

Business Ethics in the Pharmaceutical Industry and Beyond

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Key words: Nature's evolutionary principle securing survival, nanomedicine, scientific integrity, integrity of data, religion and ethics, business ethics, legal framework and science diplomacy, negotiations engineering & conflict management, transdisciplinary research & teaching.

This contribution is partly based on the author's chapter «Debate: Nanoparticles – A Blessing or A Curse?» of the book «Ethics in Nanotechnology» (in press) by G. Jesmani & M. Van De Voorde. Six axioms derived in the publication «What is Life?» available at www.ifiip.ch/downloads (SWISS PHARMA 41, 2019/1, 20-36) allow to define the life of a human being and to describe the concept of a virtual patient. Six additional axioms lead to the definition of the «Life of a Society». In other words, the society can be compared to a human being. Thus, thanks to computational science and the emerging field of artificial intelligence, it is not only possible to describe a virtual human being but also a virtual society. In this context, it is also possible to define a healthy society having no problems accepting Nano and Precision Medicine, if these new technologies are based on scientific integrity and the integrity of data. Scientific integrity and integrity of data are necessary that these technologies are approved by health authorities. In this context, the International Council of Harmonization (ICH Official web site: ICH) worldwide promotes public health by globally harmonizing laws. Accordingly, these officially authorized medical nanoparticles are a blessing in contrast to the harmful micro- and nanoparticles in the air, known since the rigged measurement of microparticles that triggered the diesel exhaust scandal. Diesel exhaust also contains nanoparticles that are a curse and need to be regulated. In this context, scientific integrity and integrity of data play a key role. This result can be generalized by taking into account other factors defining a healthy or a sick society beyond new technologies such as business ethics in general. Thus, scientific integrity and integrity of data need to be respected in all areas including business and all other human interactions. First of all, a rigorous interpretation of laws as well as a global harmonization of the legal framework and the ethical conduct need to be adopted. This measure is a prerequisite for a healthy society leading to a peaceful and sustainable world. For this purpose, it is important that all agree to replace any kind of the «Law of the Jungle» by a scientific method to find a «win-win» solution for all parties involved, leading to the survival of mankind. For this purpose, postgraduate courses such as «Negotiations Engineering & Conflict Management» based on scientific integrity and the integrity of data need to be boosted. Computational science and artificial intelligence will lead to convergence of all sciences and will trigger a new university educational reform promoting transdisciplinary research and teaching. Thus, university graduates will become more flexible, following nature's principle that flexibility is the key factor in a fast-changing environment.

1. Introduction

1.1. What is Life of a Human Being?

The author earlier published six axioms leading to the creation of human life and to the concept of a virtual patient (**Leuenberger H 2019**). The definition of the six axioms were inspired by the work of Ilya Prigogine (Nobel laureate 1977) and embrace:

Axiom 1 (Prigogine) Far from equilibrium, conditions exist favoring transformations from disorder into order, leading to the creation of life:

Chaos \rightarrow Order.

In this context, the treasure of organic compounds offers incredible opportunities such as the creation of DNA double helix (Fig.1.1).

Axiom 2 (Leuenberger) The same process is responsible for the formation of beautiful highly ordered crystals in nature (Fig.1.2): Chaos \rightarrow Order. This fact prompted the author to coin the crystallization process as **inorganic life** since the same laws are responsible for the creation of a higher order in the organic and inorganic world far from thermodynamic equilibrium conditions! In this context, however, according to our present knowledge, compounds of inorganic chemistry are not able to store the incredible amount of information as in the case of the DNA helix of Fig.1.1.

