

# Jakob von Uexküll: An introduction

KALEVI KULL

Jede Umwelt bildet eine in sich geschlossene Einheit, die in all ihren Teilen durch die Bedeutung für das Subjekt beherrscht wird. (Uexküll 1940a: 7)

Nobody is a product of their environment — everybody is the master of one's Umwelt. (Uexküll 1923c: 266)

What comes from Uexküll, is always *ab origines*. (Hans Driesch, in Schneider 1940: 186)

The interest in Jakob von Uexküll in semiotics is obvious — he was a starter and pioneer of the semiotic approach in biology in the twentieth century. The extension of semiotics from humanities, where semiotics has been centered during the period of its most intensive development, to the field of biology, has taken place gradually, with the most decisive steps taken only very recently. The conclusion of this development is most fundamental — sign systems embrace all living systems, and the roots of semiotics lie in biology. On the other hand, Uexküll's main idea was to build up a biology which can handle the vital processes, and which can include the subject, the living self; or *life itself*, in the sense of Robert Rosen, who writes:

A material system is an organism if, and only if, it is closed to efficient causation. ... Accordingly, the theory of organisms, theoretical biology, is the study of the category of all models of such systems. ... An organism is itself like a little natural language, possessing semantic modes of entailment not present in any formal piece of it that we pull out and study syntactically. (Rosen 1991: 244, 248)

And when Rosen continues (1991: 244): 'This is indeed biology from a new and different perspective', we can recognize even more the similarity with what Uexküll wrote in the first decades of the twentieth century.



Figure 1. Jakob von Uexküll, a drawing from 1942; from the archive of the Jakob von Uexküll Center

Uexküll's work is considered to be a foundation for theoretical biology and for the experimental study of organisms' behavior. Uexküll wanted to make a new biology, which would not suffer from *Bedeutungsblindheit*. Thus, doing one thing, he has been interpreted as doing

two — biology and semiotics. Which means that through him, these two fields fuse, or at least cohere. The study of sign systems is simultaneously both biology and semiotics. However, this is certainly not all that needs to be said about the importance of Uexküll.

Devoting these hundreds of pages of *Semiotica* to a biologist, we continue an already existing trend. The special issues of *Semiotica* about biosemiotics include volumes 42 (1), 89 (4), 120 (3/4), 127 (1/4) — with a trend towards growing frequency and number of pages. Still, I feel it is to some extent a risky enterprise. But isn't this exactly the same risk we meet in all of our biosemiotic work? Biology is so vast that if its semiotic fundamentals are accepted, this will change remarkably the whole of semiotics (which we can already notice, as an influence of, for instance, Sebeok's numerous biosemiotic works, or Nöth's semiotics handbook [2000]). Simultaneously, this would influence the whole of biology.

The contemporary interest in Uexküll's works coincides with a more general trend from temporal (evolutionary, genetic, 'vertical') biology which dominated throughout the twentieth century, towards spatial (organismic, genomic, 'horizontal', semiotic) biology, which shows signs of rapid growth now, but whose viable seeds already existed a century ago.

Both biology and semiotics study communicative structures and the sign systems that create them. One can say, in a way, that semiotics is biology, and biology is semiotics. Or, in Lotman's words, 'a zoologist ought to be a linguist, and may be a linguist ought to be a zoologist' (cited in Kull 1999f: 125). Very similar to this is Uexküll's expression: 'Linguistics proper is far from me — but I am convinced that you are on the right path towards making it a biological science' ('Letter to Heinrich Junker', this issue). Sign science and life science are coextensive. 'There could not have been semiosis prior to the evolution of life' (Sebeok 1997: 436). 'If, according to semiobiological theory, all living things are signs, and signs are living things, then all life *qua* signs must be seen as constantly evolving according to certain general rules, for "symbols grow"' (Umiker-Sebeok 1986: 529). And with all this sameness or coherence, which is an important source of ideas for theories (theoretical biology and semiotics), the specialized methods and empirical approaches<sup>1</sup> of these sciences remain different.

### **Uexküll's program for building biology**

Jakob von Uexküll was, first of all, a biologist. However, his understanding of the processes of living did not belong in the mainstream of biology. He wrote his main work *Theoretische Biologie* (1920a, 1928a)

in order to make biology more scientific, better founded, attached to the process of living itself.

In the introduction to his first book about the experimental biology of water animals, Uexküll (1905a) distinguished between physiology, which organizes the knowledge about organic systems on the basis of causality, and biology, which does it on the basis of purposefulness (*Zweckmässigkeit*).<sup>2</sup> Uexküll aims to build up biology,<sup>3</sup> while considering physiological experiments to be an important source of knowledge for biology.

The relationship between causal and functional (or physical and semiotic, as one can express it later) aspects of life are described by Uexküll through the relationship between the tasks of physiology and biology. In a summary for a chapter in his *Theoretische Biologie* he says:

Wir haben in diesem Synthese gewidmeten Kapitel gesehen, wie mit Hilfe der Schemata die räumlichen Dinge körperhaft geformt werden, wie mit Hilfe der Kausalität die zeitlich ausgedehnten Objekte einheitlich zusammengefasst werden, wie mit Hilfe der Planmässigkeit die Gegenstände entstehen. Wir haben ferner die Planmässigkeit erforscht und gefunden, dass ihr immer eine Funktion zugrunde liegt. Die Funktion selbst haben wir, indem wir auf unsere eigenen Handlungen zurückgingen, auf die Impulsfolge zurückgeführt, die uns indirekt durch unsere eigenen Qualitäten zum Bewusstsein kommt.

Wir haben endlich feststellen können, dass die Impulsfolge auch die Tätigkeit des Protoplasmas regelt, und sich dadurch als selbständige Naturkraft äussert, wobei sie Organe mit differenziertem Gefüge hervorbringt und wieder verschwinden lässt. Ist das Gefüge einmal vorhanden, so kann die Tätigkeit zwangmässig im Rahmen des Gefüges ablaufen.

Da aber das Gefüge durch die Impulsfolge planmässig gebaut ist, so ist auch seine Wirkung in der Aussenwelt zugleich planmässig und zwangläufig. Die Frage nach der Planmässigkeit beschäftigt die Biologie, die Frage nach der Zwangläufigkeit die Physiologie. (Uexküll 1920a: 94–95)

As F. Stjernfelt (this issue; cf. Kull 1998b, 1999e) notes, ‘Jakob von Uexküll’s theoretical biology is a main contribution to the “developmental” or “epigenetic” trend in the biology of the recent centuries’ — a lineage involving scholars like Goethe, Geoffroy Saint-Hilaire, Karl Ernst von Baer, d’Arcy Thompson, Hans Spemann, Hans Driesch, Conrad Hal Waddington, Brian Goodwin, René Thom, Robert Rosen, and Stuart Kauffman. Indeed, Uexküll’s (1910d: 225) ‘*Das Ziel aller Naturwissenschaft ist die Ordnung*’ sounds quite Kauffmanian. Thus, for the history of theoretical biology, Uexküll provides a link between Baer and Rosen.

In a way, biology in this sense follows the line of *Zeitschrift für Biologie*, edited by Wilhelm Kühne. Uexküll worked in Kühne’s institute in Heidelberg in the 1890s.

In 1904, Uexküll formulated a law of neuromotor regulation (1904a, also 1904b, 1905a). The law has been quite widely accepted and acknowledged (Haupt 1913; Wieser 1959), and is considered as an early description of the feedback principle (Lagerspetz, this issue). Later, a more general feedback concept was introduced by Uexküll through the notion of functional cycle (Uexküll 1920a, 1928; Jämsä, this issue).

In his book on water animals (1905a), Uexküll presents a detailed account of the work of receptors, the nervous system, and muscles, together with an introduction of the appropriate terminology. This leads to a chapter on functional body plans (*Bauplänen*) of animals. After describing the methods of research, he gives brief accounts of various groups of water animals as an approach to study their functional body plans. He concludes the book with a brief summary of his philosophical standpoint on the development of biology.

Uexküll was dissatisfied with the European trends in biology. He developed this view in a paper about American biology (1913d), in which he particularly emphasized the importance of developmental biology (*Entwicklungsmechanik*), genetics (*Vererbungslehre*), and research on animal behavior, the branches of biology which all had been started in Europe (he names Roux, Mendel, and Fabre — Uexküll 1913d: 801), but had been developed further mainly overseas. Indeed, the leading role in German biology of the nineteenth century was, at that time, shared between several other countries, and the rapid growth of American biology was obvious. However, as we can also find in many other of Uexküll's statements, this includes a little paradox. If anywhere, then only in Europe can one find the few supporters of Uexküll's biology who survived until its new recognition.

According to Uexküll, a basic problem of biology is the problem of the design (*Planmäßigkeit*) of organisms:

Die Planmäßigkeit der Organismen war und ist das Problem der Biologie und ihm wenden wir uns wieder zu. (Uexküll 1908a: 79; 1913a: 26)

He distinguished between three main approaches to the problem of design in biology (Uexküll 1908a: 83; 1913a: 30):

- (1) the supporters of pure causality, who try to explain both functioning and design through mechanical laws; e.g., Darwinists;
- (2) the supporters of pure design, who explain both functioning and design through the specific self-lawfulness (*Eigengesetzlichkeit*) of organisms; here belong vitalists and Jennings;<sup>4</sup>

- (3) an intermediate approach, which explains design through the specific laws of organisms, whereas the functioning is explained on the basis of mechanical laws as analogous to the functioning of machines; Uexküll calls them the ‘machinalists’.

Uexküll makes it very clear that he does not belong among the Darwinists, but he also does not identify himself as a vitalist (despite his sympathy towards this view). His own position is most close to the machinalists; however, he needs to make here an additional point. Namely, the design of machines is mostly spatial, whereas in the case of organisms it is also temporal. Thus he distinguishes between the spatial (*Planmässigkeit*) and temporal (*Zielstrebigkeit*) design or plan (Uexküll 1908a: 85, 1913a: 33). The latter (*Zielstrebigkeit*) is the term of Karl Ernst von Baer, from whom, clearly, Uexküll has inherited an understanding of the fundamental importance of the temporal organization of organisms.<sup>5</sup>

In Uexküll’s works one can find numerous variations on the statements of Baer. This connection can be recognized, for example, in these examples from Baer’s texts:

In den Organismen sind die einzelnen Theile derselben nach dem Typus und Rhythmus des zugehörigen Leben-Processes und durch dessen Wirksamkeit gebaut, so dass sie einem andern Lebens-Processen nicht dienen können. Deswegen glaube ich die verschiedenen Lebens-Processen, mit musikalischen Gedanken oder Themen sie vergleichend, Schöpfungsgedanken nennen zu können, die sich ihre Leiber selbst aufbauen. Was wir in der Musik Harmonie und Melodie nennen, ist hier Typus (Zusammensein der Theile) und Rhythmus (Aufeinanderfolge der Bildungen). (Baer 1864: 280–281)

Es ist nothwendig, ... dass man Typus und Rhythmus des Lebens nicht als Ergebniss des Stoffwechsels betrachte, sondern als dessen Leiter und Lenker, wie ein Gedanke oder Psalm wohl die Worte sucht und ordnet, um sich vernehmbar zu machen, nicht aber aus den einzelnen Wörtern nach deren eigenem Werth und Streben erzeugt wird. (Baer 1864: 282–283)

The importance of biological design (plan, order) is considered so fundamental by Uexküll that he proposes in the introduction to the first volume of *Theoretische Biologie* the phrase: *Every design is from design*.<sup>6</sup>

An der Satz: *Omnis cellula e cellula* darf man den Satz hinzufügen: *Alles Planmässige aus Planmässigem*. (Uexküll 1973: 5)

He feels that the understanding according to which order can be a principal factor in nature (*Naturfaktor*), is so new, that it requires the rebuilding of life science. And that is what he attempts to do in his books, particularly

in his main work *Theoretische Biologie*. And that is why he needs to invent a certain new terminology for biology.

Here, Uexküll introduces the concept of functional cycle (*Funktionskreis*), as the mechanism of design (see the figure at the beginning of this issue). This concept took shape in his works of the early 1920s. When comparing the first (1920) and second (1928) editions of *Theoretische Biologie*, the chapter on the functional cycle is the one that has progressed the most. In this concept, one can see an early version of the concept of feedback, or a general model of sign processes (semiosis) — depending on which side of the coin one wants to emphasize (cf. Lagerspetz, this issue; Jämsä, this issue). Anyway, both of these aspects were new for the biology of his time. For Uexküll, the functional cycle was also the mechanism of Umwelt-building.

Most of Uexküll's work was devoted to the problem of how living beings subjectively perceive their environment and how this perception determines their behavior. In the book *Umwelt und Innenwelt der Tiere* (1909a) he introduced the term 'Umwelt' to denote the subjective (subjectivized, meaningful) world of an organism. This is the concept for which Uexküll is most frequently cited in the contemporary literature (cf. Sutrop, this issue). Uexküll developed a specific method which he termed 'Umwelt-research'.

A basic idea of the Umwelt-research is — now in my own words — that organisms are communicative structures. What organisms can distinguish is dependent on the design of their structure and on the work of their functional cycles. The latter, which consist of perception and operation, are responsible for creating the Umwelt. Umwelt is an entailment of the perceptual and operational world (*Merkwelt* and *Wirkwelt*). And 'each Umwelt forms a closed unit in itself, which is governed, in all its parts, by the meaning it has for the subject, (Uexküll 1982: 30). From this it appears that signs and meanings are of prime importance in all aspects of life processes. Correspondingly, Emmeche (1998: 11) has defined life as a 'functional interpretation of signs in self-organized material code-systems making their own Umwelten'.

