On the history of joining *bio* with *semio*: F. S. Rothschild and the biosemiotic rules

Kalevi Kull

A belief, in biology, that signification is the process which may provide a key to understanding the specifics of life has arisen here and there during almost a century and through communication between scientists it has grown into biosemiotics. From the side of semiotics, the search for the origins of sign has also led to animals and other organisms, so that some have started to speak about the paradigmatic shift in semiotics which took place in the 1980s (particularly due to T. A. Sebeok's contributions in semiotics; cf. also Mandelker 1994).

Biosemiotics as a discipline, as a field, was born not much earlier than at the beginning of the 1990s, since this is the decade, when the name was taken into use in the titles of books and conferences, when an international society-like group of people appeared who regularly met and made attempts to approximate to each other's terminology, when the first university courses on the subject appeared, and when the history of the field was first reviewed (or built and constructed).

Biosemiotics as a domain, of course, has existed already much earlier, at least since the first decades of this century — as its history clearly shows (Kull 1999a; Wuketits 1998; Sebeok 2000).

Appearance of the term *biosemiotics*

In 1962, the *Annals of New York Academy of Sciences* published a paper by F. S. Rothschild, which includes the following statement:

> This approach presupposes acceptance of our position that the history of subjectivity does not start with man, but that the human spirit was preceded by many preliminary stages in the evolution of animals. The symbol theory of psychophysical relation bridges the gulf between these

> disparate avenues of research and unites their methods under the name of *biosemiotic*. We speak of biophysics and biochemistry whenever methods used in the chemistry and physics of lifeless matter are applied to material structures and processes created by life. In analogy we use the term biosemiotic. It means a theory and its methods which follows the model of the semiotic of language. It investigates the communication processes of life that convey meaning in analogy to language. (Rothschild 1962: 777)

The definition as given in that paper shows that the scope and the importance of the domain as described by Rothschild corresponds to the meaning of 'biosemiotics' as it has been used later (by the scientists who had not read his writings), for instance in a big collective work under this title (Sebeok & Umiker-Sebeok, 1992). Similarly, Rothschild (1962: 775) claimed that "Protozoa, invertebrates, vertebrates, and finally man appear as four developmental stages of subjectivity. In each stage a new sign system overlays the already established ones and makes the unfolding of a new and higher level of experience possible."

In the biosemiotic literature, published since then in *Semiotica* and in other international semiotic periodicals, F. S. Rothschild's name can not be found. Most frequently, J. S. Stepanov's book of 1971 has been mentioned as the first which uses the term 'biosemiotics', although Rothschild introduced it almost ten years earlier.

An endemic semiotician: Life and work of F. S. Rothschild (1899–1995)

When discovering Jakob von Uexküll for the field of semiotics, T. Sebeok has called him a cryptosemiotician. This is a class of semiotists, "who need themselves to become aware of the perspective that semiotic affords or whose work needs to be by others reclaimed and re-established from within that perspective" (Deely 1990: 119–120; Rauch 1983). Can we say that now we have a similar situation with Rothschild? Seemingly not, since he knew semiotics and applied it; there was simply no information exchange between him and other biosemioticians. Accordingly, we need to add a fourth class (in addition to the proto-, crypto- and ordinary semioticians) to Rauch's (1984) classification — the *endemic* semioticians. This is a branch of normal good scientists, about whom nobody in the field knows. Or a

small scientific group, who are developing the field on their own, publishing in journals which are not read by their colleagues in other countries.[1]

Friedrich Salomon Rothschild was born on December 17, 1899, in Giessen, Germany. Between 1918 and 1923, he studied medicine in the Universities of Giessen and München, specialising in medical psychology and psychiatry. From 1925 to 1928, he worked in Heidelberg with psychotherapist Frieda Fromm-Reichmann (1889–1957) and psychoanalyst Erich Fromm (1900–80), and from 1928 to 1933 in Frankfurt with neuroanatomist and clinician Kurt Goldstein (1878–1965). At that time, he was influenced by the philosophy of Ludwig Klages (1872–1956) and held a correspondence with him.[2] As, according to Klages, "*alles Leben beseelt ist*", the development of subjectivity over the evolution of living organisms became an interest of Rothschild.