It is important to realize the direction of the arrows of axiom 1 & axiom 2 from a chaotic system to a system of higher order: Chaos \rightarrow Order! This direction is the result of an **open system** with the influx of energy **far from thermodynamic equilibrium**. This result is the opposite of a **closed system in a thermodynamic equilibrium**, which is subject to an **aging process** according to the **second law**

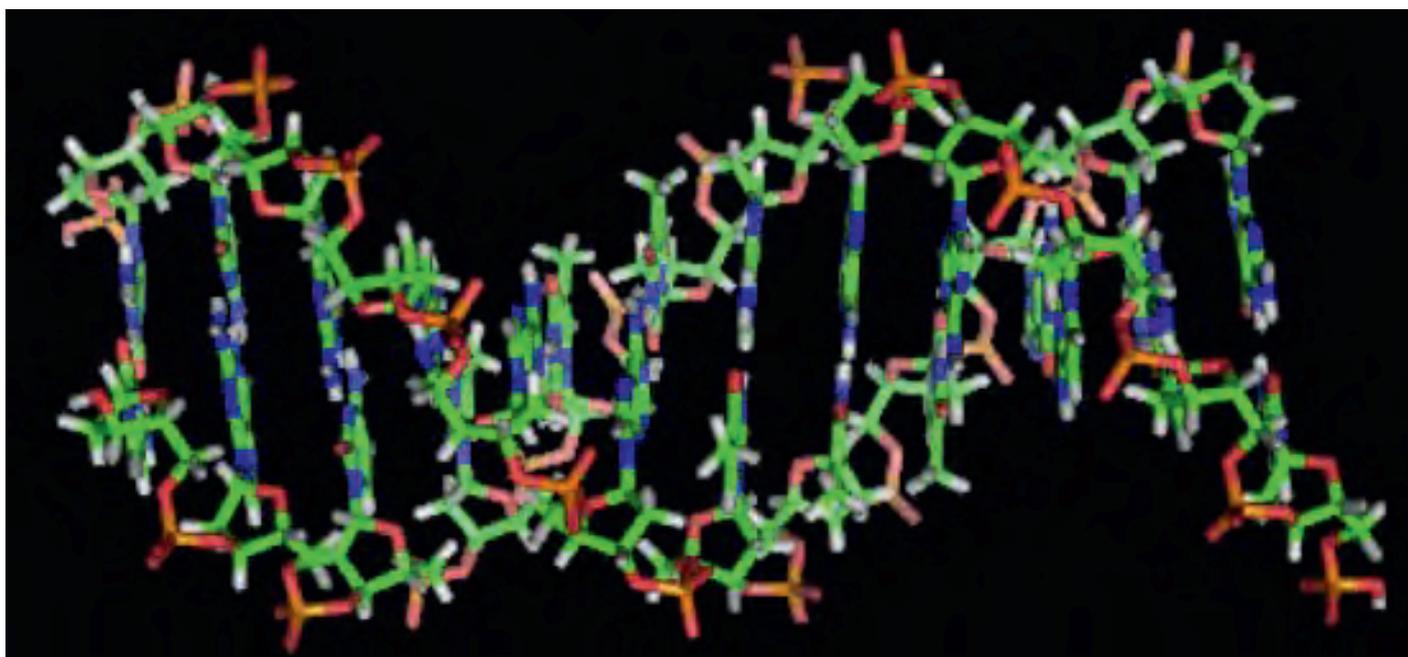


Fig.1.1: DNA double helix containing the code of life = software = axiom 3. (Nucleic acid double helix – Wikipedia Courtesy: Wikimedia Commons)



Fig.1.2: Pyrite (FeS₂) cubic crystals showing a highly ordered system of the inorganic world, as a result of «inorganic life». (Courtesy Hans Leuenberger)

of thermodynamics leading to an increase of entropy, respectively, in other words leading to a more chaotic system from Order → Chaos! This latter direction is also called by the human being the **time arrow** since we are currently not able to stop this process of getting older. This fact allows us to estimate the **shelf life** of a food or pharmaceutical product and to label the product with an **expiry date**.

Axiom 3 (Schrödinger): Life = Information = Software = Our Genetic Code.

Axiom 4 (Schrödinger/Prigogine): The human being is a living (super) computer leading to the conclusion that Life = Software and our Body = Hardware (Fig.1.3). Thus, life can be described as a dynamical equilibrium which uses a check and balance mechanism to stay healthy. In case of a disease the biological system is out of balance.