In the twentieth century, a characterization of a biologist was not considered to be complete without a hint of his evolutionary viewpoint. In order to grasp this side in Uexküll's views, one has to start from the interpretation of Baer's views on evolution. The first thing, here, is that, despite his opposition to Darwinism, Uexküll was not an anti-evolutionist (Kull 1999d), and neither was Baer. 'Nirgends Evolution, immer Epigenese', was his expression (Uexküll 1920: 94). Here, of course, the meaning of the word 'evolution' is narrower than the one used by the leaders of the synthetic theory of evolution in the 1960s. This was not

a Lamarckian, nor a Darwinian view, but a third one. In the words of Lenoir (1982), it was another view on biological causality. In a similar vein, the third view on evolution is described by Hammen (1983), who considers among its founders (besides Baer) Gustav Teichmüller (1877), a philosopher from Tartu University, and refers to the work by Waesberghe (1982; who also has a reference to Uexküll). When Uexküll (1973: 217) writes: ‘Wir haben aus diesem Verhalten der Lebewesen die Überzeugung gewonnen, dass es die Funktionsregel selbst ist, die fähig ist, Gefüge zu formen’, then this reminds us of another aspect of the Baerian approach which concerns the primacy of development over evolution (cf. Gould 1977; Salthe 1993; Kull 1998b). And this also seems to be close to Baldwin’s view on the principal mechanism of biological evolution (cf. Kull 1999e). It should also be mentioned that Uexküll was a strong supporter of Mendel’s works.

For Uexküll, the qualitative aspects of the processes of life were always more important than the quantitative ones, because the latter, indeed, can be seen as a special case of the former. Accordingly, his interest concerned mainly adaptedness, ‘Einpassung’, and much less fitness, ‘Anpassung’ (Uexküll 1922a, 1927b).

Uexküll considered himself a follower of Johannes Müller (1801–1858) and Karl Ernst von Baer (1792–1876). His philosophical views were based on the works of Kant. Among the followers of Baer, Jakob von Uexküll holds a special place (cf. Kull 1998b, 1999d). It is so, not only because he is a descendant of the same milieu at Tartu University, but because he could develop Baer’s approach in the fields of biology where Baer himself almost did not work — animal behavior and physiology.

It is not enough to say that Uexküll was one of the founders of behavioral physiology and ethology, and a forerunner of biocybernetics. Or that the fields in which his work made a remarkable contribution include the comparative physiology of invertebrates, comparative psychology, and philosophy of biology. Or that he wrote one of the first monographs on theoretical biology. Being a founder of biosemiotics, he, in fact, became a designer of the whole of biology.

Thure von Uexküll (1987, 1989, 1995, 1998) has explained very well how the biology that his father was building is semiotics. I do not have much to add to this. Just to quote Jakob von Uexküll (1950: 45–46): ‘Es ist sprachlich sehr interessant, dass die Bedeutung in der Tat ein Ur-Teil ist, das alle Teile eines Gegenstandes verbindet und ohne welches der Gegenstand nicht in die Erscheinung tritt. In der Bedeutung liegt der Kern zum Dasein aller materiellen Gegenstände’.

As Driesch has once said, ‘Was von v. Uexküll kommt, ist immer *ab origines*’ (cited in Schneider 1940: 186).



## **Biographical**

There exists a detailed biography written by his wife Gudrun von Uexküll (1964), and also Jakob von Uexküll's autobiographical book (1936, reprinted in 1939, 1949, 1957, and 1963). Accounts of several aspects of his life can be found in the works of Brock (1934a), Kühl (1965), Schmidt (1980), Helbach (1989), Harrington (1996), etc. Therefore, I will point here to only a few important dates in his life.

Jakob Johann von Uexküll was born in Keblaste manor (in older German usage — Keblas), Läänemaa county, Estonia, in September 8, 1864. He died on the island of Capri on July 25, 1944.

Uexküll's family is an old Baltic-German family, with well-studied family history (Hansen 1900; Taube 1930, 1936). The name 'Uexküll' comes from a village named Üksküla in Livonia (now in Latvia, contemporarily called Ikškile in Latvian), and means 'one village' in Estonian.

Jakob's youth was spent in Haimre manor (Heimar, in German), the family home, with visits to relatives in Vigala (Fickel) and Virtsu (Werder, close to Puhtu) manors.

Jakob went to Domschule in Tallinn (then Reval) from 1877–1883. His father was the city mayor from 1878–1883.

Uexküll studied zoology at the University of Tartu (then Dorpat), Estonia, in 1884–1889. Under his Professor in zoology, Max Braun (Maximilian Gustav Braun, 1850–1930), he became interested in marine invertebrate fauna, and participated in study trips to the Baltic Sea.

A noticeable feature of the environment of biology in Tartu at that time (and also, later) was the strength of both the great schools of thinking, the Darwinian and Baerian. Georg Seidlitz (1840–1917), a brilliant Darwinian scholar, introduced, in the early 1870s, a course on Darwin's theory of evolution, which was one of the first of its kind on a world scale. On the other hand, Karl Ernst von Baer's (1792–1876) home university carried on his school of thought in biology. Several other first-class biologists contributed to the high level of biological thinking, e.g., Alexander Keyserling (1815–1891), Arthur Oettingen (1836–1920), Carl E. H. Schmidt (1822–1894), August Rauber (1841–1917), Edmund Russow (1844–1897). Among them, some of Gustav Bunge's (1844–1920) writings gave rise to the whole neovitalist trend in European biology. This diversity had to influence everyone who studied biology in Tartu during these years.

After graduating from the university, Uexküll worked at the Institute of Physiology of the University of Heidelberg (Germany), in the group led by Wilhelm Kühne (1837–1900). It is interesting to notice that the choice

of Heidelberg is again related to Baer. Namely, Uexküll's acquaintance with Kühne started with Kühne's visit to Tartu, where he was involved in Baer's memorial committee. Kühne was the editor-in-chief of the leading European biological journal *Zeitschrift für Biologie*, and the author of the notion 'enzyme'. His institute was excellently supplied with technical equipment for physiological experiments.

In 1907 Uexküll was given an honorary doctorate by the University of Heidelberg for his studies in the field of muscular physiology. One of the results of his work during these years became known as Uexküll's law (see Uexküll 1904a, 1904b).

Uexküll also worked for many years in Naples (regularly from 1892 to 1902), in the famous Zoological Station, which was attended by many leading biologists and had a stimulating atmosphere, much due to the head of the station, Professor Anton Dohrn (1840–1909).

In 1926, Uexküll was nominated to the position of director of the Institut für Umweltforschung at the University of Hamburg (cf. Kühl 1965; Hünemörder 1979).

Between 1927 and 1939 (i.e., during his Hamburg period), Uexküll spent his summers with his family on the Puhtu peninsula (the western coast of Estonia; the German name for Puhtu was Pucht) in his summer cottage (after 1949, this became Puhtu Biological Station of the Institute of Zoology and Botany, Tartu, Estonia). His helper in Puhtu was an amateur naturalist Alexander von Keyserlingk (1895–1995), who also provided him some material from his findings.

Uexküll liked Schiller, and also Goethe, being particularly interested in Goethe's theory of colors. He smoked only plain Russian cigarettes. According to the words of Thure, his father spoke good French, his English was not good, his Russian was bad, Estonian was better; and he knew Italian.

The last four years of his life were spent with his wife on the island of Capri, with a frequent companion of the family Axel Munthe.

### **Post-biographical**

The reception and interpretation of Uexküll's views has been quite controversial, and clearly different in different periods.

In biology, the first two decades of the twentieth century were without a really dominating theory; however, this was a very productive period giving rise to many new branches in biology (cf. Bowler 1992; Kull 1999a: 389–393). Both reductionistic and holistic approaches in

biological research co-existed, and many leading biologists of that time considered the neovitalist ideas worthwhile. Accordingly, the first books by Uexküll found many supporters. However, it was also the period when the dominance of German biology of the nineteenth century began to be replaced by the American one.

The situation changed remarkably in the 1930s as a result of great works in mathematical biology and their applications in the theory of biological evolution. This made a qualitative biology less attractive for many generations of biologists, until the present time.

It is also remarkable how ecology, initially influenced by Uexküll, made a turn and reversed the terminology:

‘Umwelt’ fassen wir hier nicht in dem engen Sinne v. Uexkülls, sondern als den Komplex der Beziehungen einer Lebenseinheit zu ihrer Umgebung. ... Unter der ‘Umgebung’ seien alle die über die Umwelt hinausgreifenden Gegenstände und Erscheinungen verstanden, die von einer Spezies mit ihren Sinnesorganen unmittelbar wahrgenommen werden. (Thienemann 1956: 8)

The introduction of Uexküll as a semiotician and a founder of semiotic biology is due in particular to Sebeok (see Sebeok 1998), deriving from his work in zoosemiotics. If in his ‘Selected and annotated guide to the literature of zoosemiotics and its background’ (1969) Uexküll’s name is still lacking, then in 1972 Sebeok is already writing: ‘The task for the immediate future will be to treat, comprehensively and exhaustively, the achievements of zoosemiotics from Darwin through J. von Uexküll to the present day’ (1972: 61), and characterizes ‘Bedeutungslehre’ as a ‘pioneer monograph on zoosemantics’ (1972: 160). Despite some occasional references earlier (cf. Sebeok 1989 [1979]: 193), the breakthrough was made in Sebeok’s talk at the ‘III Wiener Symposium über Semiotik’ in 1977 (Sebeok 1989 [1979]: 187) and his numerous writings since 1976 (Sebeok 1976).<sup>7</sup> Through Sebeok, this had a positive feedback effect on ethology and many other areas, which started to refer to Uexküll again.

Shortly after the revival of interest in Uexküll by Sebeok, Thure von Uexküll published a compendium of his father’s works, supplied with extensive commentaries (J. von Uexküll 1980). This was followed by publication of translations of *Bedeutungslehre* and *Streifzüge ... in Semiotica* (J. von Uexküll 1982, 1992), and the inclusion of Uexküll in ‘Classics of semiotics’ (Krampen et al. 1987).

The word ‘Umwelt’ has by now become a term in the English-language scientific literature of many areas, including psychology, anthropology, ethology, etc. (see Sutrop, this issue).

*Impact and reception*

Uexküll's views have influenced and inspired many contemporaries and followers, far beyond biosemiotics or semiotic biology. The following brief list may illustrate the scope and variety of these fields.

- (a) Philosophy — Hermann Keyserling, Ernst Cassirer (see van Heusden, this issue), Ortega y Gasset (see Utekhin, this issue), Helmuth Plessner, Martin Heidegger, Gilles Deleuze (see Bains, this issue).
- (b) Mathematics — René Thom.
- (c) Linguistics — Heinz Werner (he knew Uexküll when in Hamburg, and became influenced by his views; cf. Werner and Kaplan 1963), Helmut Gipper (this issue), Tuomo Jämsä (this issue).
- (d) Anthropology — Tim Ingold.
- (e) Literature (see Herwig, this issue) — Rainer M. Rilke, Thomas Mann, Gottfried Benn, Raoul Hausmann, Peter Høeg (e.g., see Høeg 1996).
- (f) Art (see Botar, this issue) — Jochen Lempert (1997).
- (g) Ethology — Konrad Lorenz (he started his work on the building of ethology on the foundation laid by animal physiological behavioral research done by Uexküll; he also visited Uexküll in Hamburg), Adolf Portmann, Heini Hediger, Donald Griffin, Erich Klinghammer.
- (h) Physiology — Wolfgang von Buddenbrock (cf. Buddenbrock 1953).
- (i) Medicine — Thure von Uexküll.
- (j) Ecology — Arne Næss.
- (k) Theoretical biology — Ludwig von Bertalanffy, Adolf Meyer-Abich, Richard Woltereck (see Brauckmann, this issue), René Thom.
- (l) Semiotics — Thomas A. Sebeok, and many others.

All this is reflected in various publications about Uexküll (see 'Publications about Uexküll' below), among those in this issue. Also, several meetings and other activities devoted to him can be listed from the last half of the century.

- (1) The symposium 'Das Umweltproblem' at the third German Kongress of Philosophy in Bremen, 1950 (see Plessner 1952).
- (2) The symposium on the occasion of the sixtieth anniversary of the founding of the 'Institut für Umweltforschung' in 1986, in Hamburg (Germany).
- (3) The workshop 'Umwelt und Umweltbegriff — Die Umweltlehre Jakob von Uexkülls' on June 20, 1992, in Glottertal (Germany).

- (4) The 'Jakob von Uexküll Gesellschaft für Qualitätsausbildung von Blindenführhunden', established in September 1994, in Konstanz (Germany).
- (5) The workshop 'Uexküll and living environment' on June 7–10, 1999, in Tartu (Estonia), and the session 'Uexküll and biosemiotics' on June 12–13, 1999, in Imatra (Finland).
- (6) The symposium 'Geistige Umwelten um 1920 — Hamburger Natur- und Kulturwissenschaften im Dialog', December 14–16, 2000, in Hamburg (Germany).
- (7) Meetings and activities held in Estonia (see below).

### *Home country and the Jakob von Uexküll Center*

The rise of interest in Uexküll's works in Tartu in the last decades is a logical consequence of the regular scientific meetings of local theoretical biologists, who, among others, could not avoid a search for their local predecessors. This has been supported by the atmosphere of the Tartu semiotic school, established by Yuri Lotman.

The author's interest in Jakob von Uexküll started in 1968, when working as a young assistant during the school holidays in Puhtu Ornithological Station with a small group of scientists who were studying the ontogeny of bird thermoregulation. These were romantic days with many hours spent in a tent on an islet, chronometrizing the behavior of nestlings and their parents, and other hours at night in the lab, experimenting with small birds' reactions to different temperatures, and still more time with a heap of books about theory of biology. Puhtu itself, where the buildings of the Station are situated, was (and still is) a marvelous place, a peninsula on the western coast of Estonia, covered by old broad-leaved forest and very rich in plant and animal life, something extraordinary for the 58th latitude. This description is necessary because that atmosphere seemingly inherited much from the one of 30–40 years earlier.

An interesting fact is that the building in which the Station is housed was formerly the home of Jakob von Uexküll, built at the end of the 1920s, where he spent all his summers until 1939 with his wife and children.

When reading works by Konrad Lorenz, the head of the Puhtu Station, Jüri Keskaik came across the name Uexküll in connection with the notion of *Kumpän*. His pupil's task was to find the original of that work by Uexküll.

