

# Palaeobotany: a philosophy of life

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## ABSTRACT

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The boundaries between science and philosophy are not as sharply defined as they are usually thought to be. In the pursuit of science a stage comes where it becomes difficult to decide as to where the domain of science ends and that of philosophy, religion and spirituality begins. Palaeobotany is no exception to this.

The basic aim of palaeobotany is to understand and build up history of plant life on our planet. However, if approached with an open mind, it also provides us an opportunity to understand our own position on earth and also in this universe in terms of time and space. This helps us to look at the world around us with an entirely new viewpoint and also to decide our priorities and aims in our own life.

**Key-words:** Palaeobotany, philosophy.

Far away from the maddening crowds and the artificiality of the civilization, on a clear moonless night, standing in the middle of the vast expanse of the serene desert, lost in the peaceful tranquility of his own soul and gazing in awe at the majestic boundless sky studded with innumerable shining objects, and at the same time looking at the bloom of the tiny desert flowers near his own feet, any intelligent person with even an iota of feelings in his heart is bound to come face to face with some of the simplest, but most profound, questions about the universe and his own place in it. What is this? Where has it come from? When? How big it is? What is living? What is non-living? What is that Principle which separates the living from the non-living? What is the future of the universe and finally, what is my own position in it? The same questions must have puzzled the mind of the prehistoric *Homo sapiens* looking up at the sky standing on a hill-top. The very flaming up of these questions in his mind was the most important event in the history of the mankind. At that instant, transcending himself and nature, he left behind his animal forebears and dived into the realm of scientific enquiry. That was also the beginning of philosophy and religion and the meeting point of all the three. Since then a chain of scientists, philosophers and spiritual seekers from time to time have tried to give answers to these perpetual

questions and have watched their own answers change.

The boundaries between science and philosophy are not as sharply defined as they are usually thought to be. Any sincere student of science is bound to realize that in the pursuit of science a stage comes where it becomes very difficult to decide as to where the domain of science ends and that of philosophy begins. For this very reason, Professor Birbal Sahni termed all the true scientists as "Seekers after Truth", a term usually used for philosophers and spiritual seekers (Sahni 1940). Professor Sahni was well aware of the limitations of scientific pursuit. He, therefore, could declare in no uncertain terms: "The student of science lives in the world of fragments. Nothing in this vast array of visible things we call Nature appears to our restricted vision as a complete picture. True Artist that He is, the Creator never reveals the whole of his design at once. Like the child with a jigsaw puzzle we try to piece together the fragments of the picture" (Sahni 1940). To me, it appears that not only our vision is restricted but each of us has his own looking glass to look at the things around us. Naturally, each one of us forms a different picture of the world we live in. With this background, let us ponder for a few minutes if the science of palaeobotany can provide us a new way to look at this world. The thoughts expressed below are an

amalgamation of many of the ideas expressed by Venkatachala et al. (1988) and Bande (1999). It is bound to happen because one does not change his philosophy of life frequently.

Many a times, palaeobotany is termed as a "Dead Science". But is there any branch of science, which really deals with life? Let us think about it. In this universe, there are two basic principles: (1) Matter and (2) Life. The Matter without life matters very little. It merely exists. And Life also cannot express itself unless it is associated with Matter. There comes no problem to understand the Matter. In fact, all the material scientists, i.e. the physicists, chemists, etc. deal with the study of the matter only. On the contrary, biologists, including medical persons, claim that they deal with life. But they are highly mistaken. A little thought in depth, and even they will agree that they too are dealing with that matter only through which life is expressing itself. The eternal Life Principle which separates the living from the non-living never comes within the limitations of their study, it always remains untouched. Palaeobotany also is no exception to this and thus it too is only as much a "Dead Science" as any other branch of biological science.

