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THE VITAL FORCE

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The aim and effort of Science consist essentially in the discovery of inner significance and order of the Phenomena of Nature and utilize them for human benefit. It seeks to formulate the laws inherent in natural events and to account for them without recourse to whatever is merely magical, mysterious, mythological or super-natural. The advance of Science, in modern times as well as in ancient times meant an extension of the realm of the natural and a steady suppression of the claims of the supernatural.

There is a basic difference between the path of Science and the path of Metaphysics. Science never likes to loosen its direct link with concrete Nature—its formulations are based on directly or indirectly observed phenomena of Nature, and its inferences must have direct link with them. Whereas in Metaphysics, the formulations and inferences are based on abstract ideas, pure reasons, and so-called First Principles; and phenomena of Nature—which are expected to fit in with those abstractions—are of secondary importance to it.

This trend of Science—or perhaps better termed Scientific Philosophy—of scrupulously maintaining direct link with material reality, dates back from ancient Philosophers like Kanada, Aristotle and many others, and has persisted all through its life and advancement. Thus Aristotle (384-322 B.C.) warned—“*We should not assume any more than what we have to*”. William of Ockham or Occam (1270-1349 A.D.) repudiated any attempt

to harmonize faith with natural knowledge and asserted—"It is neither desirable nor legitimate to *assume* that some thing exists, or causes any thing if we can get along without such assumption," and also — "One never needs to prove that something does not exist, but that *something does exist.*" (Occam's Razor). Then coming to the modern ages—Francis Bacon (1561-1626 A.D.) who may be credited as the propounder of modern scientific methods, cautioned us against reasoning from the so-called first principles and the tendency to blindly follow tradition and authority (Novum Organum).

These two trends in Philosophy existing all along human civilization, became sharply defined by the 17th century, especially from the time of Newton (1642-1727) into Natural or Materialistic Philosophy of Science on the one side and Idealistic Metaphysical Philosophy (also labelled simply as Philosophy, as distinguished from Science) of thinkers of various schools, on the other. These two trends has since then maintained an exclusive existence, some times even hostile. It may be remembered, by the way, that most of the early scientists of the modern age including Newton himself were strict naturalists, scrupulously eschewing Metaphysics in their scientific work (on Astronomy, Physics, Chemistry etc.), nevertheless often indulged in supernaturalism in their spiritual and religious activities and rites and even writings.

The methods generally followed by Scientists are as follows:—

1. *Observation*—They observe closely the events and phenomena occurring in any department of Nature, and perseveringly try to discover the underlying cause and link of these events, and also its relation with other allied events. In apprehending this causative link they make various reasonable speculations which are known as—

2. *Hypotheses*—Of the various hypotheses, only that one is accepted by majority of scientists which (a) tallies with or supplements the already understood and explored laws of nature or already accepted explanations of events and phenomena ; or (b) which prove to be true by experiments and experience in the practical field with appropriate control.

When a hypothesis is sufficiently ratified by repeated experiments and experience it attains to the position of a—

3. *Law of Nature*—which forms a basis of works in the corresponding field of Nature i.e., respective Science. In this way have evolved The Laws of Motion in Physics, The Laws of Gravitation in Astronomy, Laws of Refraction, Reflexion etc. in Optics, and so on.

Thus we see that, speculation and hypothesis are not banned in Science—on the contrary, they are essential and necessary aids for advance in the search of the intricacies of Nature. But the point is that, Science can never accept them as basic truths unless and until confirmed by concrete experience and experiments. Of course, there remain vast fields beyond the regions already covered by Scientists of any department of Nature by the methods of concrete experiment or direct inference. Regarding these unexplored fields the Scientist keeps his mind open, but never submits to any absolute or supernatural Truth as done by the Idealist Philosopher.

It cannot be denied that, this relentless attachment to concrete reality by the Scientists in their search for truths about Nature has yielded overwhelming heaps of fruit, conquered considerable fields of nature for man, where the latter had been helpless victims, awe-stricken by whims of Heaven, in the pre-scientific ages; has narrowed the gulf between the Heaven and the Earth, as also between Energy and Matter, to astonishing extent; advanced a great deal towards both extremes of Infinity—the infinitely small and the infinitely large; and so on. And moreover, speed of this advancement is fast accelerating in the modern age.

In spite of these glorious achievements every field of Science is still to-day suffering in more or less degree, from **two handicaps**:—(i) back-pull of the previously explored partial truths of the past centuries which were based on *Mechanical Materialism* (most dominant in the 19th Century)—wrongly adorned as an absolute truth, controlling all the events of Nature—from one side, and (ii) confusing and mystifying ideas about supernatural powers or principles—the age-old persistent *Metaphysics*—on the other. This applies most heavily to the

most intricate, and as yet the least understood field of Nature—viz., the field of living matter—the Science of Life or Biology.