Several years later, in 1977, the third Estonian Spring School on theoretical biology ‘Theory of organism’, held in Puutu, was devoted to Jakob von Uexküll. Since then, Uexküll’s *Theoretische Biologie* started to appear as an important source in the Tartu circle of theoretical biology. In 1978, a biosemiotic conference ‘Biology and linguistics’ was held in Tartu, organized together with theoretical biologists from St. Petersburg and Moscow. In 1982, Yuri Lotman was in Puutu, to lecture at the 8th Estonian Spring School on Theoretical Biology ‘Theory of behavior’. In 1988, an international workshop ‘Semiotic approach in theoretical biology’ was held in Puutu and Laelatu.

In September 1989, to mark the 125th anniversary of his birth, a meeting about Uexküll was organized in Tartu and Puutu, with the participation of Thure von Uexküll and other members of von Uexküll family, who could visit the family’s homeland again after fifty years (Plate 1).

On November 16, 1993, the Uexküll Center in Tartu was established. An initiative for this came very much from a group of students who were attending a class on biosemiotics, being offered for the first time in the biology department of the University of Tartu that year. The idea of a Center was aired by Thure von Uexküll already a little earlier. The



Plate 1. *Uexküll family in Tartu, September 1989. From left to right: Gösta Brunow (U.'s grandson), Thure von Uexküll (U.'s son), Cornelia Uexküll-Haček (U.'s granddaughter), Marina von Uexküll (Thure's wife), Jakob von Uexküll, Jr. (U.'s grandson). From the archive of the Jakob von Uexküll Center, Tartu, Estonia*

necessary space was provided by the Estonian Naturalists' Society in its building. Currently, the Center is headed by Timo Maran, and it works in close cooperation with the Department of Semiotics of the University of Tartu. The Center has been able to facilitate a series of activities in the last few years. These include

- (a) teaching regular courses of biosemiotics for the students of biology and semiotics,
- (b) organizing international and local symposia, inviting guest researchers and lecturers, and developing an international network on biosemiotics,
- (c) researching the history of biosemiotics, and fields adjacent to biosemiotics,
- (d) establishing the archive of Jakob von Uexküll.

The preparation of the current issue was also a longer process.<sup>8</sup> It included an Uexküll symposium on June 7–13, 1999, in Tartu (Estonia) and Imatra (Finland), and quite a bit of epistolary discussions between the contributors to this issue.

### **Publications by Jakob von Uexküll<sup>9</sup>**

The aim, here, is to present as complete as possible a list of Jakob von Uexküll's published works. A need for such a list is obvious — despite the high citation rate of Uexküll's works, most of the authors are familiar with only a few publications by him. Accordingly, to help those who might be interested in finding the texts of their particular interest, the entries are supplied with brief annotations.

Most of descriptions are made *de visu*. In a few cases the references are incomplete because the originals were inaccessible during this work, or the reprints did not include the necessary data about the place of publication. Therefore, the list is not complete, and this concerns particularly the translations of Uexküll's works into other languages.

A few versions of Uexküll's bibliography have been published earlier, among them the largest ones by Brock (1934b) with 102 entries, and by Thure von Uexküll (in J. von Uexküll 1980: 402–412) with 176 entries (29 books and 147 articles). There are also quite extensive lists in the dissertations of Schmidt (1980; 62 entries), and Helbach (1989; 44 entries). A shorter list (16 books and 43 articles) is included in the 1970 edition of *Streifzüge ...* (Uexküll and Kriszat 1970: 183–186). These are all included in the current list.

The annotated list below includes 226 entries, among them 47 books (34 in German and 13 translations) and 179 journal or newspaper articles or book chapters (168 in German and 11 in other languages) by Jakob von Uexküll, including reprints. The list is ordered according to the language and time of publication. The works in co-authorship appear at the end of the list (altogether, Uexküll had twelve co-authors).<sup>10</sup>

*In German*

- Uexküll, Jakob von (1892a). Über secundäre Zuckung. *Zeitschrift für Biologie* 28, 540–549. [An experimental study of frogs' electrophysiology, carried out in the laboratory of Wilhelm Kühne in Heidelberg. U. analyzes the phenomenon of neural interference in muscular excitation.]
- (1892b). Physiologische Untersuchungen an *Eledone moschata*. *Zeitschrift für Biologie* 28, 550–566. [U. emphasizes the importance of finding new objects, especially among invertebrates, to solve the old questions of physiology. The species of cephalopod he is using in this study has been found particularly good for experiments due to its big and strong nerves. This multi-part work (cf. U. 1893a, 1894a, 1894c) was done in the Biological Station of Naples, with the head of its physiological department Karl Schönlein (1858–1899).]
- (1893a). Physiologische Untersuchungen an *Eledone moschata*. II. Die Reflexe des Armes. *Zeitschrift für Biologie* 30, 179–183. [Cf. U. 1892b.]
- (1893b). Über paradoxe Zuckung. *Zeitschrift für Biologie* 30, 184–186. [U. confirms in this small work an aspect of Ewald Hering's (1834–1918) theory of nerve impulses, on the basis of his two experiments with frogs' *ischadicus* nerve.]
- (1894a). Physiologische Untersuchungen an *Eledone moschata*. III. Fortpflanzungsgeschwindigkeit der Erregung in den Nerven. *Zeitschrift für Biologie* 30, 317–327. [Measurement of speed of nerve excitement. Cf. U. 1892b.]
- (1894b). Zur Methodik der mechanischen Nervenreizung. *Zeitschrift für Biologie* 31, 148–167. [U. describes the equipment, built for his research on neuromuscular preparations in the Institute of Physiology in Heidelberg.]
- (1894c). Physiologische Untersuchungen an *Eledone moschata*. IV. Zur Analyse der Functionen des Centralnervensystems. *Zeitschrift für Biologie* 31, 584–609. [In this detailed study on the central nervous system of the octopus, U. emphasizes the importance of physiological differentiation and warns against using human analogies in the



- interpretation of animal psyche, the more so the more distant from us they are in their organisation. Cf. U. 1892b.]
- (1895a). Ueber Erschütterung und Entlastung des Nerven. *Zeitschrift für Biologie* 32, 438–445. [U. analyses experimentally the possible mechanism of nerve excitement through unburdening, and speaks about autoelectric response.]
- (1895b). Vergleichend-sinnesphysiologische Untersuchungen. I. Über die Nahrungsaufnahme des Katzenhais. *Zeitschrift für Biologie* 32, 548–566. [A discussion about W. Nagel's book (*Bibliotheca zoologica* 1894), together with results of U.'s own studies on dog-fish *Scylliorhinus caniculus*. Nagel responded to U.'s critique in Nagel 1896.]
- (1896a). Zur Muskel- und Nervenphysiologie von *Sipunculus nudus*. *Zeitschrift für Biologie* 33 [N. F. 15], 1–27. [An experimental study done in Naples. *Sipunculus* belongs to phylum *Annelida*.]
- (1896b). Über Reflexe bei den Seeigeln. *Zeitschrift für Biologie* 34 [N. F. 16], 298–318. [U. asks the question about the basic phenomena of living, and describes the mechanism of spine reflex in *Sphaerechinus*. He uses the term 'Republik von Reflexen', and also says: 'Jedenfalls sind wir noch niemals der Auflösung des gesammten animalen Lebensprocesses eines Thieres in die Grundphänomene der einzelnen Zellarten näher gewesen als hier' (p. 317).]
- (1896c). Vergleichend sinnesphysiologische Untersuchungen. II. Der Schatten als Reiz für *Centrostephanus longispinus*. *Zeitschrift für Biologie* 34 [N. F. 16], 319–339. [Study on light perception in an *Echinoidea*. U. also answers to Nagel's (1896) response to the part I of this paper (1895b), particularly concerning the difference in the theories of Johannes Müller and Hermann Helmholtz and of Wilhelm Wundt about the perceptual qualities. Occasionally referred as 1897.]
- (1896d). Über die Function der Poli'schen Blasen am Kauapparat der regulären Seeigel. *Mitteilungen aus der zoologischen Station zu Neapel* 12 (3), 463–476. [There exists Ludwig's (1896) critique to this work, with a response in U. 1897b.]
- (1897a). Über die Bedingungen für das Eintreten der secundären Zuckung. *Zeitschrift für Biologie* 35, 183–191. [On a muscular phenomenon, which was interpreted differently by Kühne and Boruttau — the irritation of a nerve by a muscle.]
- (1897b). Entgegnung auf den Angriff des Herrn Prof. Hubert Ludwig (Bonn). *Zoologischer Anzeiger* 20 (523), 36–38. [Response to Ludwig (1896) in which an organ identification in U. 1896d was questioned.]
- (1899a). Die Physiologie der Pedicellarien. *Zeitschrift für Biologie* 37 [N. F. 19], 334–403. [An extensive study and review about the functioning of pedicellariae — specific organs of sea-urchins.]

- (1899b). Der Neurokinet (Ein Beitrag zur Theorie der mechanischen Nervenreizung). *Zeitschrift für Biologie* 38, 291–299. [About an instrument of mechanical nerve excitation, and the influence of an oscillating stimulus.]
- (1900a). Wilhelm Kühne. *Münchener Medicinische Wochenschrift* 27, 1–7. [Obituary of U.’s teacher in Heidelberg, Wilhelm Friedrich Kühne (1837–1900), saying, apropos: ‘So hat er denn auch in Physiologie immer nur biologische und nicht physikalische Probleme gesehen und so ist er der mathematischen Durcharbeitung der Lebensprocesse fern geblieben’ (p. 7). Page numbers according to the reprint.]
- (1900b). Die Physiologie des Seeigelstachels. *Zeitschrift für Biologie* 39 [N. F. 21], 73–112. [A further study on the mechanisms in sea-urchins and their spine movements. Cf. U. 1896b. Here, U. says: ‘Wenn ein Hund läuft, so bewegt das Thier seine Füße; wenn ein Seeigel läuft, so bewegen die Füße das Thier’ (p. 73).]
- (1900c). Ueber die Stellung der vergleichenden Physiologie zur Hypothese von der Tierseele. *Biologisches Centralblatt* 20 (15), 497–502. [Response to Wasmann’s (1900) critique to the paper by Beer, Bethe, and U. (1899).]
- (1900d). Über die Errichtung eines zoologischen Arbeitsplatzes in Dar es Salaam. *Zoologischer Anzeiger* 23 (628), 579–583. [U. emphasizes the importance of studying living organisms and describes various details of his work on establishing an aquarium in German West-Africa, together with observations on animal behavior.]
- (1900e). Die Wirkung von Licht und Schatten auf die Seeigel. *Zeitschrift für Biologie* 40 [N. F. 22], 447–476. [An extensive experimental study on the mechanism of light reflexes in sea-urchin *Diadema*, carried out in Dar es Salaam (see U. 1900d). Cf. U. 1896c on a similar subject.]
- (1901). Die Schwimmbewegungen von *Rhizostoma pulmo*. *Mitteilungen aus der zoologischen Station zu Neapel* 14, 620–626. [A study of swimming physiology and behavior of a medusa *Rhizostoma* (Cl. *Scyphozoa*, Ph. *Coelenterata*).]
- (1902a). *Im Kampf um die Tierseele*. Wiesbaden: J. F. Bergmann. [A separate print, with a changed title, of his 24-page chapter (U. 1902b) from ‘Ergebnisse der Physiologie’. Reprinted in U. 1980: 100–122. U. outlines the approach of biology as related to Kantian epistemology. U. terms the brain as ‘unmittelbare Aussenwelt’ for our consciousness, as different from ‘mittelbare Aussenwelt’ which is mediated by perceptual organs (p. 12). He also writes about signs: ‘Helmholz ... nennt die qualitäten “Zeichen” des äusseren Geschehens im Gehirn und durch diese vermittelt des Geschehens in der Aussenwelt. Erkanntes und Erkennendes stehen wie die Gegenstände der Aussenwelt zu unseren

- Sprach- oder Schriftzeichen in einem festen aber inkommensurablen Verhältnis' (p. 17).]
- (1902b). Psychologie und Biologie in ihrer Stellung zur Tierseele. *Ergebnisse der Physiologie* 1 (2), 212–233. [Printed also as a separate booklet (U. 1902a); see comments there. Reprinted in U. 1980: 100–122.]
  - (1903). Studien über den Tonus I. Der biologische Bauplan von *Sipunculus nudus*. *Zeitschrift für Biologie* 44 [N. F. 26], 269–344. [The central question of this detailed study is the mechanism through which the central nervous system organizes motion (and as a result, behavior). Here, U. introduces the concept of *representant*, for which tonus has a decisive role (p. 307). Cf. U. 1896a about the same species.]
  - (1904a). Studien über den Tonus II. Die Bewegungen der Schlangensterne. *Zeitschrift für Biologie* 46 [N. F. 28], 1–37. [With many figures. The principal interest of U. in this extensive study on *Ophioglypha lacertosa* (*Ophiuroidea*, Ph. *Echinodermata*) is the importance of the rhythm of excitation. U. formulates here a law: “Es fließt die Erregung immer zu den verlängerten Muskeln”, so kann man das Fundamentalgesetz des Erregungsablaufes in den einfachen Nervennetzen formulieren' (p. 28). He also gives a general model (schema) of the representant — the center that represents a muscle. See Haupt 1913.]
  - (1904b). Die ersten Ursachen des Rhythmus in der Tierreihe. *Ergebnisse der Physiologie* 3 (2), 1–11. [U. specifies here the fundamental rules of the excitation process. 'Die Erregung fließt in einem Nervennetz immer zu den gedehnten Muskeln' (p. 4). 'Die gedehnten Muskeln sind für die Erregung eingeklingt und die verkürzten Muskeln sind ausgeklingt' (p. 5). 'In einem Nervennetz fließt die Erregung vom Ort höheren Tonusniveaus zum Orte niederen Tonusniveaus hin' (p. 8).]
  - (1905a). *Leitfaden in das Studium der experimentellen Biologie der Wassertiere*. Wiesbaden: J. F. Bergmann. [In the introduction, U. distinguishes between physiology, which organizes the knowledge of organic systems on the basis of causality, and biology, which does it on the basis of purposefulness (*Zweckmässigkeit*). U. aims to build up biology, whereas considering physiological experiments as the important source of knowledge for biology. In the general part, U. gives a detailed account of the work of receptors, the nervous system, and muscles, together with introducing terminology (neural net, representant). This leads to a chapter on functional *Bauplänen* of animals, and the description of his methods of research. The special part gives brief accounts of various groups of water animals as an approach to study their functional body plans. The concluding chapter is a brief summary of U.'s philosophical standpoint in building biology.]

