

# Scientific-Philosophical Base of Darwin's and Wallace's Theory of Evolution

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## Abstract

If Darwin's and Wallace's theory of evolution is reduced to "eat and be eaten" misunderstanding and rejection arise. From a didactic point of view, a scientific and philosophical examination of the theory is necessary. It can create understanding and acceptance. Epistemologically, the theory of evolution describes a cognition and innovation process that corresponds to scientific working methods. The philosophical analysis shows that ethical behaviour emerges in evolution. The basic concept of this article is the assumption of the unity of spirit and matter (monism) and the parallelism of ethics and mechanics (Elome concept). There is no principal contradiction between the theory of evolution and religious ideas but to the magical-mythical worldview. An understanding of the scientific method is a prerequisite for a deeper understanding of the evolutionary process. It is not about a branch of biology, but about a worldview.

**Keywords:** philosophy science; ethic evolution; ethic social sciences; biology life definition; evolution pedagogy didactic.†

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## 1. Introduction

The theory of evolution occupies a central place in biology didactics, because many characteristics of living beings can only be understood from an evolutionary perspective. The theory is important for biology, medicine and society. Many interesting examples of evolutionary development can be found in the literature. The texts are mostly intended for professionals. Almost all biologists accept Darwin's theory of evolution. But there is a lot of uncertainty among the general public. Presumably many reduce Darwin's theory of evolution to "eat and be eaten". This creates misunderstanding and rejection.

One reason is the lack of connection between evolution and scientific working methods. This connection creates a deeper understanding.

One reason is the lack of integration of biology into philosophy. This connection not only increases understanding, but the inclusion of ethics can also create emotional acceptance.

One cause is rejection based on religious beliefs. Politeness and sincerity are a basis for conversation.

Building on this didactic foundation, many aspects of biology can be discussed: spirit and matter, perception and consciousness, viruses and information or the origin of biological life, arise of matter and the natural laws.

This study shows necessary and sufficient philosophical, scientific and educational approaches to create a connection. This connection is also important because of the impact it has in society. Possible solutions are shown here.

## 2. Scientific and philosophical base

Darwin's and Wallace's theory of evolution is based on simple logical-mathematical considerations. The correctness of the considerations can be proved mathematically (statistically). Simple evolutionary processes can be generated experimentally. Observations of nature confirm the concept. The driving force behind evolution is the "*struggle for existence*" (Darwin / Wallace, 1859 / 1889). But every animal and plant die, what survives? A philosophical analysis is required to answer this question.

### 2.1 Preliminary considerations

Darwin's and Wallace's theory of evolution can be divided into three steps: mutation, selection, reproduction. During mutation, the genetic material changes and variations arise, during selection some of the organisms die, while those that survive can reproduce.

The scientific way of working can also be divided into three steps: creating a model, testing the model, and publish the model. After publication, other scientists modify the model or design new ones.

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*“The theory of evolution describes a cognition and innovation process that corresponds to scientific working methods. ... Evolution brings about something comparable to science: models (knowledge) and technology (innovations). The resulting objects have spiritual and material properties.” (Fröhlich, 2017)*

Many observations show that living beings support each other and show ethical behaviour. Their survival often depends on their mutual cooperation. Ethical behaviour is produced evolutionarily in symbioses.

### **2.2 Didactic considerations about science**

A key goal of science education is to teach scientific methods. Knowledge of model properties helps to classify scientific relationships and to better understand the products of evolution such as the physical and mental properties of living beings.

Models are based on mental constructs that should help the user to set goals and solve tasks. Complex operations are simplified, taking into account the essential properties. There is no identity between model and object, just a core identity. The essential relationships to the object depend on the tasks that this model has to fulfil.

The quality of models is based on self-restraint. Philosophical models have to be logical, good ones have to be logical in themselves. Science is part of philosophy. Science imposes additional limitations on itself. (See table 1.)

<b>Designation</b>	<b>Description</b>	<b>Principle</b>
Russell's Chicken	Models should explain connections. (Russell's chicken does not understand the context.)	Principle of reason
Occam's razor	Models should be based on as few assumptions as possible, but take into account the essentials. (Occam's razor cuts off superfluous assumptions.)	The principle of simplicity, also known as the economy principle of science.
Copernican Principle	The same laws of nature apply to everyone, including the observer.	Principle of equality (before the law)
Scientific	Only verifiable statements are scientific.	Principle of truthfulness
Checked	Models should be exterminated in practice in many ways.	Principle of validation (experience, repeatability)

Table 1: Quality criteria for philosophy and science (Fröhlich, 2017)

Limitations can expand possibilities. This is how safety rules restrict actions. Road traffic, chemical plants and much more do not work without the restriction of safety rules. “*Systems theory*” (cf. Bertalanffy, 2009) is also based on self-restraint. It helps to better understand biological processes. An ant colony consists of ants, which in turn consist of cells, which in turn consist of atoms, which in turn consist of elementary particles. Systems have the ability to self-organize. This creates higher levels with new properties and laws. According to the systems theory, the laws valid at each level are observed. For this, the laws of the lower rules are restricted at the higher levels. A lowest level without laws is possible, where everything is allowed and chaos prevails.