Palaeobotany can broadly be defined as that branch of life science, which deals with the origin and evolution of plant life through ages with the help of fossils. The basic aim of palaeobotany is to understand and build up history of plant life on the earth. However, it also provides us an opportunity to understand our own position on earth and also in this universe in terms of time and space. This helps us to understand our past, as one of the species, on this planet, to look at the world around us with an entirely new viewpoint and also to decide our priorities and aims in our own life. It should also be remembered that the Past is the key to the Present and Present is the foundation for the Future. And those who do not understand, respect and learn from their past have no future, Nature never forgives them. So, let us first try to understand our own position in this universe in terms of Time.

According to the widely accepted Big Bang theory postulated to explain the origin of the universe it is believed that the universe at one point of time was

condensed into an ultra-dense, ultra-small primeval atom or primeval nucleus. How this primeval nucleus was created or how all the matter in the universe was packed into an inconceivable density? Science has no answer.

This primordial unit exploded about 15 Ga ago with a Big-Bang and gave rise to Energy and Matter, Space and Time. This Big-Bang theory, widely accepted by the scientific community, comes fascinatingly close to the postulates made by the ancient Indian seer-scientists who believed that in the beginning there was only the Hiranyagarbha (primeval nucleus, the source of all energy) that exploded ("Jadasphota" in Tantra) accompanied by the eternal sound "Om" to give rise to the universe.

Even today no hard facts are available regarding the origin of the universe. It is presumed that  $10^{-43}$  second After the Big-Bang (ABB) the universe was just  $10^{-28}$  centimeters in diameter. At  $10^{-35}$  seconds ABB the universe expanded to  $10^{-24}$  centimeters and the process of its expansion and conversion of energy into matter began. The size of the universe at that stage was that of a soft ball.

The universe grew to the size of our solar system  $10^{-6}$  seconds ABB. About 250 million years ABB the complex process of separation of radiation from matter took place and light could travel through space. The matter, which was uniformly spread in the form of a thin gas, broke up into giant gas-clouds, the proto-galaxies. This gas soon condensed into stars and formed the galaxies (Venkatachala et al. 1988). The galaxies, perhaps 10 billion in number, comprise of innumerable solar systems, big and small, with their own stars and planets. Our galaxy Aakashganga or Milky Way was formed around 10 Ga ago. Our solar system came into existence probably around 4.8 Ga before the present (BP), condensed from a cloud of hydrogen and helium. The Earth possibly formed soon thereafter.

Unlike the time and origin of the universe and the long period following that, the history of the last 4.5 Ga on earth is documentable to some extent. To understand it in a simple way let us assume that the solar system is only a day old and accordingly one our of the clock represents a time period of 200 million years (Ma)

(Venkatachala et al. 1988, Plate 1). The zero hour naturally started 4.8 Ga BP. On this time scale the earth came into being about 90 minutes after the solar system was formed, i.e. about 1.30 a.m. Next 2 hours and 30 minutes, i.e. 500 Ma were spent in cooling of the surface and in the formation of terrestrial rocks. During the course of cooling of the surface large amounts of water vapour and gases were released. These condensed and fell as torrential rains for ages and formed the mighty oceans. The major agencies responsible for land erosion, viz. air and water became active by the end of the 5<sup>th</sup> hour and this erosion of terrestrial rocks and their re-deposition in the ocean gave rise to the first sedimentary rocks so important for palaeobotanists and palaeontologists. This is more or less the hour when we start getting some evidences for the first appearance of life on our planet. How this most important event in the history of our planet, which makes it unique at least in our solar system, the appearance of life in an ocean of lifeless matter, came about? Science has no definite answer.

Considering that earth came into existence 24 hours ago, the plant life, that developed in the sea as early as 5.00 hours, remained confined to water till as late as 21.45 hours, or 450 Ma BP. Around 21.45 hours began the colonization of land by plants and then the events moved in quick succession. The vegetation that has formed most of the Indian coal is only 1 hour 15 minutes old. The flowering plants or the angiosperms came into existence only about 30 minutes ago. The mighty Himalayas are only about 7 minutes in age.