- (1905b). Studien über den Tonus III. Die Blutegel. *Zeitschrift für Biologie* 46 [N. F. 28], 372–402. [The paper begins with discussion about the difference between biology and physiology, and gives a detailed description of behavior and motion reflexes of *Hirudo* (*Hirudinea*, Ph. *Annelida*).]
- (1907a). Studien über den Tonus IV. Die Herzigel. *Zeitschrift für Biologie* 49 [N. F. 31], 307–332. [A detailed study about the behavioral mechanisms of *Echinocardium caudatum*. He also speaks about the general theory ('Lehre') of motion, and formulates its few principles, e.g., 'die Sperrung ist immer proportional der Last' (p. 328).]
- (1907b). Studien über den Tonus V. Die Libellen. *Zeitschrift für Biologie* 50 [N. F. 32], 168–202. [A study of dragonflies' (*Odonata*) behavior. Here he states: 'die Zahl der im Gehirn vorhandenen Schemata ist ausschlaggebend für die Zahl der unterscheidbaren Gegenstände' (p. 199). He calls spatial forms 'Gestalten' and temporal forms 'Melodien' (p. 200).]
- (1907c). Der Gesamtreflex der Libellen. *Zentralblatt für Physiologie* 21, 499.
- (1907d). Das Problem der tierischen Formbildung. *Die neue Rundschau* 18, 629–632. [Referring to Baer, Driesch, Roux, U. writes about the structure-building factor as an independent immortal factor that is needed to explain the *Zielstrebigkeit*. Reprinted in his book U. 1913a: 267–273.]
- (1907e). Die Umrisse einer kommenden Weltanschauung. *Die neue Rundschau* 18, 641–661. [U. introduces here the terms 'subjective biology', 'subjective anatomy' (under that he describes 'local signs', p. 655), and 'subjective physiology' (where he defines: 'Eine mit Hilfe eines Schemas geordnete Empfindungsgruppe ist ein Gegenstand'). Reprinted in the book U. 1913a: 123–154. The few changes in the text of 1913 concern particularly the terms related to Umwelt. E.g., here (p. 649): 'Diesen Ausschnitt der Aussenwelt, der für jedes Tier ein anderer ihm eigentümlicher ist, nennt man sein Milieu' (1913a: 136, '... nennt man seine Merkwelt'); here (p. 650) 'Gegenstandkerne' (1913a: 136, 137, 'Schemata, Schema'); here (p. 651) 'so bildet der Organismus mit seinem Milieu zusammen ein zweckmässiges Ganzes' (1913a: 139, 'so bildet der Organismus mit seiner Umwelt zusammen ein zweckmässiges Ganzes'), whereas here (p. 651) 'die empfundene Zweckmässigkeit in der Umwelt ist Schönheit' stays unchanged (1913a: 139).]
- (1907f). Neue Ernährungsprobleme. *Die neue Rundschau* 18, 1343–1346. [On the 'drama' of metabolism. Reprinted as the closing chapter in U. 1913a: 293–298.]

- (1908a). Die neuen Fragen in der experimentellen Biologie. *Rivista di Scienza 'Scientia'* 4 (7), 72–86. [Formulating differences between Darwinists, vitalists, and ‘Maschinalists’, U. describes the deficiencies of these approaches. Reprinted as the first chapter of his book U. 1913a: 17–34.]
- (1908b). Unsterblichkeit. *Die neue Rundschau* 19?, 315–316. [Book review of Hermann von Keyserling’s ‘Unsterblichkeit’.]
- (1908c). Die Verdichtung der Muskeln. *Zentralblatt für Physiologie* 22 (2), 33–37. [On the distinguishing between different parameters and features of muscles. Cf. U. and Stromberger 1926.]
- (1908d). Das Tropenaquarium. *Die neue Rundschau* 19, 694–706. [At the end of this popular essay, U. emphasizes the importance of ‘Respekt vor der Natur’. Reprinted in his book U. 1913a: 103–122.]
- (1909a). *Umwelt und Innenwelt der Tiere*. Berlin: Verlag von Julius Springer. [Most of the book describes the behavior and functional body plan of various invertebrate species. In addition to the Kantian philosophy, on which U.’s approach is based, one finds here also a reference to Hermann Keyserling’s book ‘Unsterblichkeit’ (p. 259). The chapter ‘Paramaecium’ (pp. 39–53) is reprinted in U. 1909b, ‘Das Protoplasmaproblem’ (pp. 11–32) in U. 1980: 153–169, and the chapter ‘Die Gegenwelt’ (pp. 191–212) in U. 1980: 233–248.]
- (1909b). Paramaecium. *Mikrokosmos* 3 (10), 190–197. [Reprinting of a chapter from the book *Umwelt und Innenwelt der Tiere* (U. 1909a: 39–53), with two figures added.]
- (1909c). Ein Wort über die Schlangensterne. *Zentralblatt für Physiologie* 23 (1), 1–2. [A comment on Mangold’s study on *Ophioglypha* which indirectly supports U.’s ‘Gesetz der Erregungsleitung’. Cf. also U. 1904a.]
- (1910a) Die Umwelt. *Die neue Rundschau* 21 (2), 638–649. [U. refers to Karl Camillo Schneider as one whose work enables one to understand the relationships between speech and Umwelt (p. 642). Cf. U. 1912h, 1913a: 204.]
- (1910b). Mendelismus. *Die neue Rundschau* 21, 1589–1596. [Describing the principles of inheritance, U. supports Mendel’s views and rejects the ones of Darwinists. Reprinted in U. 1913a: 274–283.]
- (1910c). Über das Unsichtbare in der Natur. *Österreichische Rundschau* 25, 124–130. [U. writes here: ‘Die Seelen der Tiere sind gleich zahllosen fremden Sprachen, zu denen uns der Schlüssel fehlt’ (p. 128).]
- (1910d). Die neuen Ziele der Biologie. *Baltische Monatsschrift* 69 (4), 225–239. [Besides emphasizing the role of regulation in the animal organism, he notes the correspondence of his approach to that of Aristotle, Baer, and Driesch; he also mentions Plato and H. Keyserling.]

- Reprinted (except one small paragraph of pp. 236–237) as a chapter ‘Neue Ziele’ in the book (1913a: 35–51).]
- (1912a). Die Merkwelten der Tiere. *Deutsche Revue* (Stuttgart) 37, 349–355. [A critical essay on the situation in biology. U. says about his term ‘Umwelt’ that it is often misused. ‘Es ist ganz vergebliches Bemühen, sich gegen den Sprachgebrauch zu sträuben, auch entsprach das Wort Umwelt nicht genau genug den ihm unterlegten Begriff. Ich will daher an seiner Stelle das Wort ‘Merkwelt’ setzen und damit andeuten, dass es für jedes Tier eine besondere Welt gibt, die sich aus den von ihm aufgenommenen Merkmalen der Aussenwelt zusammensetzt’ (p. 352).]
  - (1912b). Vom Wesen des Lebens (I und II). *Österreichische Rundschau* 33, 18–28, 420–431. [Reprinted in U. 1913a: 155–190.]
  - (1912c). Studien über den Tonus VI. Die Pilgermuschel. *Zeitschrift für Biologie* 58 (7), 305–332. [A study on the behavioral biology of a shell *Pecten maximus*. Cf. U. 1903, 1904a, 1905b, 1907a, 1907b.]
  - (1912d). Über den Apparat zur Bestimmung der Härte des Muskels: Sklerometer nach Wertheim-Salomonson. *Zentralblatt für Physiologie* 25 (23), 1105. [An abstract of U.’s talk, with a brief comment by Bürker.]
  - (1912e). Das Subjekt als Träger des Lebens. *Die neue Rundschau* 23, 99–107. [Reprinted (except the last paragraph) in U. 1913a: 191–204.]
  - (1912f). Wie gestaltet das Leben ein Subjekt? *Die neue Rundschau* 23, 1082–1091. [Reprinted in U. 1913a: 205–219.]
  - (1912g). Wirkungen und Gegenwirkungen im Subjekt. *Die neue Rundschau* 23, 1399–1406. [Reprinted in U. 1913a: 220–232. The word ‘Umwelt’ here is mostly replaced by ‘Merkwelt’ in the corresponding book chapter.]
  - (1912h)?. Schneider, Kurt Camillo, Tierpsychologisches Praktikum in Dialogform. Leipzig 1912, Veit u. Co. 719 Seiten. [Book Review. Place of publication not established; the proofs are marked as sent in ‘4 Dez. 12’ (from H. S. Hermann, Berlin). Cf. U. 1910a.]
  - (1913a). *Bausteine zu einer biologischen Weltanschauung. Gesammelte Aufsätze.* (Herausgegeben und eingeleitet von Felix Gross.) München: F. Bruckmann A-G. [Here, the term ‘Merkwelt’ is mostly used on the place of the later ‘Umwelt’ (cf. the comparisons with earlier texts in comments to U. 1907e). Several chapters of this book were published before in different places (U. 1907d, 1907e, 1907f, 1908a, 1908d, 1910b, 1910d, 1912b, 1912e, 1912f, 1912g, 1913b, 1913c). The chapter ‘Tierwelt oder Tierseele’ (pp. 77–100) is reprinted in U. 1980: 249–264, and another one (pp. 195–201) in U. 1926c.]
  - (1913b). Die Planmäßigkeit als oberstes Gesetz im Leben der Tiere. *Die neue Rundschau* 24, 820–829. [U. describes the behavior of medusa

- Rhizostoma pulmo*, and distinguishes between *Reflextiere* and *Erfahrungstiere*. Reprinted (except the last paragraph) in U. 1913a: 233–247. Cf. U. 1901.]
- (1913c). Die Aufgaben der biologischen Weltanschauung. *Die neue Rundschau* 24, 1080–1091. [U. begins: ‘As well as animals, also humans are objects of biology’. He gives several examples about the world as our Umwelt, which is ‘a living part of our self’. The same text has also appeared in the book (1913a: 248–264) with some small changes on pp. 1090–1091; where in the book the word ‘Merkwelt’ remains, here, in the same places, he uses ‘Umwelt’.]
- (1913d). Der heutige Stand der Biologie in Amerika. *Die Naturwissenschaften* 1 (34), 801–805. [U. says that, as different from Europe, biology proper is developing well in America, particularly what concerns developmental biology, inheritance study, and study of animal behavior. The article concentrates on the latter, describing the work of J. Loeb, H. S. Jennings, R. M. Yerkes, Parker, Herrik, and others. He also names Thorndyke, Hagerty, Watson, Cole, Berry, M. Washburn, E. L. Mark, and others.]
- (1913e). Wohin führt uns der Monismus? *Das neue Deutschland* 1/2, 641–645.
- (1913/1914). Die Zahl als Reiz. *Tierseele: Zeitschrift für vergleichende Seelenkunde* 1, 363–367. [He examines how numbers can attain the meaning of signs in the Umwelt of animals, and how they differ from the numbers used by man. Reprinted in U. 1980: 299–304.]
- (1914). Über die Innervation der Krebsmuskeln. *Zentralblatt für Physiologie* 28 (12), 764. [A brief abstract only.]
- (1915). Volk und Staat. *Die neue Rundschau* 26 (1), 53–66. [U. makes a comparison between the general features of nation (as connected to diversity and family-life) and state (as characterized by homogeneity and profession).]
- (1916). Karl Ernst von Baer. In *Das Baltenbuch*. Dachau, 17–22. [Cf. U. 1927e, 1927f.]
- (1917). Darwin und die englische Moral. *Deutsche Rundschau* 173, 215–242. [U. opposes the general opinion and the organizational imperative.]
- (1918). Biologie und Wahlrecht. *Deutsche Rundschau* 174, 183–203. [U. compares the diffuse and centralized types of organization.]
- (1919a). Der Organismus als Staat und der Staat als Organismus. *Der Leuchter* (Darmstadt, Otto Reichl Verlag), 79–110.
- (1919b). Biologische Briefe an eine Dame. *Deutsche Rundschau* 178, 309–323; 179, 132–148, 276–292, 451–468. [A popular-scientific presentation of the Umwelt-theory in the form of twelve letters. Here

- U. introduces the concept of functional cycle and gives a scheme of it (pp. 144–145). Cf. U. 1920b.]
- (1920a). *Theoretische Biologie*. Berlin: Verlag von Gebrüder Paetel. [The first edition of the main work of U. It starts from the analysis of biological space and biological time, and, going through many fundamental problems of biology, concludes with a chapter about ‘Planmässigkeit’. He gives diagrams of the functional cycle (pp. 116 and 117), which still differ from its later and stabilized version. The chapter ‘Die Innenwelt: Die physiologische Betrachtungsweise’ (pp. 109–118) is reprinted in U. 1980: 265–274, and the penultimate chapter ‘Die Lebensenergie’ (pp. 251–256) in U. 1980: 175–179. The book is dedicated to Adolf von Harnack (1851–1930), the founder and first president of Kaiser-Wilhelm-Gesellschaft (now Max-Planck-Gesellschaft), who was born in Estonia and graduated in theology from Tartu University.]
  - (1920b). *Biologische Briefe an eine Dame*. Berlin: Verlag von Gebrüder Paetel. [An introduction to Umweltlehre in the form of twelve letters. The sixth letter ‘Umwelt’ includes a figure of functional cycle (Figure 4, p. 58). The book is dedicated to his wife Gudrun. The reprinting of U. 1919f. The ‘Siebenter Brief: Entstehung’, is reprinted in U. 1980: 169–174.]
  - (1920c). *Staatsbiologie (Anatomie-Physiologie-Pathologie des Staates)* (= Sonderheft der ‘Deutschen Rundschau’, hrg. Rudolf Pechel). Berlin: Verlag von Gebrüder Paetel. [An attempt to apply the Umwelt-approach for the description of the state as an organism. Cf. U. 1917, 1918, 1919a, 1925a, 1933a.]
  - (1920d). Der Schäfer und der Böse. In *Von Pommerscher Scholle. ... Kalender für 1920*, 26–30. Gütersloh: Verl. Oertelsmann. [A literary piece.]
  - (1920e). Der Weg zur Vollendung (Des Grafen Hermann Keyserling philosophisches Schaffen). *Deutsche Rundschau* 184, 420–422. [Book review on H. von Keyserling’s ‘Der Weg zur Vollendung’, Darmstadt: Otto Reichl.]
  - (1920f). Was ist Leben? *Deutsche Rundschau* 185, 361–362. [U.’s answer here is: ‘Lebendig ist jedes Wesen, dessen körper unter der Herrschaft von gefügebildenden Naturgesetzen steht’ (p. 362).]
  - (1920g). Das Weltengeheimnis. *Deutsche Rundschau* [The correct volume number and page numbers not established.]
  - (1921a). *Umwelt und Innenwelt der Tiere*. 2te vermehrte und verbesserte Auflage. Berlin: Julius Springer. [As compared to the first edition (1909a), this one includes the pictures about the animals. The chapter ‘Der Funktionskreis’ (pp. 44–49) is reprinted in U. 1980: 274–278, and



