could with complete confidence say, that this transition *has* occurred, and the structural feature concerned originated, because *time*, the basis of the probability prediction, was plentiful and the multiplicity of the initial condition required enormous. Cosmic creation could thus have used chances which by any present standard are unbelievably small. Or, conversely, is the cosmos tremendously vast, does it contain its compound microphysical systems in enormous numbers, and does it evolve at an extremely slow rate *because* it had to use chances which, by any standard, are vanishingly small? This could well make certain reconstructions nearly hopeless ....

There is a further argument possibly supporting this consideration. The

scientific theory of the human mind shows that quantum-mechanical probabilities and information-theoretical symbol correlations are ultimately the same (the so-called statistical identification postulate of psycho-physical theory), and that this allows for the development (through "learning") of adequate ("large") probabilities suiting effortless routine process from "small" initial ones. This amounts to the development of certain transition systems *resonant* to certain external stimuli. Now, *any* microphysical transition anywhere in the universe by elementary physics releases a particular photon messenger, an elementary quantum of radiation, which races out in space, retaining its compact message as long as it exists. Such a photon need not uselessly disappear in the eternal darkness of infinity, for infinity even does not exist at all. In particular in the early conditions of the universe, a photon has had to whirl around in a possibly even rather small closed (Riemann-type) manifold. It will have had to do so until it was selectively absorbed, "causing" a new bit of microphysical change in the material field. Or it may have become *doubled* because it provoked the transition which created it *once more* under the influence of ... quantum-mechanical resonance. Clearly, such occurrences correlate transitions, modifications of the existing physical condition. Radiation, as a signal caused by transitions and feeding back to transitions precisely has the properties needed for the development of correlations. Imaginably, such phenomena could have been crucial to the early development phases of the physical world.

Transitions which through resonance or any other cause reach considerable probability (per unit of time) as individual events will, by the laws of great numbers of probability theory, lead to the reliably predictible mechanical processes of the universe. Except for some never failing (though sometimes very slow) degradation into heat (that is: back to randomness), those processes are conservative and ready to retain the information carried for considerable times. The degradation involved represents the inherent trend to thermodynamic equilibrium which would ultimately bring about a "heat-death" of the entire universe if the expansion did not steadily delay this issue. We will return to this point.

In conclusion, these considerations would seem to make it at least plausible that the known quantum-mechanical laws and rules of the physical world imply indeterminate, virtually unforeseeable and incalculable opportunities for development in a cosmos enclosing gigantic numbers of microphysical particles in a finite, expanding, spatial envelope. The fact that crucial events implied may have started from probabilities small beyond imagination might well discourage human beings considering whether to embark on tentative reconstruction.

Useful is it, though, to note that the conserving processes of the cosmos running in matter in bulk are so organized in space-time that they make it possible to descendants to retrieve the original unity. They only need to pick up and decode the messages circulating. Some of them are very, very old indeed.

The "exact" sciences show that physical considerations need confirmation

by experiment and mathematical constructions do not. This circumstance can convincingly be explained by observing that existing randomness and the indefiniteness of the scope of the possible imply the inevitability of *choice* in the steps which mark the way of creative progress. Apparently, such basically emotional events reach back to the physical second phase of cosmic evolution. In this way, the evolution of purely physical condition and law becomes a specific path in the indefinite fields of the possible. The non-existence of parity in the physical world may possibly be sign of decisions disregarding alternatives. Just so the non-existence of anti-matter. In later phases of evolution the continuous occurrence of choice becomes obvious. It is clearcut nonsense to speak of "all conceivable, possible, animals". And to ourselves the necessity to choose is permanently obvious. Now, if the creative development of the physical world (following the primordial phase) did imply choice events between diverging, alternative ways in the infinity of the possible, then reconstruction by epistomological methods of the path actually followed must in fact be unfeasible. Under such conditions reconstruction can only occur through hypothetical proposition and verification by observation and experiment. In mathematics, the ingredients are universal and all instances of choice human. So, the conditions under which conclusions are valid are straightaway known in this case, and checks by means of experiments superfluous. Again, we find reason to deplore the present provisional state of fundamental physical theory. It does not make it possible to discern with clarity how far and in what respects choice reaches down into the foundations of the cosmos.

The physical universe implies the remarkable principles of law and order expressed by the general theory of relativity which we may also take to be the cause of its strange expansion. Would it be possible to recognize with some confidence something of the original emotion implied in appropriate *psychological* terms? It seems so. Firstly, consider that according to the theory of relativity no information or action can proceed through space at a speed greater than that of light. Taking into account the vastness and the continuous expansion of the universe, this law is easily seen to limit mutual relations and interactions between sub-processes to their rather remote past. The "presents" in the pertaining regions (separate star-planet systems, say), are virtually independent, even to such an extent that the concept of the present loses meaning in such a context. As a result, the bioconscious descendants of the cosmos are, with everything which they may achieve, surely and safely protected against any form of mutual interference. Essentially, this ensures equivalent chances to all of them. At the same time, any such delegate creative agent (or *his* descendants) retains the possibility of exploring the past of the whole process in which he still somehow participates and to solve the mystery of his own existence. This interpretation nicely conforms with the relativistic postulate of the strict equivalence of all reference systems in space-time.

Our human experience implies ample proof of the exquisite wisdom of these precautions. Even if, at any spot of the universe, some delegate agent would run mad and destroy the process in his custody in self-destructive unmitigated hate against whatever he finds sharing his environment, the associated deadly radiation would dissipate without further harm in space and only after long, long times reach other parts of the universe as a weak signal of remote disaster.

Further, if this precaution did not exist, the whole universe would become controlled by the earliest centre of third level intellect. Against this, the whole remainder would be powerless and either be destroyed or ruthlessly exploited. This would make the achievement of perfection dependent on one single approach. This would take both hope and risk away from existence and denature the field of the possible to a maze with one prize only.

With expansion steadily continuing, the future of any stage of delegated creation in the universe runs towards ever greater isolation. Since emotion may be explained as search for redemption in achieved perfection at the end of time, we may conclude that the whole universe is sailing in the frantic hope of achieving a few flowers blossoming somewhere locally in its depths by the end of time.

The expansion feature, by the way, strongly affects the entropy balance. If taken as being final and irreversible, it delays the heat-death continually by constantly shifting the attainable maximum of the entropy upwards. It continuously maintains a heat-sink for the radiation emitted by the burning stars, permitting their planetary companions to replenish negentropy and thus deminish their entropy as long as their sun continues to shine. The expansion possibly even reverses the entropy law for the whole. When, starting from a small domain cylindrical to the axis of time, space is created at a rate surpassing the decay rate of naturally cohesive matter, the entropy of the whole might steadily decrease. Isn't the entropy of any finite condensation of matter in infinite space necessarily zero?

Let it be true that in the long run all energy thins out in near-infinite expanded emptiness. If then at least one isle of love and wisdom, consciousness re-united in perfection achieved, were to exist; one re-united scene of perfect harmony ready to salute the fainting stars and to commemorate all the suffering, the pain, the effort, the despair, the mischief, the struggle anywhere experienced in the realms of space and time, then the imagination of the origin would still have been realized and the hope implied have come to fulfillment. *The mission of the universe is, unmistakably, the infinitely exquisite.* A condition with an asymptotic local entropy of near-zero, and thus requiring near-infinite conscious effort.

In this way, the preceding chapter's summary may be extended as follows:

9. The transition of the primordial into the "physical" phase of cosmic creation seems to be characterized by the emergence of choice from the indefinite field of the possible and by the emergence of measurable time.
10. The unity of existence emerges from messages from the far past, the only field common to all creation.
11. The universe is protected against miserable failure of agents with delegated creative power, and also against domination by any single third-level delegate.
12. The hope of existence is perfection by the end of time in may it be a few spots locally in the vast realm of the universe.
13. The entropy law of the expanding universe implies that the local entropy of existing isles of delegated creation may decrease steadily[1], opening a road to the vanishing entropy of perfection. To this, the principles of our own theories add near-infinite conscious effort over a near-infinite time as a requirement to reach the condition.