### **2.3 Elome: Unity of spirit and matter - parallelism of ethics and mechanics**

According to Heraclitus of Ephesus (600-540 BC), natural laws arise in an evolutionary process. The starting point is change. Forces wrestle with each other. If they are of different strengths, the stronger force destroys everything it can influence and thus loses its effect. What remains are opposing, equally strong forces. In the resulting equilibrium, the forces are mutually supportive. Heraclitus called this stable balance harmony, Aristotle (384-322 BC) called it matter, and today's definition is symbiosis.

The oscillations and waves of physics have the properties described. The properties of natural laws and matter point to an evolutionary origin. There is only one requirement for this: It is possible. The universe does not arise from non-existence, but from possibility. The starting point is the principle of freedom: it is possible for valid laws of nature to form.

Valid laws have a material effect. Every material property and every material process based on valid laws. The other way around: natural laws are valid through their material effect and thus through their material properties. Spirit and matter form an inseparable unit: *Monism / Information theory*. (cf. Haeckel, 1899 / cf. Shannon, 1948)

Evolutionary stability requires compliance with the laws of mechanics and ethical rules. Ethics and mechanics develop in parallel in the process of evolution. They influence each other but are not linked to each other by natural laws. Ethics, logic and mechanics form the basis of our world: *Elome concept*. (cf. Fröhlich, 2017)

The theory of evolution is about survival. People, animals, plants are dying. What is passed on? Spiritual concepts that are materially implemented passed on.

### **2.4 Scientific considerations: evolution and innovation**

Darwin's and Wallace's theory of evolution is based on simple observations. Trees produce many thousands of seeds (reproduction). Due to genetic changes (mutations) the seeds have different properties, called variations. Only a few seeds grow into trees (selection). The scientific way of working can be divided into steps that correspond to the theory of evolution. (Table 2)

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<b>Biology</b>	<b>Science</b>	<b>Philosophy</b>
Mutation	Creation of a model	Principle of freedom
Selection	Testing of the model	Principle of truthfulness.
Reproduction	Publish the model	Principle of love

Table 2: Evolution as scientific cognition and innovation process.

Darwin's and Wallace's theory of evolution describes a scientific cognition and innovation process. This is an artistically creative process. A scientific cognition and innovation process produces models and functional models. Map and navigation system are models, self-driving car is functional model. Since living beings have developed in an evolutionary process of cognition and innovation, they have the properties of functional models. Their organs also have these properties. A wolf has the properties of a functional model in relation to its environment, the biotope. His hearing is a functional model of the acoustic environment. The functional models of a living being help to ensure survival.

Models like Maxwell's equations are written in a human language called mathematics. Models have linguistic properties. The laws of nature could have evolved. According to this, matter has the properties of functional models, physical interactions the properties of languages.

### **2.5 Philosophical considerations: monistic and dualistic concepts**

The theory of evolution has triggered a discussion on how to explain our world. Which concept is suitable for this, the scientific or the magical-mythical?

People have long pondered why thoughts and words have an effect. To explain this, the concept of magic was developed. It is based on the dualism of spirit and matter. Mental processes (thoughts, dreams, states of intoxication, spirits) therefore have a direct effect on matter. For example, if the magic word for 'fire' is pronounced, it should burn without any further cause. The assumption can be tested. The assumption was not confirmed.

Statements predicting an observable effect are scientific. Statements in which the effect takes place in transcendence cannot be tested and are therefore unscientific. E.g. 'Good deeds will be rewarded in the hereafter'.

Independent of the experimental results, dualistic models are not very suitable for explaining the world. They divide the world into two unconnected parts and do not allow understanding. To explain events a continuous, logical chain of explanation is required in science, but not in dualistic magic. In magic, the gap in explanation is often obscured by seemingly scientific explanations or references to secret truths.

Information theory is the main scientific counter-theory to magic. It is based on the unity of spirit and matter. In the monistic "*information theory*" (Shannon, 1948), words

are functional models of the action. One says: 'Make a fire', another lights a match. How does this work? Information always has a material basis, but can change its basis. E.g. written texts are read out and listened. Every time the base is changed, an energy conversion takes place. Language is like a stone unleashing an avalanche. Small amounts of energy can release large amounts.

The information theory has been confirmed in many individual cases. This monistic theory has a high quality. Information theory is suitable for explaining the effect of genes and the evolutionary processes. The magic concept has been falsified many times in individual cases. As a dualistic model, it is of low quality.