- the chapter 'Der Beobachter' (pp. 215–219) is reprinted in U. 1980: 278–282.]
- (1921b). Die neuen Götter. *Deutsche Rundschau* 189, 101–103. [U. distinguishes between three types of interpretation of temporal changes — final, causal, and planful. The latter includes two types of organization — co-organization and post-organization. U. lists a few authors who have described the planful aspects of culture.]
  - (1921c). Der Segelflug. *Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 187 (1/3), 25. [A note on the motion of a bird's body during flight.]
  - (1922a). Wie sehen wir die Natur und wie sieht sie sich selber? *Die Naturwissenschaften* 10 (12/14), 265–271, 296–301, 316–322. [An explanation of the Umwelt-concept. Here, U. distinguishes between 'Anpassung' (quantitative) and 'Einpassung' (qualitative) as different concepts of fitness or adaptedness (p. 268). Reprinted in U. 1980: 179–213.]
  - (1922b). Technische und mechanische Biologie. *Ergebnisse der Physiologie* 20, 129–161. [A study of the Umwelt of a parasitic microbe *Plasmodium vivax*, including diagrams of its 'Umwelttunnel' (p. 142) and 'Zeitgestalt' (p. 143). In its life cycle, the periods of maintenance are called the 'mechanical', and the periods of growth the 'technical'.]
  - (1922c). Der Sperrschlag. *Archives Néerlandaises de physiologie de l'homme et des animaux* 7, 195–198.
  - (1922d). Mensch und Gott. *Deutsche Rundschau* 190, 85–87. [Book review of H. S. Chamberlain (1921), *Mensch und Gott*, München: Bruckmann.]
  - (1922e). Leben und Tod. *Deutsche Rundschau* 190, 173–183.
  - (1922f). Trebitsch und Blüher über die Judenfrage. *Deutsche Rundschau*, 193, 95–97. [A review of three books — A. Trebitsch (1919), *Geist und Judentum*, Wien: Ed. Strache; A. Trebitsch (1921), *Deutscher Geist und Judentum*, Berlin: Antaios-Verlag; Hans Blüher (1922), *Secessio Judaica*, Berlin: Der Weitze-Ritter-Verlag.]
  - (1922g). Das Problem des Lebens. *Deutsche Rundschau* 193, 235–247. [Asking a question, in what sense organisms are not machines, U. describes the works of Driesch, Spemann, Reinke, and Braus.]
  - (1923a). Weltanschauung und Naturwissenschaft. In *Jahrbuch und Kalender des Deutschtums in Lettland*, 55–60. [A review of the concept of life of various authors, including Gustav Bunge.]
  - (1923b). Die Persönlichkeit des Fürsten Philipp zu Eulenburg. *Deutsche Rundschau* 195, 180–183. [Includes a note on the difference between plants (for which 'das Werden stärker hervorhebt als das Sein') and animals (for which the mechanical phase is more emphasized than the

- technical one); cf. U. 1922b. About Eulenburg (1847–1921) also in U. 1936a: 181–194.]
- (1923c). Weltanschauung und Gewissen. *Deutsche Rundschau* 197, 253–266. [‘Nobody is a product of their environment — everybody is the master of ones Umwelt’ (p. 266).]
- (1923d). Die Stellung der Naturforscher zu Goethes Gott-Natur. *Die Tat. Monatsschrift für die Zukunft deutscher Kultur* 15 (2), 492–506.
- (1923e). Die Aristokratie in Wissenschaft und Politik. *Gewissen* 5 (9). [The article starts with a case from a physiological congress, which demonstrates that voting cannot be a method to decide what a subject perceives.]
- (1924a). Die Flügelbewegung des Kohlweißlings. *Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 202, 259–264. [A study of wing movements in a butterfly *Pieris*, with speed photography.]
- (1924b). Mechanik und Formbildung: Ein Gespräch. *Deutsche Rundschau* 201, 51–64. [An essay in the form of a dialogue between a biologist and a monist.]
- (1924c). Kant als Naturforscher. Von Erich Adickes. Band 1. Berlin 1924, W. de Gruyter & Co. *Deutsche Rundschau* 53 (5), 209–210. [Book review of Erich Adickes (1924), *Kant als Naturforscher*, vol. 1, Berlin: W. de Gruyter, xx + 378. (vol. 2, viii + 494, appeared in 1925.)]
- (1925a). Die Biologie des Staates. *Nationale Erziehung* 6 (7/8), 177–181. [Notes on the biological view of a state as an organism. With a motto from Spengler. Cf. U. 1920c, 1933a.]
- (1925b). Die Bedeutung der Planmäßigkeit für die Fragestellung in der Biologie. *Wilhelm Roux’ Archiv für Entwicklungsmechanik der Organismen* 106, 6–10. [On the organization of the ‘Bauplan’ of organisms. Appeared in the memorial volume to Hermann Braus (1868–1924). Reprinted in U. 1980: 213–217.]
- (1925c). Rudolf Maria Holzapfels Panideal. *Deutsche Rundschau* 202, 229–232. [Book review of Rudolf Maria Holzapfel (1923), *Panideal*, 2 vols., second edition, Jena: Eugen Diederichs.]
- (1926b). Gott oder Gorilla. *Deutsche Rundschau* 208, 232–242. [A short play.]
- (1926c). Ist das Tier eine Maschine? *Bausteine für Leben und Weltanschauung von Denkern alter Zeiten* 4 (6), 177–182. [Reprinted from U. 1913a: 195–201.]
- (1926d). Die Sperrmuskulatur der Holothurien. *Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 212 (1), 26–39. [A study on the physiology of motion in *Holoturia*.]

- (1926e). Tierpsychologie vom Standpunkt des Biologen: Zu dem gleichnamigen Buch von F. Hempelmann. *Zoologischer Anzeiger* 69 (7/8), 161–163. [Book Review.]
- (1927a). Definition des Lebens und des Organismus. In *Handbuch der normalen und pathologischen Physiologie: Mit Berücksichtigung der experimentellen Pharmakologie*, Bd. 1, Albrecht Bethe, Gustav von Bergmann, G. Embden, and A. Ellinger (eds.), 1–25. Berlin: J. Springer. [A review of the general features of organisms.]
- (1927b). Die Einpassung. In *Handbuch der normalen und pathologischen Physiologie: Mit Berücksichtigung der experimentellen Pharmakologie*, Bd. 1, Albrecht Bethe, Gustav von Bergmann, G. Embden, and A. Ellinger (eds.), 693–701. Berlin: J. Springer. [Cf. U. 1922a.]
- (1927c). Austen Stewart Chamberlain. *Deutsche Rundschau* 211, 183–184. [An obituary and a book review; the spelling is ‘Austen’ here.]
- (1927d). Die Biologie in ihrer Stellung zur Medizin. *Klinische Wochenschrift* 6 (24), 1164–1165. [A summary of U.’s paper in the ‘Ärztlicher Verein Hamburg’ on March 22, 1927, by Kowitz. Includes brief comments by Sudeck, Bier, Julius Wolff, Embden. U. emphasizes coordination and subordination as the two basic principles of ‘Baupläne’.]
- (1927e). Karl Ernst von Baer. In *Baltenbuch*, Paul Rohrbach (ed.), 22–26. Dachau. [An essay about Baer’s life. Cf. U. 1916, 1927f.]
- (1927f). Karl Ernst von Baer. Zu seinem 50. Todestage am 28. November 1926. In *Jahrbuch des baltischen Deutschtums*. Riga. [Cf. previous.]
- (1927g). Die Rolle des Psychoids. *Wilhelm Roux’ Archiv für Entwicklungsmechanik der Organismen* 111, 423–434. [In a volume of Festschrift to Hans Driesch, U. analyzes the concept of ‘psychoid’ that was introduced by Driesch (1921b: 357). U. writes here also about ‘Sinneszeichen’ (pp. 428–429).]
- (1928a). *Theoretische Biologie*. 2te gänzlich neu bearbeitete Auflage. Berlin: Verlag von Julius Springer. [A new and considerably rewritten edition of U. 1920a. Includes the classic figure on the functional cycle (p. 105), and indexes compiled by Brock.]
- (ed.) (1928b). *Houston Stewart Chamberlain. Natur und Leben*. Munchen: F. Bruckmann A-G. [Includes U.’s introductions and closing remarks; see U. 1928e.]
- (1928c). Über den Einfluß biologischer Analogieschlüsse auf Forschung und Weltanschauung. *Archiv für systematische Philosophie und Soziologie* 29 (1/2), 78–81. [Describing the ways to solve the ‘Lebensrätsel’, U. points to an interesting correlation — that English and American scientists tend to use more analogies from human

- relationships, whereas German scientists are inclined to apply analogies from non-living nature. In this key, U. compares the views of Darwin and Baer. Cf. U. 1913d, 1917.]
- (1928d). Gibt es ein Himmelsgewölbe? *Archiv für Anthropologie, N. F.* 21 (1/2), 40–46. [Using an example of the vault of heaven, U. explains the concepts of subjective Umwelt. ‘Die biologische Lehre, die von den subjektiven Umwelten als den Urzellen ausgeht, die eine übersubjektive Planmässigkeit zum wundersamen Organismus der Natur zusammenfügt, ist keine durchgebildete Theorie, sondern nur ein Ausblick auf ein noch unübersehbares neues Arbeitsfeld’ (p. 46).]
- (1928e). Vorwort des Herausgebers (7–11). Einleitung des Herausgebers (15–16). Einleitung des Herausgebers (95–102). Schlußwort des Herausgebers (184–187). In Uexküll 1928b. [Or, Chamberlain 1928. U. notes in his introduction that it is very difficult to get an undisturbed understanding of Chamberlain because the name of Chamberlain has obtained the meaning of a political gauntlet (p. 7). U. comments on Chamberlain’s definition of life, ‘Leben ist Gestalt’ (pp. 95ff, 184–187).]
- (1928f). Houston Stewart Chamberlain: Die Persönlichkeit. In *Bücher des Verlages F. Bruckmann A-G.*, 9–13. München: Bruckmann.
- (1929a). Welt und Umwelt. *Deutsches Volkstum* 10 (1), 21–36. [Includes references to Helmholtz, Fechner, Hering, Einstein, and Baer. A paper given in the ’90. Tagung Deutscher Naturforscher und Aerzte’ in Hamburg, and in the ‘Estländische Literarische Gesellschaft’ in Tallinn.]
- (1929b). Welt und Umwelt. *Aus deutscher Geistesarbeit* 5, 20–26, 36–46. [Reprinting of U. 1929a.]
- (1929c). Plan und Induktion. *Wilhelm Roux’ Archiv für Entwicklungsmechanik der Organismen* 116, 36–43. [In a volume of Festschrift to Hans Spemann. U. sees in induction (a Spemann term) the process through which the plans can influence each other. U. distinguishes between ‘Fremdpläne’ as passive and ‘Eigenpläne’ as active (‘Mechanisator’) which characterize an ‘Autonom’. Reprinted in U. 1980: 217–225.]
- (1929d). Gesetz der gedehnten Muskeln. In *Handbuch der normalen und pathologischen Physiologie: Mit Berücksichtigung der experimentellen Pharmakologie*, Bd. 9, Albrecht Bethe, Gustav von Bergmann, G. Embden, and A. Ellinger (eds.), 741–754. Berlin: J. Springer. [U. explains, how the neural excitation coming from a receptor finds the ‘right’ muscle, and shows the role of the muscles themselves in this process. Cf. U. 1904a.]
- (1929e). Reflexumkehr: Starker und schwacher Reflex. In *Handbuch der normalen und pathologischen Physiologie: Mit Berücksichtigung der experimentellen Pharmakologie*, Bd. 9, Albrecht Bethe, Gustav von Bergmann, G. Embden, and A. Ellinger (eds.), 755–762.