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[1] This is, as far as the author is able to understand, in line with the conventional interpretations of the entropy law, except, possibly, of the assumption that the expansion of the universe forever prevents thermodynamic equilibrium. There are, to be still more precise, two conventional interpretations: (i) the entropy of any physical process which can be localized within fixed and finite spatial boundaries and which is independent of the parts of the universe outside the boundary will increase steadily, and (ii) the entropy of any process localized within fixed and finite spatial boundaries but not independent of the rest of the universe *may* decrease to the extent defined by the difference of the logarithms of the improbability lost by the energy source (the sun) through radiation into the process boundary, and the improbability lost by the process through radiation into the depths of space (Schroedinger). The entropy reduction is effected by the photo-synthetic phases of the life processes.

5. THE EVOLUTION OF LIFE

Somewhere in the close vicinity of any star in the universe physical conditions exist which are exquisitely moderate and highly favorable to complex molecular forms of material process. The temperature, probably the most important parameter, will somewhere interpolate at around 270–300 degrees Kelvin between the radiating stellar atmosphere and the few degrees Kelvin of the deep space heat sink. This is the ideal place for a planetary body. Since there seem to exist many around any sun chances are that there will be one within the niche considered. A next very important parameter is gravity. It should not be much less than the terrestrial 1 *g* if at the specified temperature a gaseous atmosphere is to be kept captured at the planetary surface. Nor should gravity be much stronger or the atmosphere will become inconveniently dense and locomotion difficult. The chemical composition of the atmosphere will probably vary from case to case since there are different types of stars. However, with a sun like our own very common, there is no reason to expect too much difference from our own atmosphere in many cases. Then, water will be plentiful; there will be seas and shores, there will be ice at the poles. The sun's heat will evaporate water from the salt seas to condense to fresh rain over the lands. Rivers will return it to the seas. Probably the axis of planetary rotation will be roughly perpendicular to the plane of the orbit, and this orbit's natural shape seems to be closely circular. Hence, there will exist a variation of day and night, and a moderate seasonal dynamics (although now and then things may imaginably have run somewhat out of hand). Rotation around the polar axis may be somewhat more or less rapid than that of this earth, and so the length of day and night may not be the same as exists here, but there is no reason to think that the earth is very exceptional in this respect. The alternating heating by day and cooling of the atmosphere at night will generate density and pressure differences in the atmosphere in turn causing winds and weather, clouds and occasional storms, and rain as already mentioned. A magnetic field will very probably exist creating a spatial environment with solar wind refractions and trapped spiralling electrons not dissimilar to this earth. So, at the poles, the night sky will now and then glow up in polar light. The sun-star's radiation spectrum will range from infrared to far in the ultraviolet; at the outer edge of the atmosphere ionization will occur as well as certain synthesizing molecular processes. The alternating heating and cooling, evaporation and condensation, winds, clouds and rains will make the atmosphere electrical and the resulting sparks will catalize further molecular reactions.

All these conditions and processes are provoked, controlled and organized by the order of the cosmos, and so be similar in similar conditions, like the common ones existing on this earth.

Actually, it is not possible to find out accurately how common such favorable scenes will be since there exists no agreed and reliable theory of the formation of planetary systems. There have been times during which this formation was held to depend on a rare accident, but more recent views hold the process for common. Philosophically, this is also the more reasonable proposition. It is pretty absurd to believe that the whole universe exists merely to amuse the organisms populating this earth with a mighty firmament. This philosophy not being tolerant to the absurd, we prefer to assume that millions or billions of planetary systems are existing in the universe, frequently with one planet with at its surface conditions favorable to complex molecular processes. With time in this condition still relatively cheap, one would again tend to predict that the scene will in the long run tend to involve *any* molecular complexity *possible*, irrespective of how improbable the synthesis quantum-mechanically is. Life being a complex molecular process, it becomes a natural continuation of the physical condition considered.

This, of course, is not an accurate theory of the genesis of life. The reconstruction, however, does take away the miracle of this development. Strictly speaking, the decisive question is how and when the emotion lingering in the cosmos could call some of the randomness still characteristic of anything cosmical to coherence in the pursuit of new purpose.

Once initiated, the new process of course has had to respect the past, that is its own past, the identity of the material symbols used and the preceding developments of the cosmos in its environment. Further, it has had to conserve its achievements in appropriate material forms.

For life as it exists on this earth (and of life existing elsewhere we have still no single bit of empirical knowledge), the barest fundamental principles could possibly be formulated as follows:

a. The process has evolved from its cosmic molecular origin in the form of *individualized* condensations of molecular order climbing up stepwise from the (atomically) essentially chaotic environment to a centre of DNA-type exhaustive order. DNA is an intertwined double chain of phosphoric-acid and deoxyribose sugar links carrying conjugate nucleotidebase coding molecules. The script is activated by local or integral unwinding. Each coding molecule is individually significant (... in principle has a macroscopically detectible effect on the whole process).
b. Away from the centre the order proceeds through migrating fragmentary RNA script copies with respect to the DNA source characterized by ribose sugar molecules in the chain (instead of deoxy-ribose) and uracil instead of cytosine as fourth coding molecule, to folding and branching aperiodic protein aminoacid chains in identical multiple, and ultimately to complex periodic (crystalline) protein or lipid sheet structures (membranes) channelling watery solutions of elementary organic compounds selectively admitted from the environment. The whole is just sufficiently

stable to generally maintain its vulnerable order against the average interference from the physical environment on the crust of the earth.

c. The process propagates its achieved order through processes copying the central script by aid of materials taken from the environment. As soon as a complete duplicate is ready, the whole system separates into two equivalent halves which each individually resume the operation. However, to the ever increasing numbers of individuals arizing in this way limits are set by a competitive interaction for raw materials, physical interference from the variable environment (now favorable, then destructive) and suffocation in the waste products inevitably shed into the environment as by-products of the synthesizing process modes (with the exception of the photo-synthetic ones, see *d*). These influences cause retardation, damage and complete dissolution back to reprocessible micromolecular elements.

d. The energy and entropy principles of the cosmos have been met by splitting the process up into two quite different modes, (α) a rather passive vegetation mode providing photosynthetic upgrading of available raw materials to meet the energy, entropy and reprocessing requirements and (β) an active animal mode of organisms with delegated third-level creative potential associated with accelerated decision processes in their organic substratum. This mode either directly or indirectly "feeds on" the α-mode. The negative entropy balance of the synthetic phases of *this* mode is compensated by the production of waste materials (assuring that the common entropy law is duly respected) acceptable to the α-mode for reprocessing.

e. The as a rule progressive creative evolution of the process as a whole occurs through mutational variations of the molecular (DNA-)code script in coherent response to conditions generated by interactions.

f. The opportunities to steer the process in conformity with emotional values have been enormously extended, the fundamental unity of the process promoted and conservation improved by a bisexual re-organization permitting coherent intercombination of past creative (mutative) events in different pedigrees (defined by sustained duplication); that is by extending integration of mutations in time with integration of mutations in space. Organically, the revision is rather complex; it hinges on a polarity introduced in the individual code systems either accidentally allowing or "instinctively" inviting occurrences of paired conjugation in the interindividual interactions followed by "diploid" spatially-integrative reorganization of the copying phase and by a final reducing quadruplication compelled to respect the sexual polarity in the resulting "haploid" code symbol sets again ready to conjugate.

g. The interaction between individuals has been submitted in part to another drastic reorganization by introducing delayed individualization in exchange for extended coherent interaction building up multicellular

organisms. The development has been made to comply with sexuality by transferring reproduction to monocellular haploid gametes separating from the organism and uniting with polar gametes.

All this is not to be considered as an attempt to compete with the experts, but as a way of looking at the problem of life in a way emphasizing features relevant to our particular objectives.

The first explanation required as a matter of fact concerns the coherence of the process. It is rather clear how in the process of life information created is preserved—the duplication of the chromosome code scripts as a basis of its dissemination is good for that—and extended. The mutational process is the accepted source of variation and extension in the world of life. This leaves open the question how the interaction modes succeed in maintaining the unity of the process in spite of its wide spatial decentralization over the entire surface of the earth. This, the irrelevancy of space to emotional control in effect again strikes as a most extraordinary proposition. Exactly because this feature was claimed to be not outside the reach of psycho-physical theory, satisfactory clarification should not be impossible.