Some of the traditional religious beliefs contain magical components. These beliefs usually have much greater problems with ethics than with science. For biology as a social science, social implications are particularly important. Magical-mythical ideas are widespread, even in the industrialized countries. So-called healing spells, which are also supposed to work over long distances, are accepted and considered ethically good by many people. But: If you believe healing spells work over long distances, you conclude that damage spells can also work over long distances. That creates fear. Fear creates witch-hunts. Healing spells are ethically very problematic.

*"Belief in witchcraft is widespread. A 2005 poll of Canadians and people from the United Kingdom found that 13 percent believed in witches. For Americans, that number was even higher: 21 percent. ... Organizations like the United Nations and Stepping Stones Nigeria have found that the number of witch trials around the world is increasing. They are almost always violent, and sometimes they are deadly."* (Schons, 2011)

Belief in magic is often accompanied with rejection of science. Science is based on the principle of truthfulness. In other words, scientists strive to find out the truth. The rule applies to scientific work: Differences of opinion are settled with arguments. Fraud is named as such. Unfortunately, this is often violated in the debate about the theory of evolution.

Socrates already found out that we humans are not able to recognize the truth: *"I know that I know nothing."* (To Socrates, 463-399 BC). Epistemologically, it is disputed whether there is 'truth'. That is why scientific theories and models are not declared to be the truth. Good theories and models are useful and only apply until more useful ones replace them. (Popper, 1933)

In a *"paradigm shift"* (Kuhn, 1962), fundamental concepts are replaced by new ones. The change from the magical-mythical worldview to the scientific worldview of information theory is a paradigm shift. Since both worldviews do not harmonize, everyone has to make a decision for themselves.

The theory of heredity replaces the concept of the transmigration of souls to explain the relationships of the family and the theory of evolution, the doctrine of creation. The natural sciences are not fundamentally in conflict with religion, but do not agree with some religious views. Differing views are common in science. However, there is a

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contrast between the effort to be truthful and ideology. Philosophical and religious dogmas that must not be questioned are not compatible with the principle of science.

What is the difference between belief and superstition? When a person's beliefs fit together, they are genuine beliefs. Ideas that contradict basic beliefs are superstitions. Many ancients believed the stars were gods and concluded that stars could influence their lives. Today there are people who believe in horoscopes even though they know that planets are rocks. What was a belief in ancient times may be a superstition today. Even today, some ideas of natives are real beliefs; the same ideas in industrialized countries are superstitions. Superstition goes hand in hand with self-deception and doublethink. It is pedagogically important to uncover these inner contradictions, as they are often psychologically distressing. Self-honesty is an important pedagogical goal.

### **2.6 Didactic considerations: evolution and education**

Representative surveys show whether Darwin's and Wallace's theory of evolution is understood and accepted. Here are the survey results from two highly developed industrialized countries:

*„The poll found that 25% of Britons believe Charles Darwin's theory of evolution is 'definitely true', with another quarter saying it is 'probably true'. Half of the 2,060 people questioned were either strongly opposed to the theory or confused about it.“* (Butt, 2009)

*„According to a new Pew Research Center analysis, six-in-ten Americans (60%) say that 'humans and other living things have evolved over time', while a third (33%) reject the idea of evolution, saying that 'humans and other living things have existed in their present form since the beginning of time'.”* (Pew Research Center, 2013)

What needs to be done? First: Good instruction of (biology-) teachers. It's not just about specialist knowledge, but also about enthusiasm for the subject and the scientific method. This is particularly important in areas where attempts are being made to discourage the study of evolution.

Then: Allocate sufficient teaching time for an appropriate engagement with the theory of evolution. Interdisciplinary lessons in biology, chemistry, physics and philosophy should school the topic of science: What is science? How do scientists work? What do scientists create? What is the relationship between ethics and science? What is information? How does information work? The biological topics can build on this. A pedagogical approach to divergent worldviews is a matter of course.

The following paragraph shows how combining philosophy and biology can create a deeper understanding. Studying viruses, students learn a lot about evolution. As a specialist and social science, biology offers many opportunities to generate interest. Microbiology, medicine, psychology and sociology can be combined.

## **2.7 Teaching practice: viruses as information carriers**

Information can be stored in different ways. In cell nuclei, plasmid rings and viruses [gene], in infectious proteins as prions [protein], in computers and computer viruses [bit] and in brains or books [*meme*]. (Dawkins, 1976) Biological viruses, computer viruses, thought viruses have common properties.