And where was the *Homo sapiens* during all this time? He appeared on the scene just about 30 second ago. On this time scale the first civilization, that of Indus valley, is only 10<sup>-1</sup> second old. Now we are at the end of the day. Are we going to see another day on this planet? Looking at the way the man, the so called most evolved and intelligent organism on this planet, is destroying the nature, playing havoc with the environment and ruthlessly killing the members of his own species just for the sake of his selfish ego, dogmas and beliefs by using the weapons of mass destruction developed by himself, it seems to be a remote possibility. The question is not whether the man will survive but

will he perish alone or take entire living world with him? Or, will he let Nature take its own course? Who knows? May be He knows, or even He knows not! Humans are so unpredictable.

This is our place in this universe in terms of time. Now let us ponder over our position in this world in terms of space. As we all know, the earth we live on is a planet revolving around the sun which in itself is a medium sized star among millions of similar stars of our galaxy, i.e. Milky Way. There are millions of such galaxies in the universe separated from each other by distances measurable in terms of thousands of light years. A light year is the distance traveled by light in one year and the speed of light is about  $3 \times 10^5$  km/second. These galaxies are still moving away from each other at a great speed and the universe is expanding continuously. In short, the universe is not only bigger than what we think, it is much bigger than what we can think or comprehend. In such a vast and inconceivably universe, the earth is comparable only to a grain of sand in the Indian Ocean. But this same universe about 15 billion years ago, just 10<sup>-43</sup> seconds after the Big Bang, was only 10<sup>-28</sup> centimeters in diameter. In other words at the time of the Big Bang, the whole of this universe including Time and Space was concentrated at an inconceivably small single point called a singularity in Mathematics. In terms of philosophy we can say that before the Big Bang it was in an unmanifested state of existence and was manifested after the Big Bang. But what was "That" which was in existence before the Big Bang which manifested itself in the form of this infinite, unfathomable universe with the Big Bang? Science has no answer. Here the domain of science ends and that of Religion, Philosophy and Spirituality begins. If we can look at the universe with this point of view, we can realize to some extent its unfathomable nature in terms of time and space. We can realize how insignificant we are as a species or as an individual in it. Then only our own pretty ego will be dissolved, we will feel humbled.

So, start with the study of fossils. With the help of this study, build up the past flora of that area. From flora, try to understand the palaeovegetation, palaeoclimate, palaeogeography, history of the continents, history of the earth and finally origin and

evolution of the whole universe. I call this yoga of palaeobotany. This was the spirit with which the Birbal Sahni Institute of Palaeobotany, Lucknow (BSIP) was started by its founder Professor Birbal Sahni. He was not a temple going religious man as we normally understand, but for him science in general, and palaeobotany in particular, in itself was a religion, a way of life. That is why on the occasion of the Foundation Stone Laying Ceremony of the Institute he could say: "For what is it, after all, that pious men worship in a stone which they place in a temple, but an idea, or an ideal, a great truth, a hope or a wish for a higher existence, whether in this world or in the next? And what is it that this stone symbolizes? The great fact of the antiquity of plant life on the globe, the intellect of man ever striving to bring that fact more and more clearly to light, revealing different stages not only in the evolution of the plant kingdom in a more and more orderly and understandable sequence, but also the evolution of his own poor understanding of these truths. The very construction of it, the flaws and imperfections in its entire make up, the labour that has gone into its preparation, are all but symbols of our imperfect and helpless efforts at constructing something new, something worthwhile" (Sahni 1949).

If we can ponder over the meaning of these deep and profound words of Professor Birbal Sahni, we will understand that for him this institute was not to be only a research centre but a Temple - a temple to understand Nature, understand it and to feel humble before it. That

is the spirit of a true palaeobotanist - a "Seeker after Truth".

If one can approach the so-called "Dead Science of Palaeobotany", or for that matter, any branch of science, in this spirit, with this attitude, this humbleness, for him all differences of nationality, religion, faith, dogmas cease to exist. Such a person becomes one with the Nature, one with the whole universe and ultimately goes beyond it to become one with that Supreme Principle, that Supreme Being from where everything is manifested and into which everything is dissolved. Such a person leaves behind the boundaries of science and becomes a traveler on the path that leads us from "Untruth to Truth", "Darkness to Light" and "Death to Immortality".

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