It appears that coherence is established in ways different from those employed in the human psycho-physical system, in spite of the fact that the symbols used are essentially the same. In the human case, the fundamental, or even prevalent status of the psychologic concepts of emotion and information (semantics) in addition to the elevation of matter to a reservoir of symbols ready to encode and conserve information, and the use of quantum-mechanics as the physical theory appropriate to the description of the purely material aspects of the process assured the adequacy of information-conserving macrophysical links in the process to the maintenance of unity. The spike-signal transfers between the cellular units of the nervous system satisfying the conservation requirement, they straightforwardly explained the coherent unity of the process throughout this large decentralized system up to boundaries where the information degrades back to chaos. With respect to the units themselves, the cells of the nervous system, the submission to coherence had its foundation in the still hypothetically assumed microphysical nature of the recording process. For such (microphysical) processes the irrelevancy of spatial separation to the maintenance of certain forms of order had an officially recognized predecessor in Pauli's exclusion principle of quantum-mechanics. This is also a principle which cannot be deduced from elementary interaction rules between system components, but only be imposed after all to the system as a whole. Its ignorance of space possibly becomes most obvious in the application to the electron gas in a piece of metal, where the principle succeeds in exerting experimentally verified control over a process of very large, macrophysical, dimensions. It imposes Fermi statistics to the electrons concerned, which means that it forbids double or multiple occupation by the electrons of any elementary cell of phase space, even when the electrons are so wide apart that there is

no interaction at all. Since Pauli's principle (enormously) reduces the measure of randomness in purely physical processes, one could believe that it is really a precursor of the exclusion of randomness of psycho-physical theory.

Still for the case of the human mind, the psycho-physical relation could be represented by an identification postulate: the information-theoretical correlation statistics of the symbols encoding the mental experience was identified with the quantum-mechanical statistics of the microphysical coding events, an identification supported by the correspondence of the reference library determining the correlation statistics with physical structure, the reference of quantum-mechanics, resulting from cumulative recording.

In the processes of life there are, again, microphysical centres where the information is created and stored in terms of, say, modulations within Pauli's elementary dictate. Such centres exist in any living cell, elementary unit of organic life. However, these centres would, now, not seem to be in any way interconnected by information conserving macrophysical interactions comparable to the spike signal exchanges of the nervous process. *The unity of the process is in this new case in effect achieved by taking up the interaction issues in the mutation statistics.* This is to be understood as follows.

The interaction processes of life fall apart in the strictly organized processes of growth to multicellular organisms (starting from fertilized egg and developing through youth, maturity and old age to ultimate death), the interaction of multi- and monocellular organisms with each other (feeding relations, parasitism and symbiosis, sexual conjugations, the struggle for survival etc.) and interaction with the cosmic environment (generally characterized by obvious features of specialized adaptation). The unity of the entire process requires that these modes all submit to coherence. Now, even though little is known about the precise organization of cellular differentiation as occurring on the basis of chromosomal information, there exists no doubt that it works through the exchange of very subtile messenger substances in the no-man's land between micro- and macrophysics, substances resulting from detail cellular facilities themselves established under chromosomal instruction and feeding back to this origin as selective suppressor, modifier or activator agents. Considering that critical phases of such processes are necessarily microphysical because the chromosomal centres themselves are microphysical, they have definitely to involve quantum-mechanical links, that is to imply events fundamentally predictable in terms of probability only. The selective suppressor, regulator and actifier transfers thus can by elementary physical principles effectively organize only correlations between microphysical events, exactly the type of interdependency extensible to emotional control. To this end, the quantum-mechanical statistics generated is only to approximate the symbol statistics of the semantics associated with the process as a complementary image. The whole of physiology can be advanced as a proof that this re-

quirement must be accepted as satisfied. If this were not so, then the accepted compatibility of all physiological and biochemical processes of life with basic physics (quantum-mechanics!) could not have become a major conclusion of corresponding biological investigation and research. When the chance events involved were not coherent, they would almost immediately cause chaos and not the order and faithfulness to purpose obviously prevailing. So, this group of intercellular interactions is contributing to unity by elevating quantum-mechanical probability to identity with the symbol statistics of the information processed by aid of messenger exchanges representing chromosomal information and feeding back to the chromosomes. Never will any deviation from the basic laws of physics be detectible except of an overall consistent compliance with purpose. This feature has unrightfully at present not yet been recognized as witnessing pure magic from the point of view of existing physics, but it is like that!

The possibility of coherence in the interindividual interaction modes results from the elementary fact, that the statistics of the mutations striking a class (sort) of organisms is physically clearly and obviously determined by (i) again the ultimate source of all physical probability: the microphysics of the basic event (chromosomal intermolecular change) and (ii) the number in which the gene affected exists in the population. Approximatively, the (small) probability per next hour is the probability per next hour of the event as an occurrence in an individual chromosomal system times the number of existing realizations of that system, the gene concerned. Now, the latter number, essentially the fractional population number carrying the gene considered in stock, is issue of the adaptation and survival races. Mutations will practically strike "successful" genes only, that is genes with already high survival value, since detrimental genes are almost non-existant. So, a kind of monogram mutation statistics is in effect strongly influenced by the interaction process, the first objective requirement for subordination to complementary emotional control. However, the survival value of (specific) genes will generally depend on the realization of other conditions, in particular the availability in the genetic stock of the organism of other specific genes. The survival, thus, will generally imply references to additional genetic conditions existing in further fractionalized subdivisions of the population and so the mutation may effectively have probabilities fitting into possibly quite complex systems of correlations. If, now, survival of the fittest is accepted as representing a basic principle of bioconscious *logic*—law of mental processing—then the interaction in effect again organizes a (mutation) symbol statistics not different from that imposed by some complementary semantics. This forges the mutations to compliance with a unified psycho-physical process, and assures their faithfulness to imposed purpose.

The interactions of life, however, form a many-sided, extremely complex process which, doubtless, implies further "mechanisms" generating correla-

tions in the time-sequence of mutations striking a sort. Several possibilities have been mentioned and discussed in ref. 2. The whole monocellular, extremely variable bacterial mode of life delineates itself as a powerful source of effective information transcriptions into the bacterial biological code. This might concern cosmic features of the physical environment—the bacteries of soil, sea and air should take care of that—or physical conditions in other living organisms submitted to test by pathologic bacteria. In the latter case, the bacterial toxins as pieces of bacterial genetic information might play a rôle as actifiers of mutations in the genetic stock of the infected organism and thus provoke remarkable correlations. Imaginably, these properties are sufficiently powerful to assign a kind of observation value to the bacterial mode of life.

It is of importance to note, that all mutagenic messengers organizing correlations as considered need only have a very low effectiveness. This is so because it is always sufficient to arrive at a significant mutation probability after multiplication with a number of the order of magnitude of population numbers. With the toxins of the pathogenic bacteria mutagenic properties may remain correspondingly weak as long as the bacterium is capable of epidemically invading an entire population. The fever which they cause is in effect already weakly mutagenic in itself (be it unspecifically).

This brief discussion has still left one fundamental process unconsidered, viz. the basic replication, ultimately duplication process copying existing genetic information with the purpose of disseminating and thereby conserving it. This process has still no satisfactory explanation in the current litterature, in spite of considerable analytical efforts trying to unravel it. The Watson-Crick chromosome is supposed to unwind and any of the two threads is supposed to serve as a "template" for a kind of magically ordered crystallization process of spare materials from a chaotic environment to a faithful copy. This explanation is quite obviously insufficient. Being microphysical (that is "manipulating individual micromolecules"), the process should fall under the control of quantum-mechanics and hence be determined to probabilities only. So it should definitely deteriorate rapidly to chaos if it were not coherent, that is faithful to complementary purpose. The simplest "psychologic" explanation of its true character is possibly that the easiest way to generate semantics is to copy existing semantics. The process must anyhow be organized stepwise through a feed-back sequence of operations which are individually almost purely physical. Between the chromosome and the environmental chaos there is (even with monocellular organisms) in effect the extensive cellular organization clearly tuned to progressive selectivity. Somewhere in the cell there may be a pool of final nucleotide-base spare materials with the appropriate "monogram" concentrations. They may become processed to digrams again with the appropriate relative frequencies. Any such step is essentially elementary and indistinguishable from purely chemical intercombination. It will finish up

with microphysical individuality in only a relatively small number of steps. The end might be some enzymatic phase involving a protein mediator hooking up things synthesized to the template at exactly the appropriate spots. Some evidence of some such process seems to exist[1].