During his studies in Frankfurt, Rothschild came to an idea that the structure and excitations of the brain can be seen as symbols of mental content and mental processes. As he later (1989: 192) wrote about this occasion: "Eines Tages, als ich über die Seitenkreuzungen der Fasern im Gehirn eines Tieres las, kam mir plötzlich die Idee, dass diese Kreuzungen für das Erleben des Tieres das Verhältnis zu seinen Objekten im Raum symbolisch repräsentieren." In 1935, he could publish his book "*Symbolik des Hirnbaus*: *Erscheinungswissenschaftliche Untersuchung über den Bau und die Funktionen des Zentralnervensystems der Wirbeltiere und des Menschen*".

In Frankfurt, he also worked on the problem of brain hemisphere asymmetry and the functional importance of this phenomenon (Rothschild 1930).

In 1933, Rothschild lost his job due to the nazi laws against Jews. In 1936, Rothschild moved to Palestine. He worked as a Professor of

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[1] There was a similar situation with H. E. H. Paterson and his group of evolutionary biologists, who developed the recognition concept of species during many years in South Africa, publishing exceptionally in *The South African Journal of Science*, until E. Vrba happened to find them and made widely known.

[2] L. Klages knew well the works of J. v. Uexküll; he belonged to the contributors of the Uexküll's *Festschrift* volume (Klages 1934). It is not known to me whether there has existed any more direct line from Uexküll's semiotic biology to Rothschild's views than this one via L. Klages.

clinical psychiatry in the Faculty of Medicine in the Hebrew University, Jerusalem, from where he retired in 1965.

In the 1950s, he published two books on the problem of self and the symbolic aspects of the central nervous system (Rothschild 1950; 1958). He also wrote a paper about a classical phenomenon of zoosemiotics — the dance of bees (Rothschild 1953).

A conference "The Psychology of the Self", held by the New York Academy of Sciences in 1961, included a paper by Rothschild, in which he directly uses the semiotic approach of Ch. Morris, and introduces the term 'biosemiotic'. In semiotics, he sees the way to a non-cartesian approach: "The concept of the symbol shows the way to overcome René Descartes' partition of man into the self as *res cogitans* and the body as *res extensa*. In the symbol psychological meaning and physical sign appear as a unit" (Rothschild 1962: 774).

As a leader of the Israel branch of the Association for Dynamic Psychiatry, he published most of his later papers in the journal *Dynamische Psychiatrie / Dynamic Psychiatry*. On June 24, 1989, a symposium "From Causality to Communication — Biosemiotics of Friedrich S. Rothschild", dedicated to his 90th birthday was held in Berlin, in the German Academy of Psychoanalysis, which resulted in a special issue of *Dynamische Psychiatrie* 22 (3/4), 1989,[3] and later a book by Bülow and Schindler (1993).

F. S. Rothschild died on March 6, 1995 in Israel.

Three biosemiotic laws

In his 1962 paper, Rothschild made an attempt to formulate his conception in the form of three biosemiotic laws. "By laws I understand here the rules of syntax of each single communication system and the rules valid for the simultaneous utilization of different communication systems as they coexist in all animals and in man" (p. 777). The laws themselves are described by him as follows.

[3] This includes a review of his life and work by Ammon (1989), a paper by Rothschild (1989) himself in which he describes his way towards biosemiotics, contributions by Hes (1989), Berendt (1989), Bülow (1989a), and a summary of the symposium (Bülow 1989b) illustated with 9 photographs from that event.

The first law.
Threat to given life elicits from the original passive state of the organism a component of activity, of inner self-assertion, transforming it *from an object into a subject of intentionality*. The first biosemiotic law expresses the intention to safeguard the structure that conveys the own essence, the self as a coherent *unity*. It is the basic rule of biosemiotic syntax. (p. 779)

The second law.
Inner polarization is necessary in order to permit the subjectivity of organisms to communicate with the objects of the world simultaneously with realization of the own self. This law dominates the arrangement of all communication systems from the cell upward. The manifestation of this inner polarity include the differentiation of motor and sensory systems in the sensori-motor foundations of experience and behavior, the bisexual disposition of organisms, the asymmetry between right and left, the differentiation of the vegetative nervous system inot a parasympathetic and sympathetic component, and the arrangement of the central nervous system in homolateral and heterolateral centers. (p. 780)

The third law.
As each new inner communication system emerges in evolution, it transcends its predecessor's horizon of meaning and requires for its actualization a new mode of intentionality. In this new form of intentionality, subjectivity is active and dominates over that of the preceding system because it is in opposition to it and thereby prevents an independent acitivity of the more archaic systems. The necessity of this *dominance* constitutes the third biosemiotic law: without such dominance, the new system cannot develop its function. (p. 781)

These three laws, indeed, seem to describe well some basic semiotic features of living beings, and will require a thorough analysis to discover their universality in the biological realm.

