

## A Swiss chemist and an American writer

“I would now like to present a few thoughts that show how, in my case, it was above all my knowledge as a chemist that disclosed a natural scientific view of life to me that gives me security.

“When, in my garden or while taking a walk, I stop to meditate on a plant, I not only see what a non-chemist sees, its shape, color, its beauty; thoughts about its inner construction, its inner life and the chemistry and the physical process they are based on also force their way into my mind. The plant is composed of innumerable individual chemical components. I can visualize their chemical formulas. To name only a few: the composition of the skeleton substance, the cellulose made of saccharose rests, then the complex formula of the leaf green chlorophyll, consisting of several nitrogenated hydrocarbon rings with a central magnesium atom, furthermore the structural formula of the colors in the blossom, for example the formula of a blue color, of an anthocyanin. Most of these plant components can also be produced artificially, by means of chemical synthesis. I know the efforts necessary for this in a laboratory, the construction out of reactive groups of atoms via many intermediary steps, at high or low temperatures depending on the type of respective chemical reaction, sometimes in a vacuum, at times under high pressure, etc. Chemist Hans Fischer Munich, who together with a whole school of assistants and students, supplied us with the main body of work for explaining the structure of chlorophyll, was rewarded with a Nobel prize. My respected teacher and doctoral advisor, Professor Paul Karrer, who worked on explaining the structure and synthesis of blossom colors, on the anthocyanins and the carotenoids during the twenties and thirties, was also rewarded with a Nobel prize for his work. And all of these achievements were only possible on the basis of the knowledge acquired by chemists of preceding generations. In elaborating in such detail to show the enormous chemical effort hidden behind the synthesis of the numerous substances of each of the numerous substances of which a plant is composed.

“And every little blade of grass is capable of this effort. It produces these materials—the work of hundreds of chemists for many years would not be sufficient to synthesize them—quietly and humbly with light as its only source of energy. A chemist has to marvel at this.

“But nevertheless, it is chemistry, and we know its laws today. We can imitate them even if it is incredibly difficult and means we have to tap all our possibilities.

“But while observing the plant I am concentrating on this moment, other thoughts as well force their way into my mind. They relate to the manner *in which chemistry is made subservient*, something that cannot be explained, it can only be described. Place and time enter into the equation, things that have nothing to do with chemistry anymore. After all, each of the uncountable synthetic processes has to take place at a given time and a given location so that the predetermined outer shape of the inner construction of the plant, its different organs with their various functions can be formed. This adds a multitude of physical processes and forces, such as diffusion, absorption, capillary phenomena, to chemistry. All this is unimaginable without a blueprint and without a coordinating power.

“Cell physiology and molecular biology offer an explanation for this. The blueprint is preprogrammed in the chromosome map of the nucleus of the cell. It is written down by means of the four letters of the genetic code, by means of the four different DNA-molecules.

“These are incredible scientific insights into a wonderful mechanism. It is important, however, that we comprehend that this only explains the mechanism; we know the four letters of the biological alphabet. The decisive question about the origin of the text remains unanswered. In addition, we have to take into consideration that chemical structures, such as the one represented by the nucleic acid group of DNA, can, by their very nature, only direct the chemism of an organism, they cannot determine its shape.

“In conclusion, I would like to talk about a third kind of thought process that goes through my mind as a chemist while meditating in the garden or while walking through the woods. It revolves around the relationship in the chemical structure of human and plant organisms and the inclusion of man in the biocosmos expressed in it.

“Every higher organism, be it plant, animal, or human being, stems from a single cell, the fertilized ovum. Cells are the smallest units of life of which organisms are constructed. Plant, animal, and human cells not only display a similar structure—consisting of the nuclei protecting the chromosomes, the former embedded in the protoplasm and the whole contained by the cell membrane—they also have a largely identical chemical composition. In spite of the innumerable variations in the chemical structure of the various organ parts and tissue types, in their totality the same classes of organic chemical compounds are involved in the material composition of the bodies of humans and animals as in those of plants. In both the worlds of plants and animals these are proteins, carbohydrates, fats, phosphatides, etc., they themselves being composed of the same simple structural units, the amino acids, sugars, fatty acids, etc. that are the main elements forming the material basis of organisms.

