1 March 1965

READING 6

Part 1

Some preliminary answers to the questions (about the possible Immortality of Man in Part 3 of last week's paper, 1965/8), seem to lead us to a simple *credo* or 'working explanation' which could give us a feeling of Aim and encourage our little efforts. This, for example, was the line of thought at Thursday's Work Party:

> What is the Life Principle? Where does it come from? Mr. Cardew felt its miraculous quality radiating from the Centre down through Organic Life. Mr. Churchill asked: 'Is the materiality of the Life Principle the same for every kind of life?' Miss Janet Simpson: 'Surely it is wrong to think of a lot of little life principles! Is there not a Universal Life Principle?' They would answer 'Yes' to questions 3, 4 and 5. Mr. Geoffroy: 'Would this be the realization of all possibilities inherent in each point of Creation?'

So we could, perhaps, say provisionally: 1) When anything in Organic Life is born, a ray of the Universal Life Principle enters it from the Sun. 2) This Organic Life Force (which we have shown to be Immortal yet continually generating living forms) could be thought of as also coinciding with the Atman of each. 3) Living in a perishable body, the Atman of man remains unmanifested in any other way unless he goes through seven gates to merge with the Universal; and then the 'unmanifested' would find its manifestation at each point in Creation by the actualisation of inherent possibilities there. 4) Higher bodies must be organised in individual man by his own efforts as a vehicle, or 'Immortal Soul', where the Atman can constantly dwell.

Such a statement doesn't seem to be discordant with the innate belief of people at different times, or with the Teachings of our System and the Shankaracharya's. Moreover the first part of it doesn't seem to be at odds with present day scientific evidence either. Here is the beginning of a current report on the study of the simplest form of life now known to science:

> Viruses, the simplest living things known to man, have two fundamental attributes in common with higher forms of life: a definite architecture and the ability to replicate that architecture according to the genetic instructions encoded in molecules of nucleic acid. Yet in viruses life is trimmed to its bare essentials. A virus particle consists of one large molecule of nucleic acid wrapped in a protective coat of protein. The virus particle can do nothing for itself; it is able to reproduce only by parasitising, or infecting, a living host cell that can supply the machinery and materials for translating the viral genetic message into the substance and structure of new virus particles. Since a virus is an isolated packet of genetic information unencumbered by the complex supporting systems characteristic of living cells, it is a peculiarly suitable subject for genetic investigation. One can study the molecular basis of life by identifying the individual genes in viral nucleic acid and learning what part each plays in the formation of virus progeny. That is what we have been doing for the past four years, working with the T4 bacteriophage, a virus that infects the colon bacterium.
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> The T4 virus is one of the most complex viral structures. About .0002 mm long, the T4 particle consists of a head in the shape of a bipyramidal hexagonal prism and a tail assembly with several components. The head is a protein membrane stuffed with a long,

tightly coiled molecule of deoxyribonucleic acid (DNA). The protein tail plays a role in attaching the virus to the host bacterial cell and injecting the viral DNA through the cell wall. Six tail fibers resembling tentacles bring the virus to the surface of the cell; a flat end plate fitted with prongs anchors the virus there as the muscle-like sheath of the tail contracts to extrude the viral DNA through a hollow core into the cell.

Within a few minutes after the DNA enters the bacterium the metabolism of the infected bacterial cell undergoes a profound change. The cell's own DNA is degraded and its normal business – the synthesis of bacterial protein – ceases; synthetic activity has come under the control of the viral DNA, which takes over the synthesising apparatus of the cell to direct the synthesis of new types of protein required for the production of new virus particles. The first proteins to appear include enzymes needed for the replication of the viral DNA, which has components not present in bacterial DNA and for the synthesis of which there are therefore no bacterial enzymes. Once these 'early enzymes' are available the replication of viral DNA begins. Soon thereafter a new class of proteins appears in the cell: the proteins that will be required for the head membrane and tail parts. About 15 minutes after the viral DNA was first injected, new viral DNA begins to condense in the form of heads; protein components assemble around these condensates, and soon whole virus particles are completed. For perhaps 10 minutes the synthesis and assembly of DNA and protein components continue and mature virus particles accumulate. The lysis, or dissolution, of the infected cell bring this process to an abrupt halt. Some 200 new virus particles are liberated to find new host cells to infect and so repeat the cycle of reproduction.'

