Review of Ladislav Kovàc's "*Closing Human Evolution: Life in the Ultimate Age*" Springer, Heidelberg, 2015, ISBN 978-3-319-20659-2

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Dr Ladislav Kovàc has had a very rich intellectual life. After initial studies in biochemistry, his fate in Czechoslovakia in the post-Stalin era led him to study psychiatry and ethology, and to develop a friendship with Konrad Lorenz. This varied career in biology plus senior positions of responsibility in science and diplomacy placed him in an ideal situation to carry out in-depth investigations and reflections on biology and evolution, the evolution of life in general and of the human species in particular, addressing questions on the future of mankind, which forms a central issue the present book.

Kovàc has adopted a stance focusing on three approaches that can be expressed as questions: What is life? What is human nature? What future are we likely to see? Addressing the first question, Kovàc presents the views of contemporary "philosophers of life" on the current state of evolution. While there is no scientific answer to his basic question "Why is there something rather than nothing?" (p. 1), there is a better interpretation of the second law of thermodynamics causing an increase in entropy. A number of authors (e.g. Prigogine, or the late Jacques Tonnelat, a specialist in thermodynamics (Tonnelat, 1995) have presented evidence showing that the general law allowing for an increase in entropy can, in non-equilibrium situations, include specific developments where entropy is reduced locally. This is specifically the case of life processes on Earth, and may even occur elsewhere in the universe, perhaps making them universal phenomena and part of a continuum between non-life and life forms. Seen from this angle, the appearance of life stands as a correlate of the second law of thermodynamics when applying locally in non-equilibrium situations, allowing living structures "not only to maintain their onticity but also to grow in size, to break up to give rise to self-similar structures." (p. 13). Darwinian theory, in its broad lines, can thus be seen as the reverse side of the second law of thermodynamics, as a permanent opening towards structures not governed locally by entropy, as "a dynamic process of generation of structures and of massive self-organisation" (p. 20). Such evolution moving in a given direction can give rise to more complex structures than those previously existing, with adaptation gradually advancing towards greater mental capacities and with more complex structures, e.g. as vertebrates, bees and octopuses, developing greater cognition which, in turn, provides acceleration, "speeding up biological evolution" (p. 26): "the growth of knowledge, epistemogenesis, has a character of snowballing." (p. 27)

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The second issue in the book, focusing on the specific status of human knowledge, is devoted to mankind. Human intelligence, while often producing non-rational or misleading behaviour (described by Kovàc as "beetle-like", p. 38), brings something quite new and different from animal intelligence, producing new and original cultural developments and artefacts. A form of continuity may be seen, the emergence of human uniqueness (on Earth) being the consequence of several earlier biological attempts by our animal ancestors to develop technical and cultural skills (Chapouthier, 2009). It is therefore important to note that the unique nature of humans – on Earth – is not the absurd belief that human beings are unique in the universe. The aberrant "anthropic principle" (Carter, 1974) according to which the entire universe was designed in preparation for the advent of humans on Earth must obviously be dismissed. While the human species is the most intelligent on Earth (intelligent apes), it is likely that millions of similar evolutions have been developing elsewhere in the universe and that our planet should clearly not be considered to be the centre of the universe. Human intelligence and uniqueness stand as evidence of wider evolution of the universe, with the switch from the first point in Kovàc's book (the evolution of life) to the second point (the evolution of thought). I am therefore bound to disagree with dubious statements by Kovàc such as "the human brain appears to be the most complex compact construction *in the universe*." (p. 71) It would have been more convincing to say "on Earth" or "in the solar system" or "in the small part of the universe that we can observe". This statement by Kovàc may very well be a "slip of the pen", for later in the book he clearly refers to the possibility of extraterrestrial and intelligent civilisations.

Kovàc astutely observes that emotions, within the bounds of intelligence, are a decisive stage: "emotions are the driving forces of life." (p. 54) Once again the preliminary development of human identity came through the evolution of animal ancestors and cousins, e.g. vertebrates and octopuses, animals possessing emotional processes. In the human brain, these abilities achieve a new dimension of self-awareness, consciously experiencing emotions, giving clear evidence to show that something new had emerged from life processes in developing brains, producing "hedonic fitness" (p. 65) with highly social behaviour, provided, of course, that consumer society does not lead to excesses in hedonism and the quest for immediate pleasure: "chasing instantaneous gratification is a process of continuous 'de-cortication' of humans" (p. 79). The reader may regret that Kovàc has not mentioned neotenic (juvenile) characteristics of the human brain (Morris, 1967), features which probably also explain its high specificity.

Despite occasional minor points of disagreement as mentioned, Kovàc's book is extremely interesting. Of particular interest is the modern feature of Kovàc's analysis where the author develops a gradual evolutionary model of the universe moving in a clear direction, a model in line with modern physics and chemistry and not requiring a religious argument such as the existence of a conscious architect of the universe, i.e. God. In other words, the ***causa finalis*** of the universe is basically its own construction, a line of reasoning which I presented in a previous publication (Chapouthier, 1995), arguing that the philosophical finality of

the universe was its own construction. Such a hypothesis does not preclude religious beliefs and can also accept non-religious stances; it fits a materialistic or idealistic philosophical stance, in either a religious or non-religious approach, as it is restricted simply to scientific arguments without embarking on the domain of metaphysics. Discussion is within the bounds of purely scientific knowledge and reasonable consequences thereof: the emergence of life processes and the subsequent emergence of conscious processes.

Let us move to Kovàc's third question asking what might be predicted from these two emergence processes? Kovàc expresses interest as well as doubts about reaming "techno-optimists" (such as Ray Kurzweil) who see the future of mankind in a purely technological (and positive) perspective. Kovàc also looks at the opposite type of dreamers, "gloomy doomsayers" (p. 96) predicting the death of human civilisation and the human species. What can be done in the current and specific situation of human history when biological evolution is too slow and "has no chance to keep up and cultural evolution runs at a stupendous speed, almost crazy" (p. 98)? What can be done when confronted with what Kovàc calls "the uncertainty of the ultimate age" (p. 107) and when taking into account today's vast accumulation of technology? Kovàc warns that "extrapolations should be taken with (…) reservation." (p. 98). He does, however, suggest a number of ways of improving life and the human race in the modern world of uncertainty, adopting Konrad Lorenz's idea of countering aggressive behaviour by "highly ritualized non-hostile combat" (p. 108), and suggests this approach be extended to include virtual worlds. (He also notes a number of reservations that cannot be presented in detail here.) The idyllic or Utopian techno-optimistic vision assumes the existence of "a world in which all problems of humankind would be simply solved by transferring them from the real world into a virtual world" (p. 109); it also assumes that "human society will be running smoothly in the parallel real world" (p. 109), thus offering only a limited, partial answer.

Kovàc stresses the biological and animal nature of human beings, citing examples in the history of life and the emergence of life as covered in the book, with emotionally-driven self-awareness developing in animals and humans. As humans now have powerful technological capabilities, they can focus on what they really are and the way they live their lives as humans, the way they "operate" as humans – an Aristotelian approach. If self-awareness could offer humans a glimpse or dream of life with no end, this would be found in the way humans exercise their human nature, and, it is to be hoped, in a move where emotional responses would lead to altruistic societies.

Kovàc's excellent book shows us that the future of the human race can only be seen when explored through its deep roots in the evolutionary past and the distinctive emotional and individual awareness of living beings.

References

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