- Berlin: J. Springer. [A detailed study of neuro-muscular feedback (follows U. 1929d). U. reaches an important conclusion ‘Die Aufgabe/ der Reize/ ist es nicht, dem Tier die Kenntnis der Aussenwelt zu vermitteln, sondern den “richtigen Weg” durch eine ihm völlig unbekannte Welt zu weisen. Deshalb ist auch die Merkwelt /.../ so dürftig und /.../ Wirkungswelt so sicher und planmässig’ (p. 762).]
- (1929f). Zur Physiologie der Patellen. *Zeitschrift für vergleichende Physiologie* 11 (1), 155–159. [An aquarium study of a mollusk *Patella coerulea*.]
- (1930a). *Die Lebenslehre*. Potsdam: Müller und Kiepenheuer Verlag. [The book consists of many short chapters, in which U. introduces the over-mechanistic biology as begun by Gustav Bunge (p. 14) and developed by Hans Driesch (p. 11) and U. himself. Appeared as vol. 13 of the series ‘Das Weltbild: Bücher des lebendigen Wissens’ (ed. Hans Prinzhorn).]
- (1930b). Jordan, H. J., *Allgemeine vergleichende Physiologie der Tiere*. Berlin: W. de Gruyter 1929. XXVII, 761 S. *Die Naturwissenschaften* 18 (4), 88–89. [Book review. According to Jordan, the task of biology is to deal with an organism as a system.]
- (1931a). Umweltforschung. *Die Umschau* 35 (36), 709–710. [U. discusses the difference between behaviorism (of Loeb and Jennings) and Umwelt-research.]
- (1931b). Der Organismus und die Umwelt. In *Das Lebensproblem im Lichte der modernen Forschung*, Hans Driesch and Heinz Woltereck (eds.), 189–224. Leipzig: Quelle & Meyer. [U. defines here the difference between the mechanical and biological view using the concept of sign. One chapter is titled as ‘Die Inhaltzeichen in unserer Umwelt und in den Umwelten der Tiere’. Reprinted in U. 1980: 305–343.]
- (1931c). Die Rolle des Subjekts in der Biologie. *Die Naturwissenschaften* 19 (19), 385–391. [On the typology of organismic processes. Includes a diagram of the functional cycle identical to the one reproduced in the beginning of the current issue. Reprinted in U. 1980: 343–356.]
- (1932a). Menschenpläne und Naturpläne. *Deutsche Rundschau* 231, 96–99. [U. states here: ‘Zur Herstellung eines Gegenstandes in der menschlichen Umwelt benutzt der Mensch den Bauplan des Gegenstandes. Zur Herstellung eines Gegenstandes in der Umwelt eines Tieres benutzt der Bauplan das Tier’ (pp. 97–98).]
- (1932b). Moderne Probleme der biologischen Forschung. *Mitteilungen für die Ärzte und Zahnärzte Groß-Hamburgs* 32 (28), 472–474.
- (1932c). Der gedachte Raum. In *Die Wissenschaft am Scheidewege von Leben und Geist: Festschrift Ludwig Klages zum 60. Geburtstag*, H. Prinzhorn (ed.), 231–239. Leipzig: J. A. Barth. [On the concept of biological space.]

- (1932d). Die Umwelt des Hundes. *Zeitschrift für Hundeforschung* 2 (5/6), 157–170. [U. describes here, functional cycles which go through two Umwelten.]
- (1932e). Über die Umwelt des Hundes. *Klinische Wochenschrift* 11 (7), 308. [Summary (compiled by Demme) of U.'s paper in 'Ärztlicher Verein Hamburg (biologische Abteilung), Sitzung vom 24. November 1931'.]
- (1932f). Das Duftfeld des Hundes. In *Bericht über den 12. Kongreß der Deutschen Gesellschaft für Psychologie in Hamburg (vom 12.-16. April 1931)*, G. Kafka (ed.), 431–433. Jena: G. Fischer. [Referred in Werner and Kaplan (1963: 10). Cf. U. and Sarris 1931a, 1931b.]
- (1933a). *Staatsbiologie: Anatomie-Physiologie-Pathologie des Staates*. Hamburg: Hanseatische Verlagsanstalt. [The second edition of U. 1920c. The chapter on pathology is considerably changed for this edition.]
- (1933b). Hat es einen Sinn von Tonusmuskeln und Tetanusmuskeln zu sprechen? *Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 232 (6), 842–847. [The author spelled as Üxküll. Critical comments on a paper by Paul Krüger, Franz Duspiva, and Franz Fülrlinger (1933).]
- (1933c). Das Führhundproblem. *Zeitschrift für angewandte Psychologie* 45 (1/3), 46–53. [A study on dog-blind communication. Cf. U. 1932d.]
- (1933d). Biologie oder Physiologie. *Nova Acta Leopoldina, N. F.* 1 (2/3), 276–281. [U. states, here, that 'der Inhalt der Umwelten ist bedingt durch hinausverlegten Sinnes-oder Merkzeichen' (p. 277). Discussing the notion of 'dynamic systems' by Hartmann and Jordan, U. says that 'dynamic' may mean both 'planvoll' and 'planlos' (p. 281). Reprinted in U. 1980: 122–129.]
- (1933e). Das doppelte Antlitz der Naturwissenschaft. *Welt und Leben* 14, 1–3. [About the difference between the 'Forschung' and 'Lehre', and between formula and form. Cf. U. 1933h.]
- (1933f). Die Entplanung der Welt: Magische, mechanische und dämonische Weltanschauung. *Deutsche Rundschau* 236, 38–43, 110–115. [Includes U.'s comments on Watson's behaviorism (pp. 110–112). In the first part of the paper, the author's name is spelled as Üxküll.]
- (1933g). Wie sieht das Tier die Welt? *Neueste Zeitung* 96 (25 April). [A summary of U.'s paper in *Wiener Urania*, taken from 'Wiener Neuesten Nachrichten' (this source not found). It is stated that the aim of biology is to find out the relationship between Umwelten.]
- (1933h)? Das doppelte Antlitz der Naturwissenschaft. *Koralle* 7 (1). [Reprinting of U. 1933e. The page numbers not found.]
- (1934a). Der Blindenführer. *Forschungen und Fortschritte* 10 (9), 117–118.

- (1934b). Die Universitäten als Sinnesorgane des Staates. *Ärzteblatt für Sachsen, Provinz Sachsen, Anhalt und Thüringen* 1 (13), 145–146.
- (1934c). Der Wirkraum. *Hamburger Fremdenblatt* 170, 3.
- (1935a). Der Hund kennt nur Hundedinge. *Hamburger Fremdenblatt* 172, 9.
- (1935b). Der Kampf um den Himmel. *Die neue Rundschau* 46, 367–379. [U. uses here the term ‘Bedeutungsträger’ (p. 377).]
- (1935c). Die Bedeutung der Umweltforschung für die Erkenntnis des Lebens. *Zeitschrift für die gesamte Naturwissenschaft* 1 (7), 257–272. [U. develops, here, his notion of ‘Bedeutungsträger’, and distinguishes between ‘Heimes’ and ‘Fremdes’, ‘Planfolger’ and ‘Plangeber’, ‘kausalbedingt’ and ‘planbedingt’, etc. Reprinted in U. 1980: 363–381.]
- (1935d). Die Bedeutung der Umweltforschung für die Erkenntnis des Lebens. *Illustr. Zeitung* 4705, 639f. [Cf. the previous.]
- (1936a). *Nie geschaute Welten: Die Umwelten meiner Freunde. Ein Erinnerungsbuch.* Berlin: S. Fischer Verlag. [An autobiographic book. The chapter on Keyserling (pp. 55–70) is reprinted in U. 1936e. For an English translation of the introduction see this issue. Cf. U. 1939a, 1949, 1957a, 1963.]
- (1936b). Biologie in der Mausefalle. *Zeitschrift für die gesamte Naturwissenschaft* 2 (6), 213–222. [The topic of this paper is the limits of the law of ‘Denkökonomie’. U. describes the differences between ‘Umgebung’, ‘Wohnwelt’, ‘Milieu’, and ‘Umwelt’; he discusses the Jacques Loeb’s concept of tropisms, and Möllinger’s studies on the learning in mice.]
- (1936c). Der Wechsel des Weltalls. *Acta Biotheoretica* A 2 (3), 141–152. [U. points to some similarities in the approaches of new physics and his ‘Umweltlehre’.]
- (1936d). Die Religion und die Naturwissenschaften. *Die Erziehung* 12 (8), 379–382. [Book review of Albert Eagle (1936), *The Philosophy of Religion versus the Philosophy of Science.*]
- (1936e). Graf Alexander Keyserling oder die Umwelt des Weisen: Aus einem Erinnerungsbuch. *Die neue Rundschau* 47 (9), 929–937. [Reprinting of a chapter from U. 1936a: 55–70.]
- (1937a). Umweltforschung. *Zeitschrift für Tierpsychologie* 1 (1), 33–34. [A brief introduction to the research of meanings and meaning-carriers in animal Umwelten, in the first issue of a new journal of the German Society of Animal Psychology.]
- (1937b). Die neue Umweltlehre: Ein Bindeglied zwischen Natur- und Kulturwissenschaften. *Die Erziehung* 13 (5), 185–199. [For an English translation of this paper see this issue.]

- (1937c). Das Zeitschiff: Eine wissenschaftliche Plauderei. *Hamburger Fremdenblatt* 80, 5.
- (1937d). Das Problem des Heimfindens bei Menschen und Tieren: Der primäre und der sekundäre Raum. *Zeitschrift für die gesamte Naturwissenschaft* 2 (12), 457–467. [A study on the problem of homing in animals and humans, and the role of symbols and maps in the latter.]
- (1937e). Umwelt und Leben. *Volk und Welt* 37, 19–22.
- (1938a). *Der unsterbliche Geist in der Natur: Gespräche*. Hamburg: Christian Wegner Verlag. [Three biological conversations (Die Gestirne; Die Gegenstände; Die Lebewesen) between four persons — v. W., zoologist, painter, and biologist (first person). Reprinted in 1946, 1947a. Cf. U. 1950.]
- (1938b). Das Werden der Organismen und die Wunder der Gene. In *Die Natur — das Wunder Gottes*, Eberhard Dennert (ed.), 135–144. Berlin: Verlag Martin Warnek. [A popular introduction to the role and behavior of genes in the development of an organism. Cf. U. 1957b.]
- (1938c). Zum Verständnis der Umweltlehre. *Deutsche Rundschau* 256 [64 (10)], 64–66. [A response to the paper by Paul Fechter (1938), ‘Der Kampf mit den Umwelten’.]
- (1938d). Tier und Umwelt. *Zeitschrift für Tierpsychologie* 2 (2), 101–114. [U. points to the differences between Newton’s and Goethe’s views of nature.]
- (1939a). *Nie geschaute Welten: Die Umwelten meiner Freunde. Ein Erinnerungsbuch*. Berlin: S. Fischer Verlag. [Reprinting of U. 1936a.]
- (1939b). Kants Einfluß auf die heutige Wissenschaft: Der große Königsberger Philosoph ist in der Biologie wieder lebendig geworden. *Preußische Zeitung* 9 (43), 3.
- (1940a). *Bedeutungslehre* (= Bios, Abhandlungen zur theoretischen Biologie und ihrer Geschichte sowie zur Philosophie der organischen Naturwissenschaften. Bd. 10). Leipzig: Verlag von J. A. Barth. [The final theoretical book of U. about biology as the study of meaning. The chapter 7, ‘Die Kompositionslehre der Natur’ (pp. 32–40), is reprinted in U. 1980: 282–290, and the last chapter ‘Zusammenfassung und Schluss’ (pp. 56–62) is reprinted in U. 1980: 382–388. English translation in U. 1982.]
- (1940b). *Der Stein von Werder*. Hamburg: Christian Wegner Verlag. [A tale about a stone with an inscription from Virtsu (Werder, Estonia), whose characters include sisters of Helwig. Helwig family owned the land of Puhtu in the nineteenth century, i.e., the place where the summer-home of U. stood at the time of the writing of this book.]



- (1940c). Tierparadies im Zoo: Brief an den Direktor des Leipziger Zoologischen Gartens. *Der Zoologische Garten (N. F.)* 12 (1), 18–20. [U. poses a few questions on how to design the space for the animals in the zoo, and how to use their learning capabilities to improve the showing of animals. Cf. the response in Schneider 1940.]
- (1943). Darwins Verschulden! *Deutsche Allgemeine Zeitung* 82 (22/23), 1–2. [U. interprets an expression of an Italian philosopher, ‘*Darwin mundum stultitiat*’.]
- (1946). *Der unsterbliche Geist in der Natur: Gespräche*. Hamburg: Christian Wegner Verlag. [Second printing of U. 1938a.]
- (1947a). *Der unsterbliche Geist in der Natur: Gespräche*. Hamburg: Christian Wegner Verlag. [Third printing of U. 1938a. The closing sentence sounds (p. 98): ‘Wie die Melodie den Leierkasten überlebt, so überlebt der menschliche Geist das Grosshirn’.]
- (1947b). *Der Sinn des Lebens: Gedanken über die Aufgaben der Biologie*. Mitgeteilt in einer Interpretation der zu Bonn 1824 gehaltenen Vorlesung des Johannes Müller ‘Von dem Bedürfnis der Physiologie nach einer philosophischen Naturbetrachtung’, mit einem Ausblick von Thure von Uexküll. Godesberg: Verlag Helmut Küpper. [A part of this essay about the philosophical problems of biology has the form of a dialogue between a supporter of Johannes Müller and a supporter of Hermann Helmholtz. The first printing of this book was completely lost due to bombing in Leipzig in 1943. Includes a chapter by Thure von Uexküll (pp. 79–118).]
- (1949). *Niegeschaute Welten: Die Umwelten meiner Freunde. Ein Erinnerungsbuch*. Berlin: Suhrkamp. [Third printing of U. 1936a.]
- (1950). *Das allmächtige Leben*. Hamburg: Christian Wegner Verlag. [In the same style as U. 1938a, the book consists of biological conversations between five persons — v. W., zoologist (representing the views close to Ernst Haeckel), painter (whose prototype is Franz Huth), biologist (first person, Uexküll himself), and Kurator v. K. (his prototype might be Alexander von Keyserling, the Kurator of Tartu University; he was not present in the conversations of U. 1938a). The places described are reminiscent of the Estonian landscape and buildings. The chapters 1–9 (pp. 15–92) are written by U., and chapters 10–18 (pp. 92–177) by his wife and son (Gudrun and Thure) according to the unfinished notes of U. Preface by Gudrun and Thure von Uexküll (1950).]
- (1957a). *Nie geschaute Welten: Die Umwelten meiner Freunde. Ein Erinnerungsbuch*. München. [Reprinting of U. 1936a.]
- (1957b). Materielle und immaterielle Grundlagen des Lebens. In *Die Natur das Wunder Gottes*, Eberhard Dennert (ed.), 123–130. Berlin: Athenäum-Verlag. [Cf. U. 1938b.]