Viruses infect humans, animals, plants, bacteria and archaea. There are even viruses that infect viruses. "*Smallpox is estimated to have killed up to 300 million people in the 20th century.*" (Wikipedia, 2023)

Viruses are often described as highly aggressive. But viruses are not aggressive attackers, they are passive - passive as a book: Books reflect light and viruses are involved in chemical reactions. The cell produces the necessary proteins to dock onto the virus, open it, transport the viral DNA into the cell nucleus, translate it and carry out the virus's instructions. The cell also provides the required energy. Humans, animals, plants, bacteria, archaea invest a lot of energy and time in activating viruses and they go to great lengths to fight viruses. What is the reason for this? In a figurative sense, it is hope that the virus contains valuable information and the fear that it will make you sick or kill you. For this reason, the viruses are tested several times before they are recorded. (See table3)



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	<b>Biological viruses</b>	<b>Computer viruses</b>	<b>Thought viruses</b>
<b>Description</b>	Chemical molecules: RNA, DNA.	Programs that are spread from computer to computer.	Human language.
<b>Spread</b>	Spread by contact, blood, saliva, feces, air.	Distribution via floppy disks, CD, USB stick, mobile phone reception, e-mail, internet.	Dissemination through talks, lectures, books, newspapers, radio, films, internet.
<b>Infection</b>	E.g., contact with infected people.	E.g., opening an infected email.	E.g., listening to a conversation.
<b>Possible valuable</b>	If the effort equals the benefit, it is very important. Viruses may be essential to life.	Helpful program as a Word processor or a mailing app, important mails and interesting pictures.	Helpful knowledge, interesting information's, the chance to become rich and powerful.
<b>Possible dangers</b>	Illness, death, external control (e.g. rabies).	Data loss, data theft, external control, destruction of the controlled machines.	Hatred, violence, suicide, murder, war, external control (e.g. some sects).
<b>Test</b>	Body and cell have immune systems. The RNA is also checked and can be destroyed.	Anti-malware virus scanner.	Inform, reflect.
<b>Example</b>	Smallpox kills.	Zero-locker encrypts all files.	Anti-Semitism discriminates and kills.
<b>Prevention</b>	Hygiene, vaccination, strengthening the immune system. Responsibility for your own health.	Caution, anti-malware, backup, encrypt data, required apps only. Responsible for your own data security.	Education, human rights, democracy, social security. mental hygiene. Responsible for your own thoughts.
<b>Treatment</b>	Care, medication, isolation.	Disconnect from the network if infected, delete viruses.	Stand up against the spread of criminal ideologies.

Table 3: Virus properties

Can books kill? Yes! For example, a love novel from Goethe temporarily triggered a wave of suicide with unfortunate lovers. But that didn't last. There is a race virus against anti-virus. If a virus is recognized as harmful, it is rendered harmless. To spread

further, viruses have to change. Biological viruses and polymorphic computer viruses can change themselves. Propaganda and thought systems are also subject to mutation. Ideas come in many variations, some catch on and spread. Viruses can become more harmless but also more dangerous through mutations. If a cell is infected at the same time by a virus that spreads rapidly and another virus that is dangerous, both viruses can mix and create a dangerous, rapidly spreading virus. This also applies to thought viruses (memes).

Information about the sender helps to assess the value of a message. Virus shells disguise themselves as body cells, e-mail transmitters are faked, and not every scientific statement comes from a scientist. Groups of people who are particularly trusted, such as scientists and teachers, have a special responsibility.

## **2.8 Philosophical considerations: evolution and ethics**

Humans have responsibilities. Does ethical action also exist in other areas of biology, such as between cells? Such questions carry the danger of humanization. Cells cannot consciously choose ethical behaviour. But cells can exhibit behaviour that we would call ethical in humans. In ethics it is the act that counts.

Cooperation for mutual benefit increases the partners' chances of survival. In social creatures, helping is one of the most important behaviours. For very important behaviours, overgeneralisation makes sense from an evolutionary perspective. Social creatures often provide help without expecting anything in return. For example, animals adopt alien, even non-specific animal children. Something new has emerged. Selfishness has turned into mutual help and even selflessness.

In symbioses, the evolutionary process promotes ethical behaviour. Outside of the symbioses, however, ruthlessness and aggression can be the most successful strategies. Even symbioses are not without conflict. Partners often try to put themselves in a better position to get more benefits out of the relationship. There is a tendency to evolve from symbiote to parasite. This development can be found in symbiotic fungi and plants, but also between spouses. The opposite reverse process also takes place. Parasites have a quest to make themselves indispensable.

The focus of the theory of evolution is mostly on hunter-prey relationships. A brutal struggle for survival takes place between individuals. But there is also another aspect. Over time, the species involved become fitter. For the individual, hunters are parasites, for the species they are symbionts. Symbioses are a suitable topic to speak explicitly about the theory of evolution and to show different sides.

Humans are living being made up of many living beings (cells), which in turn are made up of smaller living structures. Its survival relies on the reliable functioning of many symbioses. Living and surviving requires the observance of ethical rules and philosophical principles such as truthfulness, love, freedom and justice. Like love, symbioses are partisan.

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Symbiosis has an ethical basis and is a mandatory requirement for life. Darwin's and Wallace's theory of evolution can explain how symbioses and thus behaviours that meet ethical requirements arise. This is significant for laws and regulations in the fields of animal welfare, medicine, psychology and sociology.