Let us for a moment return to the origin of life and accept that all life on this earth is based on an intercoupled DNA/RNA/protein "method". Even though it is perhaps impossible to find out exactly how this method came into existence, its intimate reliance on the specific properties of carbon, hydrogen, oxygen, nitrogen and phosphoric atoms, and the obvious use of the stressed relation between oxygen and hydrogen convincingly show that the method has firm and elementary cosmic roots. Accordingly, the complementary values of the elementary symbols used, of the nucleotide-base and amino-acid molecules, must impose some kind of compulsory logic to bioconscious subjective process. They must be supposed to condition bioconscious subjective experience and to direct the process concerned in agreement with cosmic intention and foresight.

In spite of these narrow links with the cosmos, bioconsciousness has to find its way in a cosmic field which is largely "foreign" to it, to which it has to adapt and in which it may err. The molecular symbols of the processes of life are duly conditioned by their past, but this past is the primordial phase of the cosmos. Since then, cosmic creation has proceeded; it has developed the physical universe in which it has designed dust, gas, stars and galaxies, planets and moons, perhaps relying on later delegates for the solution of problems involved and the exploitation of opportunities implied. Possibly, certain features of the crust of the earth have a purposive cosmic origin. Further, the strong random feature of the cosmos must introduce chaotic features in all conditions with a cosmic origin, unintended features, arbitrary and unforeseeable. Consequently, any delegate of the cosmos, though writing his experience in the early symbols, yet finds himself confronted with a predetermined, largely unorderly, highly accidental situation. He has to use the full power of the symbols submitted to order in order to find a way adapted to the conditions encountered. Equipped with a tiny fraction of early material symbols carefully cultivated to exhaustive complexity originally writing out not much more than some inserted instincts, he has to

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[1] In the "Foreword to the 1947 Edition" of Sherrington's "The Integrative Action of the Nervous System" (ref. 6) we find the following most remarkable story: "I once had the opportunity to watch under the microscope a flea "biting". The act, whether reflex or not, seemed charged with the most violent emotion. Its liliput scale aside, the scene compared with that of the prowling lion in "Salâmbo." We feel inclined to paraphrase: "It is unfortunate that we cannot watch under the microscope the crawling myriads of micromolecules looking for their proper partners on a DNA template in course of duplication. The scene, whether physical or not, must be charged with the most obvious emotion. Its liliput scale aside, it should compare with that of the rape of the Sabines..."

make his late start into existence and to pursue his mission without opportunity to comment usefully upon the condition encountered. This makes, to him, adaptation to a matter of basic logic, at least until, perhaps, at some time, means would have been developed to impose obedience to the cosmos.

It is the mutation process which has served the evolutionary development of life from its indefinite, but anyhow relatively simple origin to its present complex diversity. The inspection of the fossil record shows, that the development of diversity has alternatingly occurred in rather sudden, major, steps, "saltations", and long periods of evaluation, development of implications and applications, exploration of limitations. This is in accordance with what one would "psychologically" expect. Within the vast mentally effortless complement of resonant, perfectly organized and stabilized life processes mental unity and creative effort can only be maintained by aid of a concentration operator of the type of attention. This will concentrate active progression on some selective "subject". The attention will perhaps be temporal; in the long run changing from subject to subject. However, now and then some major novel idea may originate. This, then, will subsequently both permit and require evaluation, investigation of its scope and limitations. In the end all lasting novelty should attain resonance. This is the mnemotechnical principle of bioconsciousness. It carries everything which it has achieved with it in an effortless conscious background to its momentary concentration. This should be comparable to the sensory report almost incessantly available in a human mind. It also presents its message—the world—in a generally effortless form harmless to whatever specific concentration may exist momentarily.

The coding principle being irresolvable, any more vivid approximation of bioconscious subjectivity should be impossible. The descriptions given are intended to try out what could be said about the organization of the mental scene. The value of the insights gained should particularly be in the legalization of purpose as a valid interpretative category in the reconstruction of evolution from the fossil record. The results of such reconstruction in effect prove to come close to incomprehensible when sustained faithfulness to purpose is not accepted as a permissible explanation. However, the arguments are not completely convincing and so the claim has become a major point of controversy between the experts. The controversy not so much concerns the facts which point to sustained purposiveness and which everyone who takes the trouble can easily recognize, but the explanation itself. The two alternatives are as a matter of fact (i) straight reference to the psychologic concept of purpose and (ii) reference to extremely complex chance processing *simulating* consistency to purpose. The waves of the controversy run high because scientists do not accept psychologic explanatory concepts ... when the mind concerned is not obviously very close to theirs! This (silent) requirement is quite clearly cancelled by our considerations. Our theory does not easily permit access to any foreign conscious stage, but it did justify the conclusion that the conservation, mutation and

interaction rules of the process (of all life existing on the crust of the earth) are exactly such as to be ready to submit to complementary semantics ... and *so* do spell out semantics. Our own mind is instance of the ultimate proof. Further, we have recognized with sufficient clarity that access to a foreign mind is a nonsense requirement as long as we even fail to succeed with our fellow-men.

The other point of view, (ii), strictly speaking has no proof at all behind it. It exists only because the human mind is weak in assimilating and surveying very large (though finite) numbers (a limitation already mentioned earlier, compare page 18). Confronted with trillions of organisms (bacteria, plants and seeds included), each defined by another trillion strings of code symbols on a deoxyribose-phosphoricacid carrier, and mutually interacting in ways doubtless allocating success and survival to "the superior", no reason is seen not to accept as a chance phenomenon whatever apparent value may be recognizible in the process. The fault is in the failure to realize that the rate of dissolution of any value dependent on chance always exceeds the rate of chance-consistency to value. The only exception is in the advance compliance of chance with the multigram statistics of the extensive code-script bearing the value considered. With no limit a-priori imposed to the scope of the statistical identification, this simply means that the process *is* psycho-physical.

Unfortunately, it is out of place to try to present here the reasoning most convincingly demonstrating the consistency to purpose of the evolution of life. There is no outlook at arriving at a result approximating the standards of the great masters of the subject. The great historic advocates of the "inevitable" acceptance of purpose as an admissible interpretative category if anything is to be understood of the evolution of life are HENRI BERGSON (ref. 7), CUÉNOT (ref. 10), Driesch, UMBGROVE (ref. 11), just to mention only a few. Their work should be consulted in the original. Of course, none of them has associated the characteristic of purposiveness with consciousness, perhaps the only final justification for the use of the concept. Not understanding the relation between mind and matter, they had to introduce the idea of purposiveness as a property which could stand for itself. Yet, they were aware of the emotional element involved, which they tried to insert in such general notions as "élan vital", "entelechy". However, this was not a way to true clarity.

Still, the approach to the reconstruction problem implied in the fossil record which this philosophy makes possible surpasses any earlier account (inclusive those mentioned above) in the free use of appropriate psychologic concepts. The following brief examples may serve as illustrations. They are shocking by the apparently bold anthropomorphism involved, but upon second thought it will probably be recognized that it is difficult to raise much really justified objection.

The case to be considered first is the famous one of the giant Sauria of the Mesozoïc period. From the rapid development of these forms of life in the

early phase of the period joy and pride can sympathetically be read at having found a way off from the small and humble to creatures mighty and giant, to designs imposing obedience to enormous quantities of cosmical matter, in one stroke. It is easy to infer the strong emotion involved and to appreciate something of the quick radicalism with which the fascinating achievement was pushed ... beyond limits later on appearing useful and tenable. The fossil record shows that, again quite understandably, the pressure of these limitations caused bewilderment, something like despair, and that quite some struggle was needed to accept that the mode apparently so promising was leading into a deadlock. This can straightaway be read from the frantic ("hypertelic") attempts to find a way out of the difficulty, to safeguard the outpost. Further, this is borne out by the again rapid extinction of these forms of life; the idea had to be given up ....

Secondly, the opportunity arises to conceive as a piece of remarkable purposive insight the idea to finish off the animal line of evolution with the human being by enhancing the human sexual instinct to perpetual readiness, dislodging it from limited seasonal periods of heat. This simple idea may well have sufficed to prevent segregation into further non-interbreeding variants and so to maintain unity. It absolutely assured mixing of genetic materials at even the most spurious contacts. It seems that the principle has been made even more effective by modulating the human sexual instinct with augmented attraction between the mutually exotic. Precautions at the same time strong enough to insure against infamous methods of human invention to destroy the basic unity of mankind.

