Questions to the reader chapter one

1. Do you accept the view that life on Earth originated from inanimate matter without any contribution from transcendent power?

2. Do you accept the idea that biological evolution is mostly shaped by contingency? If not, what would you add to this picture?

3. Are you at peace with the idea that mankind might not have existed; and with the idea that we may be alone in the universe?

4. Do you accept the idea that a man is made up only by molecules and nothing else?

Questions to the reader chapter two

1. Do you believe in the utility of the attempt to give a definition of life?

   If not, how would you go for answering the following questions?

2. Is an apple – hanging on a tree – living?
   And when it falls to the ground – is it still living?

3. What is the difference between a living horse and a one which just died? They have the same amount of RNA, DNA, and all nucleic acid reactions are working for a while. Why the dead horse is dead?

4. Do you accept the definition (operational description) of life given by the Greenman; and in particular the statement that it could have been given also a few centuries ago?

Questions to the reader chapter three

1. Do you consider possible that microfossils or at least genetic materials may be found in meteorites and/or comets?

2. Are you for an *ex-lege* explanation for the onset of homochirality – or for a stochastic one? And: is your choice due to a sound scientific argument, or to an intuition?

3. Do you have an idea on how ATP might have been produced in early biochemistry? And in particular: before or after the advent of enzymes?

4. The space mission Cassini, destined to explore the neighborhood of Saturn, will accumulate a large mess of scientific data. It was extremely costly. With this money, one could have constructed hundreds of hospitals and schools in Africa. Where would you have invested that amount of money?

Questions to the reader chapter four

1. Would you encourage experiments according to the scheme developed in this chapter for explaining the emergence of macromolecular sequences? If not, what would you add/modify?

2. Do you favor a double origin of macromolecular sequences (one for proteins, one for nucleic acids); or the view that one derives from the other in a causal way (genetic code or something similar in primordial time)?

3. Do you see any way to make a stereoregular polypropylene displaying optical activity?

Questions to the reader chapter five

1. **Do you accept the idea that self-organization in prebiotic time was the main driving force for the formation of the first living cells? (And if not, what would you add to the picture?)**

2. Suppose to divide a prokaryotic cell into its components, say ten different fractions, obtained by mild procedures; and then mix them all together. Would the living cell self-organize again? If not, why not? And: which kind of cell would you rather choose to run this kind of experiment?

3. Is the folding of proteins activated by chaperons under thermodynamic – or under kinetic control?

4. Are you convinced of the fact that finality is not an issue in the field of self-organization?

Questions to the reader chapter six (emergence)

1- Do you accept the idea that in the future unimaginable novel properties will emerge from the study of new composite materials or new synthetic complex systems?

Do you accept the idea that human consciousness is an emergent property of a particular neuronal and physical human construct?

After reading this chapter, do you adhere more to the view of "strong emergence" – or "weak emergence"?

QUESTIONS TO THE READER CHAPTER SEVEN (LIFE)

1. Suppose to find a colony of bacteria with a metabolic life but in which you are unable to measure any self-reproduction. Would you call them alive?

2. The above mentioned colony of bacteria without measurable self-reproduction would not be able to evolve. It would be life without evolution. Would that be acceptable to you?

3. What does your intuition say: did macromolecular self-replication systems come first in the origin of life; or should they be seen as the product of a mature cellular or proto-cellular metabolism?

Questions to the reader chapter 8 (AUTOPOIESIS

1- Do you find autopoiesis satisfactory as a blue-print of cellular life? (If not, what do you feel is missing?)

2. Do you accept the notion that cognition is a stratified property with different hierarchic levels of complexity – going from microorganisms up to men – to become here perception and consciousness?

3. Do you accept the argument that autopoiesis is a necessary but not sufficient condition for life?

Questions to the reader from chapter nine (compartments)

1. One can prepare by extrusion liposomes of different size, and they remain stable in their respective dimension. What about the question, of whether liposomes assume a structure that corresponds to a minimum of energy?

2. In the case of mineral particles, by making them smaller and smaller, you gain a larger and larger total surface. Is it so also with the total surface of micelles and vesicles? And how is it with the total volume?

3. Microorganisms have been solubilized in reverse micellar solutions. Would then the following experiment be possible: make reverse micelles in raw naphtha as organic solvent, have a sulphur-destroying microorganism in the water pool of the micelles, and clarify in this way naphta from, say, undesired sulphur containing compounds?

4. Make an organogel with lecithin and entrap an enzyme in the aqueous gel compartment. Can you make in this way a column for enzymatically induced chemical transformations?

Questions to the reader chapter 10 (liposomes)

1. Phosphatidylnucleotide liposomes have been prepared and partly studied). Those are liposomes coated by nucleic acid head groups
Suppose you prepare one such a family of liposomes having adenine, the other family having thymine: would the two vesicle systems recognize each other and fuse?

2. In the competition for growth of two different families of vesicles with different sizes, does it make a difference if the vesicles are empty (only water) or filled (containing biochemicals)? And how would you device an experiment, so that the vesicles content is really determining for a faster growth?

3. The fusion of vesicles with opposite charges appears to be an efficient method to increase the molecular complexity. Suppose to distribute all enzymes of the Krebs cycle into five or six different charged vesicle families (some positively, some negatively charged) – then mix them.
Would the Krebs cycle be reconstituted?

4. Vesicles can self-reproduce, however it is argued that there is no information content passing from one generation to the next. What do you think: is information really so important for self-reproduction of early protocells?

QUESTIONS TO THE READER FROM CHAPTER ELEVEN

1. Are you confident that semi-synthetic living cells shall be created in the laboratory on the basis of only 30 0r 40 genes? If not, can you give some scientific reasoning (as opposite to dubitative feelings) on why not?

2. There are artificial life approaches to the minimal cell, with the idea of creating forms of life other than those based on nucleic acids and proteins. Do you believe that this is possible? And in which direction?

3. Do you think that the construction of the minimal cells may give rise to possible hazards and bio-ethical problems?