Human society is still under construction. There are many symbioses and social behaviour that goes beyond that. At the same time, aggressive and antisocial behaviour endangers survival. A word of warning: astronomers have not yet discovered any intelligent extra-terrestrial life. The laws of evolution also apply on other planets. It is possible that the extra-terrestrial beings have become extinct each time they have developed science and technology.

### **2.9 Discussion: world views**

Religious beliefs have historically produced compassion, helpfulness, and great achievement, but also horrific wars and crimes. A peaceful coexistence of the different religions is particularly important. The discussion about the theory of evolution clarifies worldviews and their implications.

Evolution theory: The processes of nature obey logical mathematical laws of nature.

Creationism: There are texts that come from an omniscient and are absolutely true.

Intelligent Design: There is a higher power directing the universe.

The assessment of world views is based on the following principles. (See table 4.)

<b>Religion</b>	<b>Philosophy</b>	<b>Everyday life</b>
Respect for God*	Truthfulness	Principle of scientificity
Trust and love for God*	Understanding and love	Principle of legality
Religious practice	Ethics / life experience	Life practice
Wisdom		
* Ciphers in the sense of " <i>philosophical faith</i> ". (Jaspers, 2000)		

Table 4: Ethical and religious criteria (Fröhlich, 2017)

Karl Jaspers formulated the concept of philosophical faith. It is accepted that human knowledge is limited. Holy books are books of wisdom. The interpretation as literal truth is not appropriate. It is based on the acceptance of all schools of thought and beliefs. The various conceptions of God are understood as ciphers. There is no humanization of God, no attribution of immeasurably increased human abilities. (cf. Jaspers, 2000)

Creationism claims that human beings gain access to absolute truth through texts. Creationism rejects all divergent views and is in conflict with all scientific disciplines such as physics, chemistry, astronomy, geology or biology. According to the concept of intelligent design, the laws of nature are partially suspended or circumvented. This approach does not contradict any discipline, but the philosophical basis of science.

The concept of intelligent design is unscientific because it cannot be experimentally verified. Both approaches are based on the concept of magic. The principle of scientificity is based on truthfulness. Respect for God\* requires religious truthfulness.

Scientific models and philosophical concepts of God\* have no problems with striving for trust and love in God. If human attributes are attributed to God, then he also possesses negative human attributes. In creationism and intelligent design, actions punishable under human law are attributed to God. The ethical problems are already discussed in the Book of Job. The religious problems with the theory of evolution are insignificant in comparison.

Biology, sociology and systems theory describe the characteristics of communities. Mechanisms that stabilize the group but also power mechanisms are at work in communities. Statements of content and social mechanisms are often combined by the community into an interwoven dogma. A typical group-binding dogma is: believe what we believe and you will be rewarded. From an evolutionary point of view, the associated mechanism is to be separated from content-related statements and evaluated differently. This can be helpful in scientifically testing the truthfulness of statements.

The supposed possession of the truth has consequences for the human community, for everyday life and the law. The different interpretations of religious scriptures often led to armed conflicts. The formation of groups is of particular importance for a peaceful and genuine coexistence. Biology and sociology observe how groups differentiate themselves from others.

Common values contribute to group formation. Its borders are permeable, members can come and go. These groups are cooperative and work symbiotically with others. In nature cells in an organism are examples of good cooperation.

In ideologies, lies and crimes encourage demarcation. Convinced supporters defend them and thus reliably distinguish themselves. Outsiders are often degraded, exploited and persecuted. Even members who want peace and reject violence support the system.

In a religion, all people call the god by the same name. Some help people in the name of this god, some kill people in the name of this god. Do they actually believe in the same God? Some help in the name of their god, others help in the name of another god. Do they actually believe different gods?

Worldview shapes behaviour. Is religious practice and practical life oriented towards respect, trust, understanding, love and truthfulness? Faith without truthfulness can easily be misused as an instrument of power, piety seeks balance. The concept of philosophical faith shifts the focus of religion from faith to piety. Piety is a way of life based on ethical and religious values. As in science, it is also possible to work together in religion across borders without giving up one's own convictions. Fanatic, dogmatic faith divides, piety unites across borders. Today the world is growing together, people need to approach each other. Peaceful coexistence is possible.

### **3. Biological aspects of the theory of evolution**

Evolution as a scientific cognition and innovation process produces models and functional models. It is also an artistic-creative process. Our perception also emerges in an artistic-creative process.

#### **3.1 Basics of biology: perception and consciousness**

As our perception has evolved, it has model properties. Our perception is not a direct representation, but also not an illusion, not a deception. Emotionally we feel our perception as reality. But it is a fallacy to assume that the world is as we perceive it. The model of physics describes light as electromagnetic waves with different wavelengths; in the model of perception, light has different colours. However, models also have advantages over an image. They help to understand the world and are helpful in mastering life. Furthermore, several models, each of which illustrates other aspects, can be combined with one another. New technical possibilities and insights thus expand knowledge and options for action.