Have the alkaloïds of *papaver somniferum* arisen by hazard and natural selection, the stuff being advantageous to the plant—making it particularly tough, or improving its roots, or increasing its seeds, or attracting particularly diligent insects, or heaven knows why—*and* are they by miraculous accident so intimately adapted to the human nervous apparatus that they may bring blessed relief in cases of the verymost painful forms of a human being's transition to death, *or* was the stuff *intended* for the latter purpose, out of compassion with the sufferings which the final disruption of the order of life sometimes impreventably brings with it *and* was the plant designed to manufacture the stuff in carefully organized toleration with its own needs?

Such must be the end of this discussion of the psycho-physical nature of the process of evolving life on this earth. The whole proposition must remain incomprehensible if it is not accepted that the question whether a process is psycho-physical or not is to be answered by checking fundamental features relevant to the issue, and if it is maintained that the only valid criterion is the line of similarity which starts with us, which runs to our dogs and from thereon to the frogs, the fishes, the amoeba .... Consciousness *is* a condition more general; the limitation to this similarity line *is* too narrow.

Again, it is not justified to demand that the subjectivity of bioconsciousness be accessible to us, shall we accept its existence, as long as we even fail

with our fellow human beings. The all-important conclusion attainable and attained is that our human logic is applicable to all forms of process, bioconscious process with its special adaptation and survival logic included, and that our ultimate ideal, perfection, is also common to all process with a conscious image. With these endpoints solidly identified, it is easy to find the frog tied to the purposes inserted in his elaborate instincts. The animal can only seek perfection within this scope. If we want to obtain a notion of what the animal's experience could be, the only way is to carefully investigate what information his sense-organs accept and how his instincts convert that into responsive action. The conclusion might be that the frog's mind is containing some abstract of the humble animals environment, that he perceives the sounds of wind, waves and his fellow's croaking, that he feels the urges of feeding and of the behavioral preparations to reproduction, that he knows of hunger, well-being, pain, a moment of fear perhaps when the stork catches his leg....

Just so can we, by similar investigations (as attempted) sympathetically insert between the compatible logics and final purposes of our own and the bioconscious mind into the latter ... a directing will, interchanging creative effort and routine, experience of success, accident and failure, fear, joy and pride, a sense of beauty as borne out by the forms in which life exists (in particular when circumstances are permissible, as with the paradise birds of the tropical forest), and hope that the ultimate achievement, the human being, will remain faithful to the common mission and succeed ....

Checked to human standards, these emotions should be conceived as elementary, fierce and perhaps awful.

With bioconscious process, as explained, primarily controlled by the mutation correlation statistics organized by the interactions of the existing multitude of living organisms, the second-level mode of consciousness has *cosmically* been condemned *in advance* to surrender ultimately to its own supreme third-level achievement, the human being. This is so, because the interactions involve, and so are depending on, third level intellect. As long as this remains closely attached to and determined by *instinct*, it only forms a faithful extension of bioconscious insight, keeping third-level initiatiatives and achievements tied to bioconscious purposes. But with instincts becoming less specific and more general, more and more freedom becomes allocated to the intellect concerned, in the end the intellect of the human being. Bioconsciousness has to follow this, its own, development because the interactions controlling its coherence and logic become more and more determined by the operations of *man*. The end can only be, that *man* takes over control completely. So the end-responsibility and all hope are ultimately with the human being ....

6. THE ANIMALS

The β-mode of life—to use a designation introduced in the preceding chapter—is characterized by the occurrence of "third-level" consciousness, an animal mind. In more nearly physical terms one might say: is characterized by the existence, in each organism, of a micromolecular cumulative recording process registering the experience of the individual organism in its two components, (i) sensorily imported (passive) factual information concerning the physical environment (inclusive the physical condition of the organism itself), and (ii) re-active muscular intervention into the environmental situation. The process is far quicker than the mutational process of the chromosomes backing up the evolution of life in general; the physical conditions involved are hence far less stable. In the higher animals, the recording has its seat in a separate cellular system with a multilevel ascending branche picking up the inputs from the sense organs, and a descending branche differentiating response decisions into detailed instructions for the muscular system. The records of the ascending branch serve the abstractions and interpretations, those of the descending branch the skills and proficiencies.

In each recording cell—neuron of the nervous system—the recording starts at birth with annotations adding up to an aperiodic macromolecular basis, probably part of a chromosome and in any case pre-organized by the (bioconscious) development process of life. This basis defines the instinctive recognitions and skills available to the organism already at the very moment of birth.

The sense-organs of the higher animals are evolutionary developments of very simple original provisions. In monocellular organisms perception at best starts with a bare elementary sensitivity of possibly a part of the cellular surface for a few very basic environmental conditions, and response can scarcely surpass the rhythmic contraction of flagella. The fossil record presents the developments as "experimental", that is as running through many small design improvement steps continuously checked for adequacy (survival value). Final results, take for instance the eyes of the birds of prey, appear as nothing short of perfection.

Even the best developed sense-organs do not convey to the animal mind more than a superficial abstract of external conditions and occurrences. The visual sense, eg., merely presents a reflection abstract referring to the 4000–8000 Å waveband. The abstracts however, are sufficient to reveal to the animal the opportunities which the environment offers, to assist it in finding the raw materials (eg. water) which it needs, to assist it in finding cover against cosmical violence, to pick up the tracing and communication signals from other animals. It as a matter of fact generally contains very much which is totally irrelevant to prevailing specific purpose, *and so the animal*

mind in effect immediately continues the line of abstraction. It will later on be explained in how far the human mind excels in this respect.

The instincts inserted in the animal mind and transferring bioconscious purposes to it subjectively have, to the animal, rational aspects in the form of innate perceptional recognitions and innate response capabilities—frequently complex behavioral patterns—and emotional aspects running in terms of *feelings*. The violent ones attached to mating behaviour may bear direct witness of bioconscious emotion associated, for the associated (final) purpose is probably totally unknown to the animal and thus *exclusively* bioconscious.

Instinctive animal behaviour cannot be checked against truth. The appropriate category is *adequacy*, expressing the degree to which the purpose involved has become effectively ascertained by adaptation of organic provisions and response modes to relevant external conditions and opportunities. As already mentioned, the organization of instincts, when investigated, generally makes the impression of being marvellous. However, it is necessary that circumstances remain within the always finite scope of the instinct. The animal becomes helpless when this correspondence is made to fail (a fly against a window pane).

The method used to extend the set of circumstances with which the animal can cope is that of learning. This is effectively a totally general ability resulting from the mutual identifiability of the statistical approaches of quantum-mechanics and information theory to the basic recording events. The explanation is as follows: since any form of statistics can manifest itself only in sequences of events of some length, any statistics imposed to such a sequence must actually leave some freedom as to the exact structure of the sequence. This freedom can be used to try for improvement of some elementary response action beyond what is strictly implied in the imposed statistics. The record of such an improved response excercise, however, subsequently modifies the statistical predisposition in accordance with its own symbol statistics. This means that repetition of the improved reaction will be easier, or that similar effort may succeed in further improvement[1]. In this way, learning at least permits adaptation of instinctive behaviour to slight variations of external circumstances bioconsciously possibly not foreseeable. However, in *typically* acquired responsive performance, the action is to a far greater extent led by cumulative experience starting from far more neutral instinctive predispositions. Generally, the case moreover requires higher degrees of abstraction, and "conditioning" by "surrounding" instincts, like, eg., a general instinct "to be curious and to experiment". A discussion in a few lines only is impossible. The processes of

[1] The conventional "theory" of learning hinges on properties of the synapses of neurons. This is not necessarily at variance with the principles explained in the text, for the cumulative record of experience is, in the nervous system, firstly decentralized over all cells of the system, but, per cell, moreover doubtless in some way associated with the synapse system of the cell.

learning are inherently complex and dependent on many adjustments and relations. Another surrounding instinct very frequently involved is an instinct "to imitate". The objective is always the development through excercise of effortless response modes resonant to valuable environmental opportunities. With the necessity of initial correlation alleviated, the scope of admissible external circumstances is wide and variable. It is the adult animal which may thus reach really intricate and sophisticated patterns of successful behaviour in a wide range of conditions. In return, the young animal inevitably becomes relatively helpless, which shows that extensive learning capabilities must go with prolongued instinctive (!) adult care for the young.