(From 'The Genetics of a Bacterial Virus', Edgar and Epstein,
Scientific American, February 1965, p.71)

We see clearly from this account that the virus must first be *alive* (which is, as always, tacitly assumed); but given its share of the Universal Life Principle, its own peculiar properties, its recurrent lives and its 'fate' depend on the chemical composition of its own specific DNA molecule and upon its finding the right environment inside a particular species of bacterium.

Members of the Thursday Work Party went on to ask:

Mrs. Jacobs. How do the Planets influence the Life Principle? What does it mean to live under the Law of Fate?

Mr. Geoffroy. Is the basic structure, the 'blueprint' for Higher Bodies, already present in each of us?

The Group as a whole wanted to know: How School work can bring these bodies to life?

Are these questions correctly worded, and what answers would you give? That could be the basis for your discussion this week.

Part 2

There is great keenness, and great efforts in various directions are undoubtedly being made. But all this energy might be more profitably deployed if we again gave some attention to a certain universal Cosmic Law – the Law of Octaves.

Thus we keep being caught unawares by the peaks and troughs we meet with; we are constantly wasting precious energy by blaming ourselves for what is inherent in every natural course of events. We need to know very much more about this Law both in theory and in

practice. Then we could, by observation know what inevitably lies ahead on any given day, and learn to steer a course in relation to it.

Further, this Law supplies an answer to many scientific questions of the hour without the aid of complicated thought and mathematics; for it appears in scientific data of every kind. Without realising the universality of this Law, the scientist regards his glimpses of it as in the Mendeleev Table of Elements (or more recently in the Omega Minus Particle predicted by an eight-fold arrangement) as isolated curiosities. He is always making mistakes by thinking that *continuous* variations are the rule in Nature. In the realm of biology, D'Arcy Thompson saw it clearly as expressed in the following passage:

> A 'principle of discontinuity' then, is inherent in all our classifications, whether mathematical, physical or biological; and the infinitude of possible forms, always limited, may be further reduced and discontinuity further revealed by imposing conditions – as, for example, that our parameters must be whole numbers, or proceed by *quanta*, as the physicists say. The lines of the spectrum, the six families of crystals, Dalton's atomic law, the chemical elements themselves, all illustrate this principle of discontinuity. In short, Nature proceeds *from one type to another* among organic as well as inorganic forms; ...
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> ... Our geometrical analogies weigh heavily against Darwin's conception of endless small continuous variations; they help to show that discontinuous variations are a natural thing, that 'mutations' – or sudden changes, greater or less – are bound to have taken place, and new 'types' to have arisen, now and then. Our argument indicates, if it does not prove, that such mutations, occurring on a comparatively few definite lines, or plain alternatives, of physico-mathematical possibility, are likely to repeat themselves; that the 'higher' protozoa, for instance, may have sprung not from or through one another, but severally from the simpler forms; or that the worm-type, to take another example, may have come into being again and again.
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> (From *Growth and Form*, 2nd Edition 1942, p.1094)

Great advances in science have nearly always come by revealing this 'Principle of Discontinuity' through careful experiment, while formatory centre subsequently tries to take the figures and build theories which attempt to obliterate it. Thus Pasteur showed a definite line of demarcation between the world of cells and particles and the world of bacteria; and since his time another sharp dividing line has emerged between bacteria and viruses, which are again under 'different laws'.

The discoveries of the Abbé Mendel first showed the 'Principle of Discontinuity' in heredity, and the work which has followed that discovery all over the world has given magnificent corroboration of D'Arcy Thompson's prediction in the above quotation. But *still* the scientists regard mutations as evidence of *chance*, whereas we should see in them evidence of *law*. We shall have to revise all our thinking in this way.

But what we need to see first about the Law of Octaves is that this 'Principle of Discontinuity' is operative at all times and in all events of our own lives. Can you find clear everyday examples?

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