For psychology and information theory, spirit and matter form a unit. René Descartes saw an insurmountable gap between perception and the environment. (cf. Descartes, 1641) This is called the Cartesian prison of our mind. The theory of evolution makes it possible to break out of Cartesian prison. However, it is only a partial outbreak, because scientific statements are not absolute. The theory of evolution shows a connection between perception and the environment, but it is very narrow. With the help of our perception, we receive only little information about our environment. So, in the room you are in right now there are songs, pictures, films that you are not aware of. A television antenna can receive this information.

The coloured flowers of plants give scientists information about the colour perception of insects that pollinate the flowers. Flower colours have evolved and therefore serve a purpose. Obviously, plants communicate with insects. This suggests colour perception in insects.

Our perception, i.e. seeing, hearing, smelling, touching, has model properties. The innate sensations of space, time, matter and temperature are functional models of our environment. The model character can be recognized by the so-called optical illusions. Vision is combined with other sense organs such as the vestibular system and combined with 'experience' acquired evolutionarily and stored in the processing system of the visual centre. Movements are balanced, edges are sharpened, overlays are separated, objects are recognized. Our visual perception has more information than an image.

Models have the properties of languages. Our perception, i.e. seeing, hearing, smelling, touching, has linguistic properties. Language works when translated into another language. This is accompanied by a change of media.

Language has model properties. Different languages correspond to different models. There is no identity between object and model, but a core identity. A correct translation preserves this core identity. Translation modules must guarantee this. Many vital translation modules have been optimized in the evolutionary process: the narrowing cochlea of the inner ear amplifies sound frequencies locally. There the hair cells are set in motion and nerves are stimulated. - In the speech organ, nerve impulses produce muscle movements that regulate the resonance space in the mouth and shape sound frequencies. In the eye, sensory cells establish a connection between light frequencies and nerve impulses. The impulses of the auditory nerve produce tones in the brain, those of the optic nerve produce colours.

There is a problem: external perceptions are not accessible to us. Solipsism assumes that there is only one perception, your own. Systems theory provides the basis for an alternative model: every system needs an internal perception in order to function. The model is based on the following postulate: fundamental properties are based on fundamental physical processes. Physical interactions have an external and an internal effect at the same time. This inner effect is based on a symbiosis and is the basis for perception. Since perception is based on interactions, it is always about external perception and not self-perception.

Assumption: each brain area, like a person, may have its own perception. Different areas of the brain may be talking to each other. It is possible that we perceive the perception of one area of the brain and the other areas send their messages in different languages to this centre. It is possible that these conversations between the brain areas trigger the differently perceived feelings. Many scientists have a different opinion, they assume that perception is only possible for creatures with a brain.

The evolution process optimizes processes. To solve complex challenges, the internal processing is optimized. This is done by developing functional models and suitable languages in our brain. This assumption can be researched experimentally by communicating with the individual brain areas.

### **3.2 Teaching practice: from the unicellular organism to the nerve**

The way nerves work is strange at first glance. Why are there gaps between them into which they release chemical compounds called messenger substances? This process has its evolutionary roots in the unicellular ancestors. After eating, protozoa excrete urine. Other protozoa can smell the urine. When smelling, a chemical reaction takes place (matter) and information is transmitted (spirit). The urine provides information about the location of a food source. The information triggers a change in behaviour, the other protozoa swim to the food source. Knowledge can be acquired individually or through evolution. Knowledge can be stored in different ways, consciously or as a functional part of an innovation. Protozoa can use this behaviour to attract other protozoa, by excrete the substance in the urine that is smelled.

Chemical changes in this substance have enabled different reactions. We call this group of substances messenger substances or hormones. They serve not only to attract partners, but also to show growing nerves the way to their target. Messenger substances also regulate organ formation. A language based on chemical reactions has emerged. (cf. Ditfurth, 1976)

Darwin's and Wallace's theory of evolution creates an understanding.

### **3.3 Basics of biology: on the origin of life**

There are many different definitions of life. Here is a technical and a scientific-philosophical definition of life: *“Living beings have a boundary, a metabolism, grow and reproduce. They can record, save, change, and send information. They obtain their inner order by responding appropriately to internal and external influences.”* (Fröhlich, 2022) Symbioses are a necessary condition for life. In the symbiosis definition, life has an ethical value and provides a basis for legislation. This is important for lawyers, doctors and vets. *“In the words of philosophy: ‘Basis of life is the principle of love. Life exists where this principle rules (symbiosis).’ In the words of biology: ‘Basis and indicator of life is the symbiosis.’”* (Fröhlich, 2022)

How do symbioses, how does ethics arise? Is it possible for chemistry to become biology? The theory of evolution creates family trees. They help to recognize connections and to better understand how the organs of living beings work. Drawn up by scientists they describe possible relationships and not always the actual ones. Possibilities are shown. There are many possible pathways in chemical evolution in the laboratories of nature: hydrothermal vents, cold vents, methane vents, white smokers, black smokers, fumaroles, mud pots, dried up puddles, deserts, salt flats, ore deposits, crystals, ice, clouds, asteroids, meteorites. Different reactions are described that could have resulted in important chemical building blocks such as sugar, fats, amino acids or nucleic acids. The following description gives one possible way.