Life, having developed the working principles of instinct and learning to their very limits, has ultimately found a way allowing the removal of virtually all restrictions to the scope of third-level capability. It has been realized in the particular animal *homo sapiens*. In order to recognize the new methods used, the following summary of what the earlier animals can achieve is a useful preparation.

The facts which the ordinary animals can handle are, clearly, limited to the sum total of their individual assimilated experience, perhaps with slight extensions of "communicated" parental experience and observed fellow-experience. This sum-total remains attached to the generally narrow environments in which they live. The facts recognized by an earthworm do not extend beyond one tuft of grass. For the highest animals they become fairly extensive, but it is completely obvious that they never surpass a minute fraction of the facts in principle accessible to third level consciousness. For accessible in principle is everything existing in the spatio-temporal "niche" which extends from the "now" in a wide cosmical environment of the earth (the solar system) to the remotest past of the entire universe (compare chapter 4). Commensurate with the strong limitations of the facts, any ordinary animal's ramifications of purpose are limited to the instincts of self-preservation, competitive aggression and defense, feeding, mating and caring for the young.

With homo sapiens, restrictions have been crushed in some sort of the following way:

a. the neuro-physiological provisions of the high abstraction sphere have been liberally extended with rather neutral circuitry ready to receive and process a vastly expanded field of highly useful abstractions. This extension seems to be so generous, that no human being possibly uses it up completely during his life.
b. the extensions are pre-adapted to a particular process of mapping the high abstractions—concepts—into a code consisting of man-made and thus literally entirely conventional (language) symbols. These symbols are acquired through the aural information channel and mastered (developed to effortless utilization) through training and learning. Their conventional nature allows the abstractions to *surpass* bioconscious foresight.

c. the extensions further comprise a vastly improved vocal chord action channel. The improvement concerns the modulation potential and adapts the instrument to effective differentiation as required for the appropriate use of a language code in active communication.
d. in addition, the other action channels have been improved to a degree pre-adapting them to the effective manipulation of tools.

It may be noted as extremely remarkable and highly fortunate that the nervous circuits securing the storage and appropriate mobilization of *concepts*—the last most highly purposive abstractions of experience—though far surpassing the rest of the nervous machinery, still just fit into the manageable space of a human skull.

The incredible effectiveness and power of these measures is due to the fact that they permit *socialization* of human purposive action. They make it possible to develop a civilized, cultural society. In such an environment, the communication facilities of the common language extend the facts accessible to any individual to all facts recognized by the whole community; even to all facts of the totality of mnemotechnically or conventionally (technically) recorded experience of that community. All such extra-personal fact, acquired through communication, does not become completely equivalent to facts from true personal experience, but the abstracts acquired precisely contain the elements most relevant to purposes implied. If need be, low-integrative background can, moreover, frequently be added by following up appropriate recommendations ("try it yourself, look on yourself").

The facts accessible to a human community, however, can easily be extended beyond anything individually achievable by aid of coordinated common action, equally a direct outcome of the communication capability. The application of tools in such common action finally seems to make virtually everything feasible and achievable (even a trip and sight-seeing excursion to the moon). It thus becomes justified to think that *humanity* (the community of all human beings) will in course of sufficient time retrieve *all* the useful facts hidden in the niche of space-time accessible to any form of third level consciousness. This would mean that the triarchy of consciousness becomes closed and that there is *nothing* in existence which man could not know and in compliance with his mission try to develop to the ideal of perfection lingering at the end of time. On this mission, he can overstep the limits of anything bioconsciously foreseen or foreseeable.

The ranks of the animals are, thus, closed with homo sapiens, the last animal. The continuation of the story is human. There does not exist a biological problem of the evolutionary emergence of man. The animal homo sapiens is the end of the biological line of life, and the human being is the product of a new, non-biological, cultural continuation. Even at this moment, 1972, any human being can decide to return to the status of animal by simply forgetting the obligations of human culture ....

7. HUMANITY

The considerations of the preceding chapter have led to the philosophical conclusion that, apparently, the High Authorities of the Hierarchy of Consciousness have succeeded in creating, at the third level, an organism—homo sapiens—which is so equipped that it should be capable, through methods of social cooperation, to explore the whole niche of space-time to which the constitutional laws of the cosmos permit access, and to exploit all opportunities which lay hidden in the facts of this domain. It followed that this achievement is in a way final, that homo sapiens is the true end-point of the line of animal evolution. This line was a decentralizing attack primarily on the opportunities offered by the favourably conditioned cosmical chaos of the crust of the earth under still centralized—bioconscious—control. Each animal organism was definable in physical space as an area of individualized information conservation and control. With *human* beings the boundaries of that area were becoming vague since the marvellous faculty of creating, processing and disseminating information in *spoken* words is intended to serve a communication interaction link before the sound waves involved, declining with distance, have lost their information in the surrounding cosmical noise.

The elementary communication case is a discussion between two human beings. It is characterized by mutual vocalchord transcription of individually created information into trains of sound waves capable of crossing the spatial distance between the two partners with satisfactory conservation of the information carried, and mutual aural reconversion of the wave-borne information into the physical processing modes of the nervous systems (microphysical recording and spike-interconnected progressive abstraction up to complete evaluation). Clearly, the fundamental information criterion tends to refuse strict conscious *individuality*, in this case, to the two organic centres involved. The information link must be accepted to achieve, to amount to, a certain *confluence* of consciousness between the organically separate partners. The communication link, as a matter of fact, may make it possible to attain creative results surpassing those within reach of each individual on its own. This confirms the superiority of the conscious condition over the two minds separately[1]. The communication may, further, generate such emotion—such awareness of common purpose—that not one partner can at the same time retain clear awareness of the frontiers of his own mind. Therefore, the assumption of some confluence of minds seems sound and satisfactory.

Another case quite naturally explainable as (temporal) confluence of consciousness is the so-called "psychological mass". This is a crowd

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[1] The essence of consciousness is creation.

through some cause caught in a common primitive-emotional pattern. The primitivity of the pattern should assure that elementary instincts (eg. rage, hate, jealousy, revengefulness, fun, surrender, etc.) are involved very closely similar from the one member to the other. This naturally creates a resonance condition in which weak couplings may obtain strong effects. The mutual sensory perceptions, communications, then become sufficient to again achieve considerable confluence of consciousness. The mass acts as one unit.

In comparison with this, the solipsist's concept of the individual mind only looks artificial. With his concentration on property and frontiers of his own private mind the solipsist cuts the interaction with his fellow human beings. This is in fact equivalent to (temporary) isolation of the personal mind. However, cultivation of the habit is bluntly abnormal and probably self-destructive.

For such and (a host of) similar reasons, the conscious condition of humanity seems a difficultly definable thing. The individualization of consciousness in the human world is doubtless strong, but not absolute.

Now, the ultimate purpose of existence already proved to be perfection by the end of time .... Apparently, this mission can also be formulated, in particularly human terms, as *restoration of mental unity* and unconditional mutual love would be the way to achieve this. This is in effect felt to be an enormously satisfactory insight, a marvellous and strongly confirming, supremely valuable conclusion of this philosophy.

This conclusion needs not necessarily imply, that the "modes" of consciousness cannot be extended beyond human consciousness. It may be that man will find reason and means to organize himself new condensations of consciousness, conscious machines, say. "Organisms" in some way mediating in the integration of opportunities existing in the environment. With our present knowledge it is not possible to decide whether this can be done or not. Sure is it, however, that any such creation would not continue the line of decentralization of consciousness, but serve the restoration of unity.

The mission of man can rightly be said to be supremely difficult. The universe, though vast, had to respect its own past only. The world of life, though leading to extreme complexity, still had to adapt itself to one predecessant creative principle only. Man, however, has to accept the whole disorderly condition produced and to proceed with mental equipment for which he is himself not responsible either. Yet he is charged to find a way to perfection *on that basis*. He may have the infinity of the possible still before him, but in entering it he has to bear all the obligations of the past, of the two predecessant modes of creation. It is of little consolation to realize that, if he fails, at least his immediate predecessor will have failed too.