Signs of semiotics in philosophy of biology

An understanding of the importance of sign processes for living organisms has been growing in biology for centuries. For instance, the teleology of Johannes Müller (1801–1858), and Karl Ernst von Baer (1792–1876) has much in common with the contemporary understanding of the intentionality of sign processes. However, due to the absence of an appropriate theoretical framework in biology, and the lack of intercourse between semiotics and biology until the recent decades,

the terminology which has been used to describe essentially the semiotic side of biological processes varied to a great extent. This makes it really difficult to reconstruct the history of biosemiotics of the pre-biosemiotic period in biology. However, this does not mean that one may avoid it.

In a footnote of the book about Rothschild's biosemiotics, Bülow and Schindler (1993: 72) have also mentioned J. v. Uexküll:

> Beschränkt auf den Bereich der Biologie, kommt von Uexküll zu ähnlichen Ergebnissen wie Rothschild. Thure von Uexküll billigt der Zelle Subjektcharakter zu, in Anlehnung an Jakob von Uexküll. Wie Rothschild versteht er Organismen als lebende Systeme, die miteinander durch Zeichen, die sie selbst kodieren und beantworten, kommunizieren. Das Denken in kommunikativen Austauchprozessen löst auch bei von Uexküll das lineare Denken in kausalen Ursache-Wirkungs-Beziehungen ab.

Jakob von Uexküll, a sovereign pioneer of semiotic biology, had a number of supporters among biologists. These biologists — Hans Driesch (1867–1941),[4] Richard Woltereck (1877–1944), Adolf Meyer-Abich (1893–1971) — have not yet received much attention from the side of biosemiotics. However, we may speculate that this is mainly a result of their specific and quite individual terminology — they have not used the language of semiotics, whereas their approach itself could very well be compatible with semiotic biology.

Understanding inobligatory aspects

An unusual aspect in the works of F. S. Rothschild concerns his interest in parapsychology (cf. Berendt 1989), which separates him from the main trends in current biosemiotics. As a parallel, the same interest can be found in the works of Hans Driesch, a theoretical biologist of the beginning of the century. A key for understanding this

[4] Most of the textbooks on the history of biology interpret the views of Hans Driesch as if he was a cartesian philosopher, i.e. a dualist. Indeed, the direct statements by Driesch himself provide a strong argument for such a view. Most of the criticism against his neo-vitalism underlines that Driesch introduced non-material entities in order to explain living phenomena. However, it might well be so that a non-cartesian interpretation of Driesch' philosophy of biology can be a more adequate, and a much more useful one.

phenomenon can be found in a statement by Aloys Wenzl (1951: 155):

> Bedeutsam für das Lebensproblem ist, auch wenn wir von der Frage der Materialisation ganz absehen, jedenfalls die Tatsache, dass die *Vorstellung* leibliche Veränderungen bewirken kann.[5]

Thus, this is the influence of *Vorstellung* on body, which makes a scientist search for various explanations. The solution proposed by R. Sheldrake (and together with him, but much earlier, by H. Driesch or F. S. Rothschild in some of their works) differs from the one developed in the biosemiotics of the 1990s. It should also be mentioned that the view on biosemiotics as described by some colleagues of Rothschild (Hes 1989) differs in several aspects from the one established under this name in most of the contemporary biosemiotic literature.[6]

Conclusion

Thus, the term 'biosemiotics' was introduced by Rothschild (1962) almost at the same time when T. A. Sebeok coined the term 'zoosemiotics' (1963). However, since Rothschild's works appeared exclusively in a psychiatric context, these remained unnoticed by biologists as well as by semioticians for quite a long time.

A semiotic interpretation of the asymmetry of human brain hemispheres in terms of communication, as developed by Rothschild since the 1930s, is to some extent similar to the analysis of the same problem by J. Lotman in the early 1980s (Lotman 1983; cf. Kull 1999b).

