

**Viewpoint of biosemiotic in biological cases**  
**Perspectivas de biosemiótica en casos biológicos**

**Gunther Witzany, 2007. The Logos of the Bios 2. Bio-Communication.**  
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This book, like the first volume, is basically a collection of papers with the principal aim of offering the practical applications of the theory presented in volume 1. In consequence, this review will be, also, intends chapter by chapter.

The first chapter intend to show communication in plants under the biosemiotic paradigm, which involves sign processes that are realized among plants of different species, plants with other organisms, and also among cells, and, even, in cells of the same plant. To that aim the author provides interesting examples in each kind of interaction. What is worth to note is the proposition that chemical molecules function as signs and that they are interpreted which implies that they are differing from molecules that not form part of messages, which are noise. In connection to this it should be noted the sense of the term semiochemicals that the author specifies, he points out that it must embrace all chemicals which are involved as signs, in sign-mediated interactions in and between organisms. Which is also interesting is the similarity between plants and animals in the developing of immune substances and even more the synapse-like communication among all parts of the plant and recognition in neuronal-like networks, that are a possible explanation of some kind of memory shown by plants, all this could be part of an underlying principle that could be called the relativity constancy of patterns. What seems something misleading is the assertion that plants have a decentralized nervous system which seems not proved.

The second chapter is dedicated to the communication in fungi under the biosemiotic perspective. Here there are also nice examples illustrating the theme, of all these which is very interesting to be noted is the relationship between viruses and fungi which is a unique one different to the relationships among viruses with animals and plants being this a possible indication of coevolution between viruses and fungi, also it shows the relevance of cooperation and the tendency to structuration that might be widespread in nature. What is also reliable to note is a pattern followed throughout the whole of the signalling process which states that fungal organisms coordinate all their behavioural actions utilizing a core set of chemical molecules, and the distinction of the biosemiotic perspective differentiating the three levels of rules employed in signalling against former systematisations that investigate only combinatorial rules of meaning and functions.

The third chapter is dedicated to communication processes within and among corals, these include also organisms of all phyla that populate the shallow-waters of tropical ecosystems. As in the previous chapters this abound in nice examples illus-

trating the points treated. One of the interesting points tried in this chapter is the striking similarity between coral reefs and terrestrial tropical ecosystems which makes us to think one more time in the relative constancy of patterns. Also it is interesting to note that what permits the coral to survive in the long term are the communication processes and relationships with the surrounding life-world rather than the individual organism. It is established that to the success of these processes all participants must obey the semiotic rules, though these rules are not free of problems that may disrupt the life processes. This chapter ends with an interesting appendix on bioerosion which shows the very important action that bioeroders do on the coral reef creating a diversity of habitats, contributing to the sculpture of the reef, and producing sediments though if the transpecific communication is distorted the activity of bioeroders might trigger the decline of the reef.

The fourth chapter is dedicated to the distinct communicative competences of bacteria on all levels. One of the interesting points presented is that referred to the importance of viruses in the evolution, diversity, and competences of bacteria via the horizontal gene transfer and the emergence of the symbolic DNA from remnants of viral integration success which are part of a genome editing meta-code that possesses higher order regulatory function for the same genetic data-set, which, for the future, represents the pathways for inheritance of acquired abilities all this is also remarked by Goldenfeld and Woes (2007) in a very interesting and insightful essay. What is also worth of noting is the fact that the evolution of bacteria was not a random event of chance mutations and their selection but transfer of whole genes and gene-blocks, and the fact that the essential results of genome editing are not emerged randomly through chance mutations and their selection but through real viral competences. Both facts are lucidly illustrated. Finally, it is necessary to emphasize what is mentioned about communicative competences of bacteria enabling them to develop, organize, and coordinate rich social life; this is also shown and enriched by Shapiro (2007) in a lucid article.

The fifth chapter is dedicated to the natural genome-editing competences of viruses, this is developed using three evolutionary steps that of the eukaryotic nucleus, the origin of the adaptive immune system, and the innovation of placental mammals in all of these the very important action of viruses is clearly stated under the biosemiotic perspective. Which is of particular interest is the proposition that the evolutionary novelty is not randomly a derivation of chance mutations as largely has been considered, but a precise genome editing by omnipresent viral agents being this built on combinatorial rules and interactional contexts which determine differences in the semantic context. Thus evolutionary history is not the result of a summation of chance mutations of the genetic text with its associated selection, but, in the words of the author, "it is a permanent and competent processing of genetic sequences to acquire previously unknown

abilities and to ward off competing parasites via genomic innovation". What is disputable is the proposition that viruses are living beings, though they could display varying survival strategies differing in agree of their host this do not seem necessarily a characterization to qualify an entity as alive.

The sixth chapter is dedicated to the serial endosymbiotic theory (SET) and its biosemiotic update. SET gives a turn in the way we see the evolutionary process from ramification to merging, but the author criticise the use of the classic language of mechanistic biology as imprecise puntualizing that it describes the altered states of matter and not the semiotic aspects of genome editing. Making emphasize in the fact that it is a multi-leveled, generative DNA-processing which is involved instead of "fusion" (the quotations marks by the author) emphasizing that sign processes are always related to "life" functions. An item that is of great interest is the one referred to language and communication which offers some very interesting ideas that merit an analysis which here because of a lack of space is not possible. Of all this it seems that the author does not make a clear distinction between language and communication though he makes clear that both depend on sign usage, also after giving a list of the prerequisites for successful communication he establish that "only with such an (*universal-*) *pragmatic* concept of language and communication..." which is not correct because a list of prerequisites is not a conceptualisation of something. One thing that his discourse seems to raise is that for a real understanding of nature it might be necessary, if not the creation of a complete new language, at least the creation of new signs (words and structures) which may go beyond the mathematics and verbal language that we have at this time, this is also puntualized in

the essay by Goldenfeld and Woese (2007). One final point worth to mention is that the author in proposing a difference between living and non-living nature says that life depends on sign-mediated interactions which is incorrect if we think in life as opposite to death, probably he is referring to organic living nature which is commonly mistakenly equated with life, being the mistake to confound the possessors: the organisms with the possessed: life.

The last chapter tries on the *Unwelt* concept supplemented by the *Mitwelt* concept and goes on examples of these concepts. Of all these what calls for special attention is the inheritance of the geMetaCode which constitutes the 97 percent of the DNA having higher order regulatory and constitutional functions, the importance of this geMetaCode is exemplified with the capacity of plants of overwriting the inherited genetic code reverting to that of their grand or great-grandparents. This is evident in situations like stress. Therefore, perhaps, we might talk of an stress evolution too.

The book finishes with a short epilogue reinforcing and summarizing the ideas of bio-communication.

At the end one feels to having read a nice book with interesting propositions supported by a good deal of empirical data. In this volume the English appears improved respect to the first volume, though there are some grammatical and spelling mistakes. The great majority of figures lack of a reference in the text this is the same for the only one box. Again it has the same great fault of the first volume there is not index. A better proofreading has been necessary. Something that merits to be appreciated is the photograph on the cover.

#### Literature cited

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