Fig.1.3: Mummy (Mummy – Wikipedia) at the British Museum. (Courtesy: Wikimedia Commons)

Can the mummy of Fig.1.3 be described as the (remains of the) hardware of a formerly living (super) computer being alive as a result of the software stored in the DNA helix = axiom 4? Is it only a coincidence that a computer virus infects the software of a computer hardware, damaging the functionality like a virus infection of a human being, such as the Corona virus?

Axiom 5 (Fröhlich): The evolutionary process uses all existing physical laws of the present (imperfect) standard cosmological model to find a niche for a successful survival of the biological system! Thus, according to Fröhlich (Herbert Fröhlich – Wikipedia) it can be anticipated that there exists between individual cells a nonchemical communication, leading to coherent decisions of the behavior of a living system (organ), similar to a crystalline phase transition in the inorganic world (axiom 2).

Axiom 6 (Zwicky): The evolutionary process uses, also, yet unknown physical laws beyond the present standard cosmological model to find a niche for a successful survival of the biological system!

1.2. What is the Life of the Human Society?

As in case of a human being, the society's health, life, and death depend on framework conditions such as technologies improving quality of life. In addition, the previous six axioms need to be complemented as follows:

Axiom 7 (Mandelbrot): Nature's principle of self-similarity. This principle is an element of the evolutionary process which is linked to

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systems far from the thermodynamic equilibrium, leading to the fractal non-linear description of the world. Mandelbrot's principle of self-similarity can be found in life sciences of the organic world, but also in the inorganic world with an incredible range of scales from subatomic to galactic size. In this context, it has to be kept in mind that non-linear laws play an essential role.

It makes sense that the achievements of nature are copied by the human being for identifying innovative engineering solutions, which inspired Jack E. Steele to coin the term Bionics (Bionics – Wikipedia) as a synonym for biologically inspired engineering. But this approach does not need to be limited to engineering, but can be extended to philosophy:

Axiom 8 (Steele): Bionic inspired philosophical solutions. In this context, Fig. 1.4 shows the fate of a colony of microbial cells in a closed habitat, which can be interpreted as follows: The growth of microbial cells can be compared to the growth of the world population, which was formerly in a dynamical, but sustainable equi-

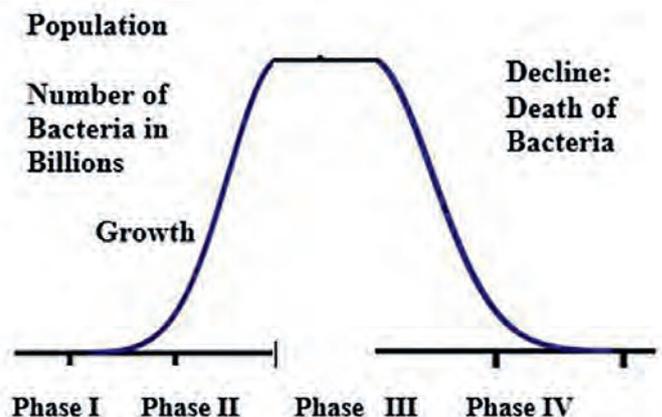


Fig. 1.4: Scheme of growth & decline of a bacteria colony in a closed habitat. (Fig. adapted from Peleg M, Corradini M G 2011)

librium, before the number increased exponentially, exploiting all resources and polluting the environment. This will lead to a stagnation of the further growth of the population of microbial cells, respectively, of mankind. As a result of the pollution and the lack of further resources, the death of the colony is programmed. In case of mankind, i.e., homo sapiens, the lag time of the anatomically modern human is approximately 200,000 years if not 500,000 years. The human growth rate (phase II) is at least exponential. Currently, mankind is in Phase II. It can be safely anticipated that **the time left for mankind till extinction will be an extremely short fraction of the experienced lag time**. Thus, the lag time can serve as an estimate of the total time mankind existed on earth. The anthropogenic pollution is illustrated in Fig. 1.5.