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[5] This is taken from the chapter titled as "Parapsychologie und Lebensproblem", in A. Wenzl's (1951) work on H.Driesch.

[6] Rothschild has also touched the problems of religion in several of his writings. I even think that there can be found some aspects of similarity between Uexküll's and Rothschild's theological thinking (cf. Uexküll 1936; Rothschild 1986). However, the current situation in the discussions on creation and evolution do not provide the necessary atmosphere for a serious analysis of this part of their writings, since this belongs far beyond the creationism-darwinism context.

Psychosomatic medicine has been a field which has both applied the biosemiotic approach and contributed to it (Uexküll & Wesiack 1997; Hoffmeyer 1997). The contribution by Rothschild, whose work also belongs to the area between medicine and psychology, illustrates this thesis well.

The usage of the term 'biosemiotics' by Rothschild in 1960s, together with the absence of any reception of his works by those who developed this field for a longer time, just demonstrates that the logic of development of scientific thinking may create almost identical solutions independently by different thinkers in different places.[7] Seemingly, the idea of biosemiotics was just in the air at that time.

The three biosemiotic laws, formulated by Rothschild, represent a remarkable contribution to the field, and are worthy of attention and further analysis.

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[7] On the other hand, the social aspect of the development of scientific fields, namely the absence of communication in this case, is evidently an important reason why the Rothschild's biosemiotics in several aspects considerably differs from the mainstream.

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К истории соединения *bio* и *semio*: Ф. С. Ротшильд и биосемиотические закономерности

В статье дается краткий обзор научной деятельности психиатра Ф. С. Ротшильда (1899–1995), который видимо является одним из первых, пользующих термином *биосемиотика* (в его статье 1962 года). Его определение биосемиотики хорошо соответствует содержанию этого раздела науки в 1990-е годы (когда биосемиотика формировалась в полной мере), несмотря на отсутствие его контактов с коллегами в этой области (поэтому его можно называть *эндемным* биосемиотиком) и своеобразие некоторых аспектов его подхода.

Ротшильд сформировал три основные правила (которые он называет законами) биосемиотики.

Первое утверждает, что первичная интенциональность и первичное образование субъекта связано с активностью организма хранить свою структуру , т.е. созиданием себя самого.

Второе правило гласит, что коммуникация связано с внутренней асимметричной поляризацией.

Третье правило утверждает, что знаковая система нового уровня при актуализации доминирует над старой.

В статье предлагается гипотеза, по которой семиотический аспект в биологии существует давно, имея представителей уже в XIX веке. Но из-за разной и специфической терминологии его выявление оказывается трудным и оставалось до сих пор почти незамеченным историками биологии.

Bio ja *semio* ühendumise ajaloost: F. S. Rothschild ja biosemiootilised reeglid

Artikkel esitab lühiülevaate psühhiaater F. S. Rothschildi (1899–1995) teaduslikust tegevusest, märkides, et ta oli arvatavasti esimesi, kes võttis kasutusele termini *biosemiootika* (artiklis Rothschild 1962). Tema esitatud biosemiootika määratlus vastab hästi selle mõiste kasutusele viimasel aastakümnel, kuigi tal ei olnud arvatavasti mingeid kontakte tänapäeva biosemiootikutega (mistõttu teda võib nimetada *endeemseks* biosemiootikuks), ning ta oma uurimistöö kaldus sellest mitmes aspektis kõrvale. Ometi on ta formuleerinud rea biosemiootika üldistusi, seahulgas kolm põhireeglit, mis artiklis ka ära tuuakse. Esimene reegel väidab, et primaarne intentsionaalsus ning esmane subjekti ilmumine on seotud organismide enesekohasusega, enda kaitsmisega; teine ütleb, et kommunikatsioon on seotud sisemise asümmeetrilise polariseerumisega; kolmas väidab, et uue taseme märgisüsteem aktualiseerudes domineerib vana üle.

Esitatakse hüpotees, et semiootiline aspekt bioloogias on vana, ent varjatud spetsiifilise ja erineva terminoloogia taha, mistõttu selle avamine on seotud raskustega ning jäänud seniajani bioloogia ajaloolaste poolt peaaegu tähelepanuta.