

Survival determinism: a common perspective to disease, development and evolution

Survival determinism is a concept referring to a broad set of genetic mechanisms for self-survival proposed to be innate to every living entity. I have argued that such mechanisms would be present since the dawn of evolution, when single-celled organisms were the only inhabitants on the Earth, and subsequently propagated and retained in cells of multicellular organisms. The idea of existence of such mechanism(s) was previously discussed with respect to the role of the respective process(es), encapsulated by the term, in diseases. Namely, it was argued that the cells of a multicellular animal, under the conditions of various types of stress, would activate the respective mechanisms in order to respond to such stress. However, as unforeseeable consequence, such events would result in disease. The underlying idea was to interpret single cells of a multicellular animal as members of a colony and the respective diseases as a result of a collapse of cells' original altruistic disposition, i.e. their failure to constitute a multicellular organism and perform specialized functions within it. In the current paper, the idea of *survival determinism* was extended to the role of the underlying mechanisms in multicellular organisms regarded as colonies of collaborative, semi-autonomous, single cells.

Two forms of the respective processes have been described: *stochastic*, which would involve activation of mechanisms for generating a vast amount of genetic variability in the offspring cells, aiming to adapt to novel/stressful conditions (the behavior analogous to what is commonly seen in cancer); and *targeted* (as described for many other diseases, including early stages of cancer), characterized by cell death and possibly increase in cell proliferation, whereby some of the offspring cells are sacrificed (e.g. by accumulating the stress agent) so that their 'siblings' are preserved, thus aiming for the survival of the cell lineage. The analogous mechanisms could be found in cases of asexual reproduction in animals, as well as different stages and aspects of animal development, thereby supporting the argument that such mechanisms, despite their role in diseases, could have been beneficial and hence propagated in evolution. Similarly, the proposed concept follows a parallel between social relationship of cells and that of insects in a colony. Thereby, the origin of multicellularity could be seen as reflecting a more sophisticated and complex colony formation capacity, compared to that of unicellular organisms. In particular, some aspects of these mechanisms were also discussed in the context of various cellular processes, such as cell division and mechanisms of inheritance of particular DNA strands.

After a broad discussion about usefulness of the *survival determinism* concept for interpretation of different cellular and physiological processes, a parallel with Darwin's rationale of evolution by natural selection has been made and the concept was laid out and discussed following his 4-point argument from *On the Origin of Species*: (1) members of the species vary with respect to their characteristics, (2) some of these characteristics are heritable, (3) more offspring is produced in every generation than survives and (4) survival and reproduction of these individuals are dependent on their adaptivity and survival fitness. Furthermore, the idea is seen as possibly

supporting the notion that evolution could be occurring in large leaps rather than, or in addition to, slow, steady process of mutation and adaptation as it is most commonly envisioned. The background idea of the work was to offer a more general, inclusive way of looking at a plethora of issues in life sciences: those of various diseases, some aspects of multicellular development and mechanisms of evolution. This aim was achieved by consolidating the disparate data from various publications and viewing them from a common perspective.

Pavle Krsmanovic

*Institute of Pathological Physiology, First Faculty of Medicine,
Charles University, U Nemocnice 5, 128 53 Praha 2, Czech Republic*

Publication

[Vigor of survival determinism: subtle evolutionary gradualism interspersed with robust phylogenetic leaping.](#)

Krsmanovic P

Theory Biosci. 2017 Dec