Fig. 1.5: Bane of the Caribbean: Pollution beyond air nanoparticles. (Courtesy: Klaus Eichler, [Internet] Kandern)

Thus, in order to avoid the human overpopulation of our earth, and for reasons of sustainability, human society needs a birth control as discussed in the conclusions, and/or to adopt the policy of a 1 child family, which was first introduced many years ago in China. Thus, it may be possible to achieve a sustainable solution. In addition, a rigorous interpretation of the book of Prigogine and Sanders leads to

Axiom 9: The human society can be described as a living biological creature consisting of system relevant organs such as the **brain = world pool of scientists**, **heart = world system of banks** pumping blood (money) to the **muscles = all kind of industry**, to the **lungs = combustion engines**, power plants inhaling O₂ and exhaling CO₂, and to the **digestive system = society needing consumer products**, which creates waste to be recycled or disposed.

1.3. Definition of a healthy and of a sick society

Thus, society's life is in a dynamical equilibrium similar to a human being, using a check and balance mechanism to stay healthy. The check and balance mechanism of the society is part of its culture and of its constitution, adopted. It is important to notice that the evolutionary process in case of a human being and of a healthy society usually follows incremental and peaceful steps. In case of a disease, the society's dynamical equilibrium is out of balance due

to failure of the check and balance mechanism. A failure of this mechanism can be provoked by environmental conditions such as lack of food, pollution, lack of money, climate change leading to flooding, drought, large scale wildfires etc. However, a change of environmental conditions can be not only a result of natural disasters such as earthquakes, but also of wars, including trade wars, etc. As history of mankind teaches us, a sick society favors terrorism and is a fertile environment for violent, bloody revolutions leading to collateral damages. Thus, it is important to diagnose and to cure the disease of the society. The cure can be as simple as changing the framework conditions of a society.

Thus, it can be concluded that, as in case of a human being, the society's health, life and death depend on framework conditions, such as technologies, improving quality of human life.

The author's preceding article describes an innovative, aseptic spray freeze-drying process. This process is a safe technology for manufacturing medicinal nanoparticles and from this point of view this technology does not differ from any other medicinal product, as discussed in the following section.

2. The Human Society and Business Ethics in the Pharmaceutical Industry

A medicinal product and process needs the approval of the health authorities such as FDA/EMA to protect the patient/consumer and the manufacturing staff. The approval depends on the scientific integrity and of the integrity of the data submitted to the health authority. The manufacturer of the medicinal product must be committed to the integrity of the science and data in order to enable the health authority to take the right decisions to protect the patient/consumer. This point is generally accepted by the public and by organizations protecting consumers and patients. In this context, scientific integrity and integrity of data are also a must for institutions such as the Swiss Academies of Arts and Sciences providing the Federal Government with data and conclusions enabling optimal governmental decisions. This is also the task of the US agencies (scientificintegrity.pdf (bjs.gov)) delivering statistical information to the US government. In this context, the correct scientific information is a prerequisite, i.e., despite the fact that the agencies are funded by the government, scientific integrity and integrity of data must prevail. The department of the company responsible for the quality of a manufactured product is in the same situation. Thus, the head of the quality department is directly reporting to the CEO of the company and not to the head of the manufacturing department! This concept complies with the constitutional rules of a governmental system with a separation of the powers. However, it has to be kept in mind that the medicinal formulation and manufacturing process is only a small part of the pharmaceutical business and supply chain, discussed in the following section.

2.1. Scientific integrity of developing, manufacturing, distribution (supply chain) and marketing of pharmaceutical products