The birth of humanity, the upheaval of homo sapiens to the status of human being, must have been long and difficult. Particularly difficult is it to imagine, how the major requirement, the development of effective

language, communication based on conventional (and not innate) symbols, has occurred. The process may, of course, have started from a few innate vocal calls, but these should not have surpassed the few needs of interaction in an animal environment. They may have expressed fear and joy, warning, pain, hunger, food, search, rage, ... but all this is extremely far from the systematic and complete transcription of fact in all the diversity required by human experience and purpose. Even when main objects of human interest in the environment should have become associated with vocal symbols, it is still a very long way before all facets of order in space and time of perception and action are satisfactorily under control, in such a way that inherent logic becomes obvious and vocal constructions easily memorizable. It is of importance to recognize the one circumstance *helpful*, the basic convergence of human ideal (to the one ultimate, perfection) in contradistinction to the obvious divergence of facts (each useful combination of facts yielding a new fact). Due to this circumstance the (highly purposive) high abstractions (concepts) of the human mind have a very wide scope (the word "knife" stands for an indefinite number of mutually not at all identical or even similar objects), which limits the number required.

Trying to guess how the development of language may actually have occurred is expert business in which we cannot take part. However, one thing is sure; in the whole birthphase talking, chatting and listening must have been *extremely* emotional occupations. All primitive societies of man must have borne the mark of this circumstance. The still enormous amounts of vain talking in the present world of man should be sufficient proof.

Associated with the possession of language is the problem of truth. Truth demands respect for the *known* facts of the past. The facts processed in language and thought remain attached to the material coding symbols of the human brain. These date back to the primordial past of the cosmos and are ready to express anything complying with this past, that is anything complying with logic, the basic laws of human thought. Further, there is a pre-organization with a bioconscious origin which causes human experience to use the abstracting qualities and categories of human perception, and human emotion to contain innate references to the basic purposes of life in general. This accounts, for example, for the sexual element in nearly all human art.

So, any verbal construction which

a. complies with the principles of logic,
b. complies with the whole *assimilated* past of the human individual in question, cultural transfers to him included (that is: with the whole set of facts *at his disposal*),
c serves a human purpose

obtains the subjective stamp of TRUTH.

When the integration is entirely in terms of "perfect" abstractions, that is in terms of concepts found to hold for everything taken from perception,

concepts referring back to the constitutional order of reality, then all further experience necessarily complies, a-priori, and the truth stamp assumes the character of recognized compulsory, obvious, logical truth. Any such verbal construction is a human creative recognition of an implication of constitutional order. Checks to new and further perception are not needed; should any fail, then the experiment is necessarily defective. Truth of this category is identical to all human beings, it is based on a past common to everything. The purpose of such constructions is investigation of elementary implications of primordial order and of its inherent perfection, results increasing the proper understanding of reality.

The truth stamp is the sceptical one of *scientific* truth if the construction is entirely in terms of carefully specified, repeatable and elementary observation in repeatable, carefully arranged conditions. This truth refers to the choice part of cosmical and/or bioconscious creation; it breaks down as soon as one repeatable non-conformal observation is discovered.

Truth attached to reconstructions of incidental personal experience "from memory", immensily important in everyday life, may reach anything between certainty and guess; everyone knows that it is imperfect, subject to limitations, subject to error or even to complete failure. The explanation is that it requires reconstruction from a record decentralized over billions of (admittedly interconnected) separate microphysical stores (in the cells of the nervous system) which *in total* contain *the whole* of past individual experience. Even though the search is (very powerfully) helped by natural coherence of any *possible* reconstruction—the order of the existing stores and the perfect information reliability of their interconnections exclude chaos in any search process—it forms a very complex *conscious*, that is re-*creative* process which as a rule can only be successful when the attempt does not concern such small detail that notes concerned have disappeared in the multitude. The easy case is formed by past events represented by large numbers of notes because the original experience received ample attention and stretched over a significant time. Reliable reconstructions from memory are (nearly) always extensible, that is combinable with additional notes to an ever more complete account of an ever more important portion of past experience. This extensibility is as a matter of fact used continuously in the search as a check method. Never, however, does such a process reach the reliability of written accounts on paper, with their tremendous waste of molecules of printing ink. It is just therefore that notes on paper and the art of writing are so important to the human world.

The TRUTH mark becomes both overwhelming and critically sensitive when it concerns the high conceptual integrations which man may possess as a member of a cultural society and which represent this society's conclusions on the nature of reality and its mission in it. Such ideas are always a common creative achievement developed under the leadership of the highly talented; they imply all the facts from a usually long common past carefully kept alive by educational transfer to the offspring. Their scope and the

strength of the ideals involved inspire awe, but cause blindness at the same time. The reason is that such a truth system of course does not really reach perfection—far from that—because it covers a limited field of facts only. When confronted with incompatible facts, it easily decides to remain blind to them. Acceptance would, in effect, destroy the understanding, comfort and insight achieved and threatens the value system associated.

Dangerous may conditions become when two cultural groups, two different societies, each availed of its own unshakable truth, the one incompatible with the other, meet each other. Then each group finds its conceptions and purposes disrespected by the other. This strongly activates the aggressive animal instincts. Violence and murder, submission of "the enemy" by brute force, may become the inevitable end.

When two different systems of faith find themselves compelled to tolerate each other in some common environment, they become concentrated on self-protection and may show an astonishing, paradoxical, lack of self-confidence. Both groups may try to keep their members together and to screen them as well as possible from the others. Loudest truth may to a suspicious degree depend on early indoctrination, careful screening and radio-jamming.

All cultural systems of faith of course recognize that reality and the world of man are far from ideal, not conforming with ideals recognized. This creates the necessity to explain why this is so. Clearly, discordance of animal instincts and the cultural ideals developed is a primary cause. The associated stresses are an exclusive burden of man. The religion of Christ, however, excels by a brilliant alternative solution. It refers the discordance by aid of a verbal-imaginative construction back to a polarity of good and evil. In first resort, this idea threatens to run into an awkward difficulty. For God is, in this as much as in all religions, conceived as omnipotent and omniscient, that is as endowed with the common infantile exaggerations of parental power and wisdom, and so the admitted existence of evil threatens to detract from the divine superiority. This, however, is in a remarkably effective way prevented by charging all the evil of the world to *human* disobedience and fault. This solution has the unique merit of with the same stroke confirming the insurpassable importance and total freedom of man. Exactly these confirmations are a main purpose of all religion.

The religion of Christ unfortunately is as unable as any religion to resolve its incompatibility, clash, with "foreign" religions and systems of faith, and so has not brought and cannot bring peace to the earth[1].

According to our philosophy, good and evil do *not* represent a fundamental polarity. The clash of human ideal and reality actually results from the imperfection of the world in its present condition, which it is the mission of man to eliminate in constant pursuit of perfection. Evil is the sign of the

[1] The sin of the future is narrow-mindedness . . . .

still horrible limitations of the condition achieved, of true mischief and failure, of all the incompatibility which the simultaneous, largely uncoordinated attack on the infinity of the possible by all the interacting individualizations of consciousness which the cosmical edict has called into existence has momentarily yielded[1]. Against this, good is sign of recognition of imperfections prevailing and of the duty to try to overcome them, by sacrificing personal chances not strictly needed in order to create badly needed chances for others, fellows, to those less gifted or fortunate, to those hurt by the cosmical chaos, to those threatening to perish under the burden of their task.

In this philosophical view, evil is surmountable through sustained conscious effort, and in this way only. This is the narrow and difficult path all the creatures of the universe have to go. Off this path there is the megaton hell of nuclear fire ready to ignite under the pressure of rage and hate, ready to destroy forever. Fate of those incapable of sticking to their not at all indiscernable mission.

There is one final subject for which this philosophy offers a particular view.

Let us return to the birth-phase of humanity; the phase during which homo sapiens had, in long instinctive effort, succeeded in developing the vehicle of language to useful perfection. This achievement effectively serves two important faculties: communication *and thought*. Thought is a kind of self-communication. No one else being involved, it is even more flexible than talking. When necessary, it is easily intercombinable with perception, perceptional imagination and/or action. It may silently create some substitute satisfaction from imaginary adventures, to relieve a grey reality. More usefully, it permits the design of action propositions until one has been found promising to satisfactorily reach objectives set. In complex cases, always proceed in imagination first! Finally, that is a world identical to the true one to the point of using *exactly* the same perceptional abstractions.