“This similarity of material composition exist in relationship to the great metabolic and energetic cycle of all things living in which the realm of plants, animals, plants, and humans are united. The energy that keeps this cycle of life going is supplied by the sun. Primarily it is nuclear energy created by the transformation of matter into radiation energy during nuclear fusion. The daystar transmits this energy to the earth in the shape of light. The plant, the green carpet, the vegetable kingdom, is capable of absorbing this immaterial flow of energy in material susceptibility and of storing it in the shape of chemically bound energy. During this process, the plant transforms organic matter, water, and carbonic acid onto organic substances with the help of the leaf green chlorophyll as the catalyst and light as the energy source. This process, called the assimilation of carbonic acid, supplies the organic construction units—sugars, carbohydrates, amino acids, proteins, etc.—for the assembly of the plant, and thus of animal organisms as well. *Energetically, all life processes are based on this tight absorption by the plant.* When the nutrients stemming from plants are combusted in human organisms to obtain the energy necessary for the life processes, the reversed process of assimilation is taking place; the organic nutrients are transformed back into anorganic matter, into water and carbonic acid, while releasing the same amount of energy originally absorbed in the form of light. Even the thought process of the human being is supported by this energy, so that the human spirit, or consciousness, *thus represents the highest, the most sublime energetic stage of the transformation of light.*

“I have taken the liberty of recapitulating these basic insights of the natural sciences, facts that can be looked up in any elementary text book on biology, specifically because they are no longer given appropriate attention due to their general familiarity. They are part of a body of knowledge that only receives consideration on a strictly intellectual level. Moon landings, space travel, science fiction books and movies, in which living nature is not even shown any more, have a greater influence on the minds and imagination of the inhabitants of our industrial society and define their values of life and perceptions of reality.

“However, to someone with close ties to nature, to someone who through meditation, lets these natural scientific findings come to conscious life, the tree or the flower he is contemplating no longer appears simply in its objective beauty. Rather, he feels deeply connected to it as a fellow creature, as a living being created by light.

“I am not talking about some sentimental enthusiasm for nature, about a ”back to nature” in Rousseau’s meaning. Indeed, the roots of that romantic movement—with its search for an idyll in nature—can be found in man’s feeling of being separated from nature.

“What I have tried to describe using the example of our relationship to the world of plants is the elementary observation of the actual extant unity of every living thing, the development of an awareness of security in a common basis of creation. The more original flora and fauna of earth have given way to a dead technological environment, the rarer this kind of exulting experience will become.”

Dr. Albert Hofmann, *Insight - Outlook*. © 1986 (English © 1989)

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And a few minutes later I read this:

“I am sitting under a sycamore by Tinker Creek. I am really here, alive on the intricate earth under trees. But under me, directly under the weight of my body on the grass, are other creatures, just as real, for whom also this moment, this tree, is ”it.” Take just the top inch of soil, the world squirming right under my palms. In the top inch of forest soil, biologists found “an average of 1.356 living creatures present in each square foot, including 865 mites, 265 springtails, 22 millipedes, 19 adult beetles, and various numbers of 12 other forms... Had an estimate also made of the microscopic population, it might have ranged up to two billion bacteria and many millions of fungi, protozoa and algae—in a *mere teaspoon* of soil.”

Annie Dillard, *Pilgrim at Tinker Creek*, © 1974

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And all that LIFE the same chemicals, the same atoms, the same plan, products of the energy of the one sun. And then to think of the enormity of all those billions, trillions, of life forms interacting. Eating each other and needing each other.

Modern Man thinks himself outside of it all and so gets scared by the chaos, wants to control, simplify what is. And so he is killing the planetary ecology.

From within the chaos, however, we feel awe at how all this LIFE works, how it *lives*. The miracle of Life in a trillion forms and yet the same stuff, arranged differently, all ultimately fed by the sun.

HOW CAN WE BELIEVE THAT WE ARE *NOT* PART OF ALL THAT IS,  
OUR BROTHERS AND SISTERS, COUSINS, NEPHEWS,  
ALL OUR RELATIONS

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12 september 2009