There are small cavities in rock. It can be observed that slimy deposits form on the walls of the cavities. Chemical reactions take place in them, which catalytically promote each other. (cf. Eigen, 1971) This symbiotic system already has the most important functions of a living being. Through fissures, chemicals (food) enter the cavity (boundary), react (metabolism), and leave (excretion). Some of the resulting catalysts remain in the cavity (growth) or get into neighbouring cavities (reproduce). Catalysts from different sources can mix (sexuality). Changes in catalysts change the speed of chemical reactions (evolution). Chemicals and thus information are absorbed, processed, stored and released. Over time, membranes can form on the wall and in the gaps. This way the inflowing and outflowing substances can be regulated (cell walls). This also creates a requirement for exiting the hole. Catalysts accelerate reactions, end products inhibit them. Catalysts are preserved in chemical reactions. A cycle is formed in which the end product can be used as the starting product in a further cycle. In this hypercycle, the cycles involved regulate each other. (cf. Eigen, 1971) In other words:

They obtain their inner order by responding appropriately to internal and external influences. According to the above definitions, it is a life form. You can find them in cavities. Metabolism is information processing. Hypercycles are information stores. In this life form there is no storage of information in written form. Writing and reading presuppose structures that can carry out instructions. The RNA has formed in its own hypercycle as a chemical. The cell plasma is prior than our genes. Later different hypercycles have joined together to give rise to modern cells. In them, the genetic information is stored as text in the DNA / RNA.

RNA and DNA are written languages that use different types of paper made from sugar compounds. The deoxyribose of DNA creates a more stable paper than the ribose of RNA. The four letters consist of four different nucleic acids. Words consist of three letters. The translation module, called t-RNA, translates words into protein language. The medium DNA, like the medium book, can store information in the long term. Messenger RNA can spread information like a radio broadcast. Proteins serve both as building components and as construction machines.

The cycles described here meet the requirements of the technical definition of life. In the symbiosis definition of life there is no contrast inanimate - alive, but a smooth transition. In protozoa there is a very large number of symbiotic processes. A hypercycle describes the first step from chemistry to biology, but is closer to chemistry. Hypercycles arise constantly in many places in a variety of forms. They obey the rules of evolution. Evolution is masterful in perfecting processes and in combining different components (building block method), but it takes a lot of time.

According to this model, life possibly begins in a variety of rock pores. The starting point is not an individual, but a community. The community could be described as a species or biotope. The biotope forms the first biological form of life. The one cell from which all other cells descend is just a statistical construct. The possibilities for the emergence of biological life are so manifold that many biologists suspect that there are diverse life forms in space.

### **3.4 Scientific considerations: evolution and nature laws**

There are issues in science that are controversial. Like Heraclitus, some scientists assume that the laws of nature and matter arose evolutionarily, while others reject this notion. Natural laws and matter should therefore have typical properties. These products of evolution arise through symbioses. Symbioses store information and create an environment, a history. Symbioses must be maintained. Accordingly, the validity of every natural law in their environment would have to be constantly confirmed. Symbioses create a tiered structure of varying complexity. According to this, matter should have a graded structure. The laws of the higher levels limit the possibilities that are available at any one time. Accordingly, natural laws should limit. Symbioses are only stable in the long run if ethical principles are observed. According to this, the laws of nature should be based on principles.



### **3.5 Teaching practice: examination of the theory of evolution**

Darwin's and Wallace's theory of evolution is based on as few assumptions (Occam's razor), and can explain connections (Russell's Chicken). The only requirements are mathematics and natural laws (Copernican Principle). The statements are verifiable (scientific). The theory is testable and has been tested many times through observation and experimentation (checked). Some topics were discussed intensively:

Animals that can have offspring together belong to a species. The division into species is a human classification that is only valid given the place and time. It does not refer to the ancestors. Experimentally, two different species could be bred from one species, and the separation of the species could be observed in fossilized mussels.

Do new species have worse properties? Both in speciation and in spatial separation into breeds, the number of individuals and the gene pool is becoming smaller. Skills are lost but innovation can spread faster. A major driver of evolution is race formation and interbreeding. The breeds involved contribute their respective abilities to the gene pool. Speciation increases competition, which often leads to specialization.

Many innovations occurred in the Cambrian Explosion 500-600 million years ago. A comparable process can be found in the industrial explosion. A basic innovation triggers a chain of further innovations. Organ formation was probably the basic innovation in the Cambrian explosion. During organ formation, different cell types join together in a symbiosis according to a blueprint.