In the area of pharmaceutical products, the integrity of data regarding the design, the development and the manufacturing process of a new medical product is a prerequisite. The integrity of data is part of the ethical codex of scientists in all disciplines, but is of primary importance regarding research in medicine (**Swiss Academies of Arts and Sciences, 2008**). The implementation and the enforcement (**Bossi, E, 2010**) is a must and should be harmonized globally. This goal is largely achieved in the scientific technical area by the creation and adoption of the rules of **ICH** [Internet], of the International Council for **H**armonization of Technical Requirements

for Pharmaceuticals for Human Use. In addition, the industrial code of practice embraces a set of enforceable rules and regulations and standard measures in lieu of governmental regulations. Its main purpose is to improve industrial standards by providing low cost and flexible measures of regulations to protect business and customers. Industrial codes of conduct are two types: The first one is mandatory, which means compulsory, enforceable, that protect consumers and is bound by code, and the second one is a voluntary code that is a self-regulated code of practice. In this context, the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) discusses «ethics and compliance in global pharmaceutical industry marketing and promotion»: See the role of «IFPMA and self-regulation» (Shaw B & Whitney P, 2016) To be on the safe side, members of IFPMA realized that it is important to strengthen their ethical conduct in adopting their own explicit codes (Novartis 2020). It is evident that the harmonization beyond technical requirements is complex and more difficult to realize. Thus, as long as no global harmonization of the ethical codex exists, it is the obligation of each country to establish its own codex (Salari, P et al. 2013). It is well known that even an optimal pharmaceutical product needs a marketing effort to be sold, so that the consumer/patient knows the benefits and the risks. In this context, the question arises, to which extent can the ethical codex be enforced regarding marketing and business activities? As a first step it makes sense to extend the tasks of the ICH Council to cover not only technical manufacturing aspects but, in addition, **topics of ethics and compliance in global pharmaceutical industry regarding marketing and promotion.**

2.2. Scientific integrity beyond medicinal products

In case of registered pharmaceutical products, the data integrity is a prerequisite that the scientific technical data cannot be manipulated for marketing and business purposes. However, in case of other products on the market, the scientific integrity of data is not mandatory, leaving more freedom of interpretation and manipulation.

In this context, it is a must to be aware that sophisticated tools exist on how to manipulate the consumer. This point is discussed in the article «Der heimliche Verführer (secret pretender)» by Marc Tribelhorn in the Neue Zürcher Zeitung (Tribelhorn M 2018). He describes the life and career of Edward Bernays (Edward Bernays, Wikipedia) as the master of manipulation. Citing Marc Tribelhorn (translated): «Edward Bernays advised several US presidents, promoted products such as Lucky Strike, and even provoked a military coup (in South America). If there were a ranking of the most dazzling professions, they would certainly occupy a top position: **Public Relations (PR) consultants.** It has to be noted that the term PR has a more positive connotation than the term **lobbyism**, which is nothing else than **marketing a product, an idea or a policy.** The reputation of PR consultants is dubious and their influence is mythical. In recent decades, **public relations have grown into a multibillion-dollar business worldwide, while quality journalism has been shrinking.** The messages spread by stormy mercenaries of business and politics are meant to **guide what we consume, who we vote for, or what we think!** Facts and truth are elastic and purely matter of interpretation or consideration, it is often claimed.»

In this context, it is a must that the source of financial contributions of PR activities are disclosed. To avoid that truth becomes «elastic», **a rigorous interpretation of scientific integrity and integrity of data is a prerequisite.**

In addition, in order to comply with scientific integrity, it is important to carefully choose the wording to avoid any misinterpretation which may raise anger or hatred regarding a topic, a nation or a

race. A typical example is the so-called Spanish Flu of 1918 (**Spanish flu**, Wikipedia) In this context, the use of the wording 1918 flu pandemic or H1N1 influenza, or a virus of unknown origin is appropriate. **The sophisticated tools for marketing and for manipulating people prompt the question, whether there exist legal measures to protect the patient or the consumer in general?**

3. Ethical Issues and Legal Framework

3.1. Religion and Ethics

Religion should be respected and everybody should be free to make his/her choice, commonly known as freedom of religion. Thus, as a result of a personal evolutionary process, people have a chance to get enlightened, enjoying incredible happiness and health. In this context, it is important to notice that common denominator of all religions is an ethical code of conduct. Such a conduct can be essentially realized by implementing the corresponding exemplary rules such as the **Ten Commandments** (Wikipedia). The rigorous application of the Ten Commandments includes the rule that nobody should kill another person. This fact prompts the following questions:

- 1) Should we support the «death penalty» or should we support the **International Federation of Human Rights** with the following ten questions (10 Questions on the Death Penalty (fidh.org)?)
- 2) Who can be in favor for supporting the religious wars of the past?