- (1963). *Niegeschaute Welten: Die Umwelten meiner Freunde. Ein Erinnerungsbuch*. Berlin: Suhrkamp. [Reprinting of U. 1936a.]
- (1973). *Theoretische Biologie*. Frankfurt: Suhrkamp. [Reprinting of U. 1928a. With an introduction by Rudolf Bilz (1973).]
- (1977). *Der Sinn des Lebens*. Gedanken über die Aufgaben der Biologie, mitgeteilt in einer Interpretation der zu Bonn 1824 gehaltenen Vorlesung des Johannes Müller ‘Von dem Bedürfnis der Physiologie nach einer philosophischen Naturbetrachtung’, mit einem Ausblick von Thure von Uexküll. Stuttgart: Ernst Klett Verlag. [Reprinting of U. 1947b.]
- (1980). *Kompositionslehre der Natur. Biologie als undogmatische Naturwissenschaft. Ausgewählte Schriften*, herausgegeben und eingeleitet von Thure von Uexküll. Frankfurt: Verlag Ullstein GmbH. [Includes twenty two reprinted texts by U., publication of four letters (to Hans Driesch, Hans Spemann, Friedrich Brock, and Heinrich Junker), and extensive comments by Thure von Uexküll.]
- (1997). Schattenmärchen. In *Subjektive Anatomie: Theorie und Praxis körperbezogener Psychotherapie, 2.* Auflage, Thure von Uexküll, Marianne Fuchs, Hans Müller-Braunschweig, and Johnen Rolf (eds.), 3–5. Stuttgart: Schattauer. [Reprinting of a chapter from U. 1936a: 11–18 (with abbreviations). First edition in 1994.]
- (1998). Erinnerungen. In *Galut Nordost: Zeitschrift für jüdisch-baltische Kultur und Geschichte* (Köln: Wissenschaft und Politik) 1 (1).
- Beer, Theodor; Bethe, Albrecht; and Uexküll, Jakob von (1899a). Vorschläge zu einer objectivierenden Nomenklatur in der Physiologie des Nervensystems. *Biologisches Centralblatt* 19 (15), 517–521. [The paper proposes a classification of responses to irritants, and of organs of perception. Cf. U. 1900c, U. and Brock 1935, Wasmann 1900, Dzendolet 1967.]
- (1899b). Vorschläge zu einer objectivierenden Nomenklatur in der Physiologie des Nervensystems. *Zoologischer Anzeiger* 22, 275–280. [Another printing of the previous paper. Reprinted in U. 1980: 92–100.]
- Cohnheim, Otto and Uexküll, Jakob von (1911). Die Dauerkontraktion der glatten Muskeln. *Sitzungsberichte der Heidelberger Akademie der Wissenschaften, Mathematisch-naturwissenschaftliche Klasse* 32, 1–9. [Measurements of gas exchange as dependent on muscular work in *Hirudo medicinalis*.]
- Noyons, A. and Uexküll, Jakob von (1911). Die Härte der Muskeln. *Zeitschrift für Biologie* 56 (3/4), 139–208. [A large experimental study on muscle physiology, in order to distinguish between different functions of muscles.]

- Uexküll, Jakob von and Brock, Friedrich (1927). Atlas zur Bestimmung der Orte in den Sehräumen der Tiere. *Zeitschrift für vergleichende Physiologie* 5 (1), 167–178. [Using rasters of different density, a series of photographs is made, which can be used to estimate an animal's seeing abilities if the direction constant of the eye is measured.]
- (1930). Das Institut für Umweltforschung. In *Forschungsinstitute, ihre Geschichte. Organisation und Ziele*, Bd. 2, Ludolf Brauer, Albrecht Mendelssohn-Bartholdy, and Adolf Meyer (eds.), 233–237. Hamburg: Hartung Verlag. [A formulation of the main aims of Umwelt-research. They define: 'die Umweltforschung ist eine Plangebung für alle lebenden Gestalten'.]
- (1935). Vorschläge zu einer subjektbezogenen Nomenklatur in der Biologie. *Zeitschrift für die gesamte Naturwissenschaft* 1 (1/2), 36–47. [The paper reflects on the interpretations after Beer, Bethe, and U. 1899a. The biological nomenclature should reflect the differences which the subject-Umwelt-whole makes by itself through its functional cycles. Here, the notions of meaning and meaning carrier are used. Reprinted in U. 1980: 129–142.]
- Uexküll, Jakob von and Gross, F. (1913). Studien über den Tonus. VII. Die Schere des Flußkrebsses. *Zeitschrift für Biologie* 60 (8/9), 334–357. [An experimental study on the neuromotorics of *Astacus*. Cf. U. 1912c.]
- Uexküll, Jakob von and Kriszat, Georg (1934). *Streifzüge durch die Umwelten von Tieren und Menschen: Ein Bilderbuch unsichtbarer Welten* (= Verständliche Wissenschaft 21). Berlin: J. Springer. [A popular introduction to the study of Umwelten. The text is written by U., and the illustrations made and compiled by Kriszat. Several illustrations belong to Franz Huth and Thure von Uexküll. Dedicated to Otto Kestner for his sixtieth birthday. Reprintings cf. U. and Kriszat 1956. English translation in U. 1992.]
- (1956). *Streifzüge durch die Umwelten von Tieren und Menschen: Ein Bilderbuch unsichtbarer Welten. Bedeutungslehre* (= Rowohlt's deutsche Enzyklopädie 13). Mit einem Vorwort von Adolf Portmann. Hamburg: Rowohlt. [New edition of U. and Kriszat 1934 and U. 1940a. Reprintings: 1958, 1962, 1970, 1983. The chapter 'Die magische Umwelten' (pp. 87–93) reprinted in U. 1980: 356–363.]
- (1958). *Streifzüge durch die Umwelten von Tieren und Menschen. Bedeutungslehre*. Hamburg: Rowohlt. [Reprinting of U. and Kriszat 1956.]
- (1962). *Streifzüge durch die Umwelten von Tieren und Menschen. Bedeutungslehre*. Hamburg: Rowohlt. [Reprinting of U. and Kriszat 1956.]

- (1970). *Streifzüge durch die Umwelten von Tieren und Menschen. Bedeutungslehre*. Frankfurt: S. Fischer. [Reprinting of U. and Kriszat 1956. With introductory articles by Adolf Portmann and Thure von Uexküll. Reprinted in 1983.]
- (1983). *Streifzüge durch die Umwelten von Tieren und Menschen. Bedeutungslehre*. Frankfurt: Fischer-Taschenbuch-Verlag. [Reprinting of U. and Kriszat 1970.]
- Uexküll, Jakob von and Roesen, H. (1927). Der Wirkraum. *Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 217 (1), 72–87. [Definition and analysis of the concept of the individual operation space.]
- Uexküll, Jakob von and Sarris, Emanuel Georg (1931a). Das Duftfeld des Hundes (Hund und Eckstein). *Zeitschrift für Hundeforschung* 1 (3/4) 55–68. [An experimental study on the marking behavior of four dogs.]
- (1931b). Das Duftfeld des Hundes. *Forschungen und Fortschritte* 7 (17), 242–243. [A summary of the study described in Uexküll and Sarris 1931a.]
- (1931c). Der Führhund der Blinden. *Die Umschau* 35 (51), 1014–1016. [A study of relationships between Umwelten of dog and human. Includes seven experiments with a dog and a chair.]
- (1932). Dressur und Erziehung der Führhunde für Blinde. *Der Kriegsblinde* 16 (6), 93–94.
- Uexküll, Jakob von and Stromberger, K. (1926). Die experimentelle Trennung von Verkürzung und Sperrung im menschlichen Muskel. *Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 212 (3/4), 645–648. [A study which continues the work of U. 1908c and U. 1926d.]
- Uexküll, Jakob von and Tirala, L. G. (1915). Über den Tonus bei den Krustazeen. *Zeitschrift für Biologie* 65 (1/2), 25–66. [A study on crab legs physiology and biology. In the end few comments to Haupt's (1913) paper.]
- Uexküll, Jakob von and Uexküll, Thure von (1943). Die ewige Frage: Biologische Variationen über einen platonischen Dialog. *Europäische Revue* 19 (3), 126–147. [In a book form see the next (1944).]
- (1944). *Die ewige Frage: Biologische Variationen über einen platonischen Dialog*. Hamburg: Marion von Schröder Verlag. [U. says in the introduction that contemporary biology has put us closer to the Antique. Biological understanding can approach nature not from the outside, but from the inside. The text is written in the form of a dialogue between Sokrates and Menon. Reprinting of the previous (1943).]

*In French*

- Uexküll, Jakob von (1909d). Résultats des recherches effectuées sur les tentacules de l'*Anemonia sulcata* au Musée Océanographique de Monaco, en décembre 1908 (note préliminaire). *Bulletin de l'Institut Océanographique* 148, 1–3. [Brief list of results of a study on *Anemonia (Hexacorallia, Cl. Anthozoa)*.]
- (1965). *Mondes Animaux et Monde Humain*. Paris: Gonthier. [Translation of U. and Kriszat 1956.]
- Uexküll, Jakob von and Gross F. (1909). Résultats des recherches effectuées sur les extrémités des langoustes et des crabes au Musée Océanographique de Monaco en février et mars 1909. *Bulletin de l'Institut Océanographique* 149, 1–4. [The object of this research is *Palinurus* from subordo *Reptantia*.]

*In English*

- Uexküll, Jakob von (1926a). *Theoretical Biology* (=International Library of Psychology, Philosophy, and Scientific Method), trans. by D. L. MacKinnon. New York: Harcourt, Brace. [Translation of U. 1920a. An inconsequent translation of U.'s terms in this book has made it difficult to use; cf. Sebeok 1998: 32.]
- (1957c). A stroll through the worlds of animals and men. In *Instinctive Behavior: The Development of a Modern Concept*, Claire H. Schiller (ed. and trans.), 5–80. New York: International Universities Press. [Second printing in 1964. Translation of U. and Kriszat 1934. Cf. Lashley 1957; Schiller 1957.]
- (1982). The theory of meaning. *Semiotica* 42 (1), 25–82. [Translation of 'Bedeutungslehre' (U. 1940a), with a preface, introductory paper, and glossary by the guest editor of the issue Thure von Uexküll (1982a, 1982b, 1982c). Trans. by Barry Stone and Herbert Weiner.]
- (1985). Environment [Umwelt] and inner world of animals. In *The Foundations of Comparative Ethology*, Gordon M. Burghardt (ed.), 222–245. New York: Van Nostrand Reinhold. [Excerpts from U. 1909a (pp. 4–10, 54–55, 58–61, 73–74, 88–90, 117–119, 192–198, 231–236, 240–242, 248–253). Trans. by Chauncey J. Mellor and Doris Gove.]
- (1992). A stroll through the worlds of animals and men: A picture book of invisible worlds. *Semiotica* 89 (4), 319–391. [Reprinting of U. 1957c.]
- (1996). A stroll through the worlds of animals and men. In *German Essays on Science in the 20th Century* (=The German Library 82), Wolfgang Schirmacher (ed.), 171–178. New York: Continuum.

[Reprinting of Claire H. Schiller's translation of the introductory chapter of U. and Kriszat (1934; 1957: 5–13, without figures). The book includes writings by twenty German scientists of the twentieth century: Mach, Weyl, Schrödinger, Einstein, Heisenberg, Planck, Meitner, Gödel, Butenandt, Koch, Uexküll, Lorenz, Eigen, Weber, Vossler, Simmel, Radbruch, Bosch, and Weizsäcker.]

#### *In Dutch*

Uexküll, Jakob von (1924). Hoe zien wij de natuur en hoe ziet deze zich zelve? *Wetenschappelijke Bladen* (Haarlem) 3, 37–51. [A translation of U. 1922a.]

Uexküll, Jakob von and Kriszat, Georg (1958). *Zwerftochten door de Werelden van Dieren en Mensen*. Amsterdam: Wereld-Bibliotheek.

#### *In Estonian*

Uexküll, Jakob von (1991). Tähendusõpetus. *Akadeemia* 3 (10), 2105–2113. [Translation of a chapter from 'Bedeutungslehre' (1940), trans. by Meelis Tõns.]

— (1996). Rännak läbi loomade ja inimeste omailmade. *Vikerkaar* 1–2, 165–171. [Translation of two chapters from U. and Kriszat (1956: 46–53, 60–65). Trans. by Piret Peiker.]

Uexküll, Jakob von and Kriszat, Georg (1999). Rännud loomade ja inimeste omailmade. *Eesti Loodus* (1), 35–38, (2/3), 107–109, (4), 156–159, (5), 204–206, (6), 252–255, (7), 301–303, (8), 349–350, (9), 393–395, (11/12), 518–520. [Translation of U. and Kriszat 1934. Trans. by Mari Tarvas.]

#### *In Italian*

Uexküll, Jakob von (1947). *L'immortale spirito della natura*. Bari. [Cf. Mondella 1967: 80.]

Uexküll, Jakob von and Kriszat, Georg (1967). *Ambiente e comportamento*. Verona: Casa editrice Il Saggiatore. [Trans. by Paola Manfredi, with an introduction by Felice Mondella (1967).]

#### *In Japanese*

Uexküll, Jakob von (1973). *Seibutsu kara Mita Sekai (The World As Seen by Living Things)*, trans. by Hidaka Toshitaka and Noda Yasuyuki. Tokyo: Shisakusha.

*In Polish*

Uexküll, Jakob von (1998). *Istota*<sup>11</sup> *ywa jako podmiot: Wybór pism Jakoba Johannesesa von Uexkülla*, ed. by Aldona Pobojevska, trans. by Aldona Pobojevska and Malgorzata Pólrola. Lodz: Studio Wydawnicze Karta. [This includes translations of U. 1902a, 1905a (excerpts), 1907e, 1910c, 1921a (excerpts), 1922a, 1933d, and U. and Kriszat 1934 (excerpts).]

*In Portuguese*

Uexküll, Jakob von (?). *Dos Animais e dos Homens: Digressões pelos seus mundos próprios. Doutrina do Significado*, trans. by Alberto Candeias and Anibal Garcia Pereira. Lisboa: Livros do Brasil. [Translation of U. and Kriszat 1956. The year of publication not shown in the book.]

*In Spanish*

Uexküll, Jakob von (1922). *Ideas para una concepción biológica del mundo* (= Biblioteca de ideas del siglo XX: 3). Traducción del alemán por R. M. Terneiro. Madrid: Calpe. [Translation of U. 1913a; second edition 1934.]