Is evolution just a matter of chance? Genetic changes have different causes. Point mutations caused by radioactive radiation are random. The exchange of gene sections is controlled by mechanisms. Protozoa have an arsenal of genetic engineering tools at their disposal. They can activate mechanisms depending on the situation. Even unicellular organisms can learn and act adaptively. Not only the mutation, but also the selection is not purely random. This enables the high speed of the evolutionary processes that can currently be observed. In retrospect evolution has a direction. Chance is important, but in the long run principles prevail.

The theory of evolution is based on cause and effect and does not require a goal to be striven for. Mechanisms do not have a goal, but a direction. The mechanism of evolution tends toward cognition and innovation. The mechanism of evolution produces the striving for goals. The seed of a tree obeys cause and effect and becomes a tree according to its genetic blueprint. Living beings can aspire to goals. Cause and effect or striving for a goal has been an important topic of philosophy since Aristotle.

### **3.6 Basics of biology: important steps in evolution**

In evolution, small steps often lead to small improvements, but sometimes to fundamental changes. These are referred to as basic innovations or emergence. Here are five important innovations.

e.g. Matter / Laws of nature: From a purely material point of view, it is very strange that the universe should once have been smaller than a hazelnut. In the concept of the unity of mind and matter in terms of information theory the Big Bang is a legislative process. Laws always have material properties. New matter arises with new laws. Evolution creates dynamic stability. Interactions are the language of the laws of nature.

e.g. Biological life / Language of genes: Biological life arose in two steps. First the cell plasma formed and then the gene language. The construction and operating instructions for cells, organs and the body are stored in the genes.

e.g. Eukaryotes / Complex cells: Protozoa with different abilities often join together. Smaller cells attach to larger ones or live inside the cell (endosymbiosis). Together they can do more. The higher organisms are eukaryotes.

e.g. Organisms / Organ formation: All cells in an organism have the same DNA. When organs are formed, cells acquire different abilities and join together according to a blueprint. Together they can do more and the Cambrian explosion could start.

e.g. Instinct Language / Universal Language / Science: Their universal language, the ability to cooperate and their manual skills are particularly important for people's success.

### **3.7 Discussion: meaning of life**

Science limits itself. It makes no claims about transcendence. It doesn't say whether or not there is a transcendental meaning. But scientific analyses of our world can reveal a lot about goals, values and meaning.

The environment of life is the biotope. Nobody is alone. Many forms of communication have evolved: smells, colours, movements, songs, languages and actions. Many behaviours have evolved, helpful and aggressive. Evolution creates a thirst for research and knowledge, technical excellence and beauty, art and music, colour and sound perception, love and hate.

Living beings perceive. They taste, smell, see and feel. They also perceive their emotions, their thoughts, joy, sadness and pain.

Living beings want to live and experience. They want to find partners and procreate. They strive to prove themselves through achievement and in battle. There are many ways of setting goals and creating meaning: experience, love, fight, research, learn, teach, create, design.

A starting point of evolution is the principle of freedom. Living beings can set themselves goals and strive for them. Every living being can give its life its own meaning. We, the living beings are part of the universe. We give meaning to the universe.

## **4. Conclusions**

Like science, evolution is an artistically creative process. The matter of the universe and all living beings are created through symbioses within the framework of cognition and innovation processes based on the mechanism of science (mechanism of evolution) and in accordance with philosophical principles. This creates a logical-mathematical control system that obeys ethical principles and has material properties. Ethics, logic and mechanics form a unit. Spiritual concepts that are materially implemented are passed on from generation to generation. Living beings, their organs and their perception have the properties of functional models of their biotope. Symbioses sustain life. Mechanisms have a direction but no goal. Living beings can aspire to goals and show unselfish behaviour.

The universe does not arise from non-existence, but from possibility. The starting point is the principle of freedom: it is possible for valid laws of nature to form. Valid laws have a material effect. Every material property and every material process based on valid laws.

Biological life begins with the biotope as the original form of life. Ultimately, all forms of life form a symbiosis in a biotope. Ultimately, all people worldwide form a symbiosis. There is a worldwide ethic among people and a biotope-wide ethic among all living beings. However, this is often subject to the egotism of the individual life forms.

Evolution, like science, creates power. Creatures kill creatures to survive. Mutations are more often harmful than beneficial. Hereditary diseases lead to disability, suffering and death. Affected individuals make sacrifices for the common good of the species. The theory of evolution does not lead to a relativization of the concepts of good and evil, but to an understanding of the connections in a tragic conflict.

It is difficult to imagine that a unicellular organism develops into a lion. But you can observe how a fertilized egg cell becomes a tadpole and then a frog. And you can see how a caterpillar becomes a butterfly. Darwin and Wallace's theory of evolution explains the connections. The discussion about the theory of evolution is not just about a part of biology, but about a world view.

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