The Biological scientists have been making frantic efforts for more than hundred years to explore and explain the phenomena of living matter with the light of Mechanical Materialism. In the process, of course, in collaboration with Scientists of other branches, they have acquired great achievements in the crude material aspect of this field. They have not only explored the various physical and chemical properties of protoplasm—the material basis of life—i.e., of which life is a peculiar property, but also have even prepared synthetically in the Laboratory most of the constituents of protoplasm. The great revolutionary significance of these achievements of Science can be appreciated if one remembers that before only 1828 A.D. the constituents of living matter or products of the same—known as **Organic Compounds**—were believed to be radically different from the non-combustible, so-called inorganic compounds. Whereas the latter form of compounds could be prepared by man, as they were subject to ordinary laws of Chemistry, the Organic compounds were believed to be beyond the scope of human manufacture—as they fell beyond the ordinary laws of chemistry and were produced by the influence of a peculiar omni-potent force—termed as **Vital force**. This mystery of organic compounds was exploded in 1828 when Wohler succeeded in obtaining **Urea** (an excretory product of certain animal organisms) from Ammonium Cyanate—an inorganic compound easily produced in the Laboratory. Since then upto date, almost all of the so-called Organic compounds—believed to be under the influence of a supernatural force came under the control of man, easily manufactured by him. *Pari-passu* with these, there went on the exploration of the Physico-Chemical properties of colloidal mixtures (which is the form of Protoplasm also)—as well as the explanation of the various properties of ultramicroscopic particles of protoplasm (viz. absorption, adsorption, diffusion, surface-tension etc., etc.).

But, after all, howevermuch these marvellous developments in the field of Physics and Chemistry or rather Bio-physics and Bio-chemistry have gone deep in appreciating, describing and

explaining the material aspect of living matter still, up-to-date, they prove far too inadequate in describing and explaining any of the intrinsic phenomena of that property of living matter, which is known as life. Even on the question of the simplest and most basic phenomenon of Life viz. metabolism, Chemistry and Physics cannot as yet explain the selective absorption and elimination of protoplasmic molecules, what to speak of the far more complicated problems of growth, development, reproduction, death, behaviour, heredity, evolution, resistance and susceptibility to diseases (natural or medicinal), etc. etc.? Thus Science, in the 19th Century especially towards its later half began to realise the special significance of the emergence of a *new aspect in matter when life had begun* in the history of the Universe. This new aspect cannot be described in terms of non-living crude matter (inorganic or organic), nor does it obey the Laws of the latter (Laws of Physics, Chemistry, Mechanics etc.)—although of necessity it can neither antagonize those Laws, as its crude material aspects are bound by them. Thus Biology emerged and evolved as a separate science with its own terms, concepts and Laws. And this new science is fast advancing in this century so much so to-day, as it has enabled man to manufacture new species by his own effort instead of depending on a creator.

Notwithstanding all these marvellous achievements Biology is still lagging far behind the overwhelming progress of other older branches of Science, and many of the phenomena in this field of Nature still remain unexplored and inscrutable with respect to their essential nature and cause. Of many such obscure spots in this field we may mention a few, such as—the selective affinity and repulsion of protoplasmic particles; the differentiation of cells and tissues from the unicellular zygote to multicellular or multi-systemic organism; the *wholeness* of the Organism with its myriads of multiform and multifunctional cells, tissues and systems—perfectly balanced and co-ordinated—enabling the Organism to behave as a single unit—as a whole *individual*. In these problems Biology cannot but remain empirical and simply descriptive. And in these descriptions and understanding, Biology is compelled to use certain terms, con-

cept and categories which are essentially of its own and which are at present irreducible.

Thus, for describing and understanding the perfectly co-ordinated structural and functional activity of the myriads of multiform cells of the organism a co-ordinating force is assumed. But this assumption is perfectly scientific and tallies with the scientific tenets of Aristotle, William, Bacon and others; as this assumption is based on observed facts of life and not on any supernatural First Principle. This force is named most appropriately the **Vital Force**—at least there does not appear any better term to express its full meaning and implications. But the scientific significance of the term will be mystified, if it is equated with the terms like "*entelechy*", "*elan vital*" etc. of the Metaphysical Philosophers. This idea may be called "**Methodical Vitalism**" to distinguish clearly from the "**Positive Vitalism**" of Metaphysical Philosophers. The significance of maintaining this distinction clear cannot be over-emphasized in view of the fact that Science has a deliberate purpose and constant effort to dive into these until-now unreduced concepts, to unravel their inner significance *by its own method* instead of lying complacent believing in abstract mystic principles, and following the speculative method of Metaphysics.

It is by dint of this scrupulously objective attitude of Science that Pavlovian Physiology to-day is not only fast exploring the dusky field of Mind which had so long been an almost exclusive domain of Idealist Philosophy, but also, more over, trying to solve the problem of co-ordinated activity of the whole individual in its environment.