—(1925). *Cartas biológicas a una dama*. Traducción del alemán por M. G. Moreno. Madrid: Revista de Occidente.

—(1942). *Meditaciones biológicas. La teoría de la significación*. Traducción del alemán por José M. Sacristán. Madrid: Revista de Occidente.

—(1944). *Teoría de la vida*. Madrid: Summa.

—(1945). *Ideas para una Concepción Biológica del Mundo*. Buenos Aires: Espasá-Calpe Argentina S. A.

**Post-bibliographical: Publications about Jakob von Uexküll**

The publications about Uexküll are of several, and quite different, types. This list cannot be complete.

- (a) Thorough descriptions and interpretations of his views and concepts. These are, particularly, the writings by his son Thure von Uexküll (1979a, 1979b, 1981a, 1981b, 1982b, 1987, 1989, 1992b, 1998), by Sebeok (1986, 1989 [1979]), and several others (Brock 1934a, 1939a; Franck 1999; Gipper 1963; Kull 1982, 1999d; Langthaler 1992; Pobojevska 1993a, 1993b). Here belong also the

- chapters on him in several textbooks on semiotics (Deely 1990; Stepanov 1971), and papers on the history of science (Alt et al. 1996; Harrington 1996; Hünemörder 1979).
- (b) Dissertations about him (Lassen 1941 [1939]; Eberhardt 1953; Schmidt 1980; Helbach 1989; Szewczyk 1993).
  - (c) Papers that comment or criticize his particular works or statements (e.g., Haupt 1913; Ludwig 1896; Nagel 1896; Wasmann 1900; Ziegler 1900).
  - (d) Book reviews (Alverdes 1932; Brock 1929; Driesch 1921a; Ehrenberg 1929; Glaser 1910; Holle 1920; Lehmann 1934; Rosen 1920; Schaxel 1922b; Thomson 1927; Wirth 1928), including a few secondary ones (Buchka 1994; Koehler 1965).
  - (e) Introductions and closing remarks to his books or their translations (Gross 1913; G. von Uexküll and T. von Uexküll 1950; Kriszat 1958a, 1958b; Lashley 1957; Portmann 1956, 1970; Schiller 1957, 1992; Mondella 1967; T. von Uexküll 1982a, 1982b, 1982c, 1992a, 1992b; Pobjewska 1998a, 1998b; Kull 1991b, 1999b, 1999c).
  - (f) Obituaries or festive speeches or articles on the occasions of his birthdays or anniversaries (Brock 1934a; Coutinho 1934; Dau 1993; Driesch 1934; Kühl 1965; Meyer 1934a; Schröder 1934; Skramlik 1934a, 1934b; J. von Uexküll, Jr. 1991).
  - (g) Memoirs about him (G. von Uexküll 1964; Bethe 1940; Goldschmidt 1956; Fritsch 1964; Driesch 1951; T. von Uexküll 1991b).
  - (h) Biographical entries in dictionaries or encyclopedias or elsewhere. Only a few longer ones are included in the list below (Deschamps 1984; Goudge 1967; Graumann 1988; Grenner-Sillamy 1980; Jahn 1998a; Kriszat 1958b; T. von Uexküll 1986b).
  - (i) Books and articles dedicated to J. von Uexküll (Brock 1939b; Chamberlain 1919; Lorenz 1935, 1957; Sarris 1937; Meyer 1934c). Festschrifts — collections of papers to his honor — have been published for his sixtieth birthday (*Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere* 205, 1924, 1–200, among contributors were Hans Driesch, F. J. J. Buytendyk, K. Spiro, Otto Kestner, E. H. Starling, Rahel Plaut, Albrecht Bethe, T. Nakamura, Leon Asher, N. Kleitman, R Magnus, Hermann Braus, and others), and seventieth birthday (*Sudhoff's Archiv für Geschichte der Medizin und der Naturwissenschaften* 27 (3/4), 1934, pp. 193–352; among contributors were Friedrich Brock, Hans Driesch, Ludwig Klages, Heinrich Balss, Friedrich Eggers, Yrjö Renqvist, Hermann Jordan, Otto Kestner, Karl Friederichs, Ernst Janisch, E. Almquist, Helmut Minkowski, Adolf Meyer; however, only the papers by Brock and Meyer treated directly Uexküll's works).



- (j) Scientific or philosophical literature the authors of which to some extent share Uexküll's views and thus refer to him and develop his views (H. Keyserling 1910; Cassirer 1972 [1944]; Driesch 1921b; Sebeok 1976, 1986, 1989 [1979], Hoffmeyer 1996; Salthe 1993, and others). Here belong also many works of his collaborators (particularly those by F. Brock), and many others (e.g., Meyer 1934b, 1934c; Meyer-Abich 1963; Gipper 1963).
- (k) Literature in which J. von Uexküll and his concepts are briefly mentioned. There is a great number of such papers and books throughout the whole century, and particularly from the last decade. Among them, a great deal of sources refer only to his concept of Umwelt, quite often also to the concept of functional cycle. These are generally not included in the list here.
- (l) The articles in the current issue (not referred to here).<sup>11</sup>

Alt, Wolfgang; Deutsch, Andreas; Kamphuis, Andrea; Lenz, Jürgen; and Pfistner, Beate (1996). Zur Entwicklung der theoretischen Biologie: Aspekte der Modellbildung und Mathematisierung. *Jahrbuch für Geschichte und Theorie der Biologie* 3, 7–60.

Alverdes, Friedrich (1932). J. v. Uexküll, Die Lebenslehre. *Sociologus* 8 (1), 71. [Book review.]

Anderson, Myrdene; Deely, John; Krampen, Martin; Ransdell, J.; Sebeok, Thomas A.; and Uexküll, Thure von (1984). A semiotic perspective on the sciences: steps toward a new paradigm. *Semiotica* 52 (1/2), 7–47.

Ansell-Pearson, Keith (1999). *Geminal Life: The Difference and Repetition of Deleuze*. London: Routledge.

Apel, Karl-Otto (1976). *Transformation der Philosophie*, Bd. 1–2. Frankfurt: Suhrkamp. [Compares the views of Morris and U. about the sign behavior in animals (e.g., vol. 1: 161).]

Baer, Eugen (1986). The unconscious icon: Topology and tropology. In *Iconicity: Essays on the Nature of Culture: Festschrift for Thomas A. Sebeok on his 65th birthday*, Paul Bouissac, Michael Herzfeld, and Roland Posner (eds.), 239–250. Tübingen: Stauffenburg Verlag. [Includes a chapter on the relationships between phantasy, Umwelt, and self in organisms.]

Baer, Karl Ernst von (1864). Welche Auffassung der lebenden Natur ist die richtige? Und wie ist diese Auffassung auf die Entomologie anzuwenden? In *Reden gehalten in wissenschaftlichen Versammlungen und kleinere Aufsätze vermischten Inhalts*, vol. 1, Karl Ernst von Baer (ed.), 237–284. St. Petersburg: H. Schmitzdorff. [A work which has served as a source of several ideas for Uexküll.]

- Ballauff, Theodor (1949). *Das Problem des Lebendigen: Eine Übersicht über den Stand der Forschung*. Bonn: Humboldt-Verlag. [Ch. 13/2 (pp. 82–87), titled as ‘Die Umwelttheorie’, is a nice summary of Uexküll’s ‘Umwelttheorie’. The author writes (p. 87): ‘Die Umwelttheorie wird von Kurt Goldstein (1934) in grundsätzlicher Weise ausgebaut und zugleich ein in der Uexküll’schen Theorie überangenes Moment zur Geltung gebracht’.]
- Behne, Adolf (1914/1915). Biologie und Kubismus. *Der Sturm* 5 (11/12), 68–71.
- (1917/1918). Biologie und Kubismus. *Die Tat: Monatschrift für die Zukunft deutscher Kultur* 9 (2), 694–705.
- Bertalanffy, L. von (1952). *Problems of Life: An Evaluation of Modern Biological Thought*. New York: Wiley.
- Bethe, Albrecht (1940). Erinnerungen an die Zoologische Station in Neapel. *Die Naturwissenschaften* 28, 820–822.
- Biedermann, W. (1902). Elektrophysiologie. *Ergebnisse der Physiologie* 1 (2), 120–196.
- Bilz, Rudolf (1973). Vorwort zur Taschenbuchausgabe. In Uexküll 1973: v–xxiv.
- (1981). *Psychotische Umwelt: Versuch einer biologisch orientierten Psychopathologie*. Stuttgart: F. Enke Verlag.
- Bowler, Peter J. (1992). *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900*. Baltimore, MD: John Hopkins University Press.
- Braga, Joaquim (1964). *Criticas filosóficas: Kant e Uexküll Seguidas de um discurso de justificação da crença no real*. [Publication place not established.]
- Brock, Friedrich (1929). Gedanken zu J. v. Uexkülls theoretischer Biologie. *Der Zoologische Garten* 1 (7/9), 328–330.
- (1934a). Jakob Johann Baron von Uexküll: Zu seinem 70. Geburtstage am 8. September 1934. *Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften* 27 (3), 193–203.
- (1934b). Verzeichnis der Schriften Jakob Johann v. Uexkülls und der aus dem Institut für Umweltforschung zu Hamburg hervorgegangenen Arbeiten. *Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften* 27, 204–212.
- (1939a). Die Grundlagen der Umweltforschung Jakob von Uexkülls und seiner Schule. *Verhandlungen der deutschen zoologischen Gesellschaft* 41 (= Zoologischer Anzeiger Supplement 12), 16–68.
- (1939b). *Typenlehre und Umweltforschung: Grundlegung einer idealistischen Biologie* (= Bios 9). Leipzig: J. A. Barth. [The book is dedicated to Hans Driesch and Jakob von Uexküll.]

- (1939c). J. von Uexküll 75 Jahre. *Rheinisch-Westfälische Zeitung (Essen)*, 7. September.
- (1955). Umweltforschung (biologisch-soziologische Aspekte). In *Wörterbuch der Soziologie*, Wilhelm Bernsdorf and Friedrich Bülow (eds.), 574–577. Stuttgart: Ferdinand Enke Verlag.
- Buchka, Peter (1994). Kompositionslehre der Natur: Maximiliane Mainkas Film ‘Unbemerkte Wirklichkeit’. *Süddeutsche Zeitung* 22, 12.
- Buddenbrock, Wolfgang von (1953). *Vergleichende Physiologie*, Bd. 2 *Nervenphysiologie*. Basel: Verlag Birkhäuser. [Contains extensive descriptions of U.’s physiological studies.]
- Cassirer, Ernst (1972 [1944]). *An Essay on Man: An Introduction to a Philosophy of Human Culture*. New Haven, CT: Yale University Press. [In Chapter 2, ‘A clue to the nature of man: The symbol’ (pp. 23–26), adopting the view of Uexküll, he describes the difference of humans as *animal symbolicum* from other animals.]
- Chamberlain, Houston Stewart (1919). *Lebenswege meines Denkens*. München: bei F. Bruckmann A-G. [Chapter 3 (pp. 63–155) has title: ‘Meine Naturstudien: Brief an Baron J. von Uexküll’. Includes some correspondence with plant physiologist Julius von Wiesner (1838–1916), and discussion on the concepts of type and symbol in biological context.]
- (1928). *Natur und Leben*, ed. by J. von Uexküll. München: F. Bruckmann A-G. [See U. 1928e (Uexküll’s preface and afterword). Includes a paragraph ‘Uexküll über die Wissenschaft’ (pp. 23–24).]
- Clark, Andy (1997). *Being There: Putting Brain, Body and World Together Again*. Cambridge, MA: MIT Press. [Clark discusses U. and Kriszat (1934), with a series of illustrations from it (pp. 26–28). Anthony Chemero has made few comments on this in his unpublished review ‘A stroll through the worlds of animals and humans’.]
- Count, Earl W. (1970). *Das Biogramm: Anthropologische Studien*. Frankfurt: S. Fischer Verlag. [The author says that the concept of ‘Biogramm’ is based on the ideas of J. von Uexküll and L. von Bertalanffy (p. 140).]
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## Notes

1. E.g., in finding out the ‘cognitive maps’ of organisms and the mechanisms creating them.
2. Later, Uexküll prefers to use the term *Zielstrebigkeit* (directedness). This is probably due to his reading of Karl Ernst von Baer’s works, who made a clear distinction between *Zweckmäßigkeit* and *Zielstrebigkeit* (Baer 1864).
3. In some cases (e.g., Uexküll 1913a: 143), he also calls it ‘subjective biology’: ‘Es ist dies eine neue Wissenschaft, die noch niemals systematisch in Angriff genommen worden ist. Wir wollen sie die “subjektive Biologie” nennen’.
4. Herbert Spencer Jennings (1868–1847).
5. In the preface to Uexküll’s book *Bausteine ...*, Felix Gross wrote about two views — psychism and materialism. And added (Gross 1913: 10): ‘Die Zukunft wird uns aber noch eine dritte bringen. In ihr wird die Herrschaft der beiden Urphänomene des Physischen und Psychischen verschwinden und statt dessen das Phänomen des Lebens eine zentrale Stellung einnehmen’.
6. The relatedness of this Uexküll’s principle to Redi’s principle *omne vivum e vivo*, Schleiden’s *omnis cellula e cellula*, and Peirce’s *omne symbolum e symbolo* is obvious.
7. See a detailed account of how Uexküll has been found by him in Sebeok (1998: 31–35).
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10. The abbreviation ‘U.’ for Jakob von Uexküll is used in the annotations.
11. The list also includes all references cited in the current article.

Kalevi Kull (b. 1952) is Associate Professor in the Department of Semiotics and Researcher at the Institute of Zoology and Botany at the University of Tartu, Estonia <kalevi@zbi.ee>. His research interests include biosemiotics, theoretical biology, and the ecology of semi-natural communities. His major publications include *Lectures in Theoretical Biology* (with T. Tiivel, 1988, 1993), *Wooded Meadows* (with T. Kukk, 1997), ‘Organism as self-reading text: On the origin of anticipation’ (1998), and ‘Biosemiotics in the twentieth century: A view from biology’ (1999).