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[1] There is a recent scientific discovery which might well be accepted as proving that evil must be conceived as sign and issue of imperfection. According to PATRICIA JACOBS (Nature, Vol. 208, page 1351) a quite unexpected number of men with serious criminal records and detained in special security mental hospitals appeared to have an extra *Y* (sex-) chromosome in their chromosome stock. So this defect is almost certainly at least part of the *cause* of their dangerous aggressiveness. This, of course, makes it awkward to blame these men for their crimes; much more are they victims themselves. Nor, however, can the responsibility be transferred to bioconsciousness, although chromosome interplay is normally under *its* supervision. Even bioconsciousness cannot, namely, create *in*coherence. The defect, as any chromosome defect, is to be considered as an intrusion of cosmical chaos and randomness into the bioconscious process. Randomness, however, exactly expresses absence of intention or purpose. So, the responsibility can in all truth and reason only be charged against the whole hierarchy of consciousness. Or: moral responsibility can only be felt and not be allocated.

Still more powerful, of course, is the combination of thoughtful exercise with discussion with fellows in behalf of still more difficult or far reaching purposes.

By such methods, man can leave the "now" and "here" in exploring the dimensions of time and space. A little backwards in time, a little forward, or even a long way back and a long way forward. Ultimately back to the origin or up to the end.

Young humanity, so it appears, has first used these faculties to explore the future, provisionally leaving the past in a dress of firm or vague recollections and colourful but unreliable legend. References scarcely reaching back more than perhaps a poor century.

Why so? Mainly for three reasons, we think. Firstly, there is the instinctive need to find out what a human being is, to achieve a notion of what the human mission might be and to develop some self-confidence. *To raise as human beings above the animals.* Why turn to a disappointing past if there is a fascinating future ahead? Secondly, the excursion into the past is impossible without considerable experience and some effective tools. Young humanity could scarcely write! And thirdly, the departure from the now into the future soon unveiled the terrible certainty of personal death; terrible because of the mystery implied, because of the impossibility to imagine personal non-existence, terrible because of the possibility that it may strike whilst wishes and hopes are still unfulfilled. Terrible because our will cannot master it. *Obsessive mystery.*

Plentiful are the proofs of this obsession in the early records of mankind. Anthropologists rightfully retrieve the remnants of early humanity from burials and graves, typically human-imaginative dispositions of the dead. The early culture of the Egyptians was impregnated with the idea of death; its monuments are graves, its literature a sustained attempt to cross the boundaries of death. Indeed, with death unforeseen, thought can scarcely have existed and life scarcely have surpassed the animal level.

The ways in which young humanity has tried to assimilate and overcome death are simple and obvious. Endowed with the exquisite powers of apparently immaterial imagination and thought, the obvious solution was to conceive death as a mere transfer from the world of matter to the world of invisible phantoms. Escape in psychological faculties ready to provide some relief and to offer some comfort: imagination and fantasy. Solution moreover ready to pick up the vague, universal, deeply-rooted intuitive recognition of ... the bioconscious agency which created the world of life, which has part of its substratum in the human organism and the essence of its purposes in the human soul. Imaginative constructions provisionally not hurt by indigestible facts, by all the past *unknown.*

On its way into the distant future, human high-emotional integration shows up a remarkable convergence, sharply contrasting with the divergence of the world of facts (all mental achievements creating new facts from existing ones, the set of facts irrespective of purposes originally associated is

indefinitely expanding with time). This convergence can easily be recognized. In all human cultures, the scouting of the far future has occurred under the leadership of the emotionally highly gifted. Everywhere, the excursion has started from different facts of life. Yet, the developments, if pushed to at least some perfection, have led to much the same insights, much the same values. Everywhere, the emotional penetration has led to the discrimination of good and evil, everywhere it has led to esteem duty, friendship, fidelity, sincerity, sacrifice, courage, love ..., and everywhere it has brought rejection of treason, falsity, deceit, fraud. Of course, conclusions have never been exactly the same. Many minor and some major variations do exist, and not everyone has been capable of reaching equally far .... Moreover, the rationalizations chosen to make the insights transferable by communication, the metaphysics added to explain and justify the conclusions reached, to maintain the connections with the present and the past, differ widely. This makes the point of convergence not actually discernible by continued reasoning. It is a pure emotion lingering near the end of time. "Perfection" is the word-reference for which we have expressed preference. But with the crux of the problem in interhuman relations, the supreme command of unconditional universal love may hit the point still better. In essence, all religion and all ethics are drawn towards this one point of convergence.

The exploration of the future by the profetic genius of mankind lies now some 5000 to 1000 years back in the past of human culture. The results are in the great religions. All they have started from the valid intuition of the existence of the predecessant creative Authority of Life, whose works are to be continued and extended. They have firmly established the human status of homo sapiens. Their views on the end of time are expressed by their moral codes and commands.

In the same period, parallel to and largely due to the developments mentioned, the society of man has for the first time taken shape.

With this achieved, the improved forces of human creation came free for the attack on the second important problem: the exploration of the world of facts. This evolution has started in space rather than in time with the exploration of the theatre of the crust of the earth. It has ended in forms of provisional control characterized by ruthless exploitation of facts and values discovered, solving the cultural encounters naturally implied by force of arms in terms of victory and destruction, dominance and submission.

Thus, again considerably enlarged forces could, finally, be concentrated on the last major unknown, the past. This demands systematic reconstruction, disclosure of the pole of reason, retrieval of the long path of predecessant creation. Apart from some early signs already dating back some one or twothousand years, this enterprise has obtained impetus only a few hundred years back from now. Under the impression of first obvious successes, it has just now enchanted humanity and drawn the best genius into its continuation and completion. Human Science, proud and self-conscious, rapidly re-

constructing the story of the past, wrestling from nature its intimate secrets, its hidden laws.

Although very far from complete, this penetration has already at this moment tremendously extended both the knowledge and, by application, the power of man. It is already clear that He, on this earth, has the future in his hands. At this very moment, however, the development is running into a serious difficulty. The reconstruction of the past in human terms, from the origin up to the present, does not link up, in this point, with the rationalizations of the earlier emotional explorations of the future. This is understandable, for those rationalizations were only provisional carriers of the ideals discovered during the up-time trip. They were not critical with respect to facts employed, which were more wish and hope than truth, more legend than history, more fantasy than reality. So, the progress of humanity has just now led to a quite critical mismatch, a dangerous incompatibility. This incompatibility undermines the high ideals; they start looking suspect and obsolete in the light of their disintegrating metaphysics. And on the other side, the story of the past, Science, is becoming extended into the future as a cult of Reason, arrogant and misunderstanding.

The present condition of humanity, in conclusion, appears to require imperatively, that a suitable part of human ingenuity be devoted to the resolution of the fault, to the development of a *valid* interconnection of facts and ideals over the full span of time, right down from the origin up to the very end. This is a main problem and task for the near future.

The continuously imminent possibility of failure disregarded, the mental maturity of humanity is still in a very far future, when all the facts of the entire niche of space-time which man occupies have been properly recognized and true purposes firmly selected.

SUMMERY

Generalizing an available theory of the human mind (refs. 1, 2, 3), it appears possible to conceive reality—that is the totality of all that exists —as one interconnected psychophysical process organized in a hierarchy with three levels, (i) a cosmical top level, (ii) a biological intermediate level and (iii) an animal/human lower level. The process consistently has two complementary aspects, a mental one referring to a singular scene of consciousness and a conserving symbolic one existing in physical space-time. At the cosmical top, the mental aspect contains the ground-rules and purposes of the cosmos encoded in the bulk materials of the universe with their nearly completely unorganized (chaotic) atomic background. The second level contains the purposive evolution of life on the crust of the earth encoded into the microphysical symbols of the chromosome aggregates controlling the growth and reproduction of living organisms. At the third level, the individualized animal mind evaluates the opportunities of the organism in its cosmic environment as perceptionally acquired, continuously recording its experience in microphysical symbols of the neurophysiological system. Conclusions are converted into mechanical action upon the environment. The human extension is characterized by extremely powerful and general communication facilities permitting socialization of all anywhere ascertained facts and the effective organization of common action. The disrupted unity of creation resulting from the decentralized attack on the infinities of the possible by numerous individualized agents thus may ultimately become remedied through social integration and love.

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