The numerous **Crusades** (Wikipedia) that started in the 11th century, led to catastrophic damages. The term «**Holy War**» (Wikipedia) was coined by Bunyan and is still used today by the religious parties involved. The religious war between the Protestant and Catholic Church in the **Thirty Years' War** (Wikipedia) from 1618–1648 led to a death toll of 8 million people in Europe. This number needs to be compared with the **list of countries by population in 1600** (Wikipedia). Thus, it can be concluded that during the Thirty Years War more than the population of the Habsburg Monarchy lost their lives.

- 3) Who is ready to support priests and politicians preaching revenge and hatred?
- 4) What are the measures needed to detect and eliminate double standards, double language, hypocritical behavior, mental confusion, premeditation, lack of truthful information, and lack of transparency?
- 5) What are the driving forces: Is it money or power?

During the Thirty Years War, the **Swiss nobility** (Wikipedia) made a lot of money by providing **Swiss mercenaries** (Wikipedia) to fight on the side of the Catholic Habsburg troupes such as Heinrich von Fleckenstein (**Historical Dictionary of Switzerland**), catholic, and Johann Rudolf Werdmüller (**Hostettler U, 1991**), a protestant supporting the protestant Swedish troupes. Later, after the **Swiss Peasant War** (Wikipedia), Werdmüller became catholic and provided the Habsburg Monarchy with Swiss mercenaries. The human trafficking with Swiss mercenaries was a legal business, not contested by the catholic or protestant church. At that time, religious freedom was not granted. Thus, churches prosecuted dissenters, a policy having the same roots as the crusades. Thus, many **Anabaptists** (Wikipedia), such as the Mennonites and Amish people, found a new homeland in the United States, far from Switzerland (**Leuenberger H, 2019b, 2020**).

Only after the adoption of the **Swiss Federal Constitution** (Wikipedia) of 1848 this unethical human trafficking of mercenaries

was completely prohibited. Switzerland was, in the 19th century, the only European country, which adopted the **Constitution of the United States** (Wikipedia) of 1787 with the separation of powers and adapted a **Swiss version** for the benefit of the federation of cantons (states) with different cultures, languages and religions.

However, the religions cannot be blamed that their ethical conduct is not rigorously implemented. This statement refers to hypocritical politicians and priests tolerating prosecution of the Jews and people of color and/or being actively involved in hiding scandals.

Unfortunately, the business of powerful elite and their disciples/sycophants prevailed and still prevails over the ethical conduct of the religion.

In this context, the statement published in 1930 by Albert Einstein on the topic «Religion and Science» is not surprising and **complies with a lifestyle based on scientific integrity and on integrity of data**: «A contemporary has said, not unjustly, that in this materialistic age of ours the serious scientific workers are the only profoundly religious people». In other words, scientists, whose work is strictly based on scientific integrity and integrity of data, follow these guidelines more precisely, religiously, than church adherents abide theirs.

3.2. Basic guidelines of business ethics

Business ethics (Investopedia) is related to the implementation of appropriate business policies and practices that include corporate governance, insider trading, bribery, discrimination, as well as social and fiduciary responsibilities, and more. **In principle, it is the law which provides the basic guideline(s), but does not go into details regarding its implementation or to enforce an ethical conduct.** As an example, an attorney in Florida is not obliged to inform about the opposing party's right to consult his or her attorney to review the contract to be signed. In addition, the attorney is not obliged to provide a document to be signed by the opposing party, stating that he or she explicitly renounces to consult his or her own attorney. Thus, in a worst-case scenario, the opposing party will realize only later that it was wrong signing such an unfair contract, which may lead to an uphill battle and to an expensive and unsuccessful lawsuit. In the optimal case of ethical conduct, the **collateral**

damage of such an unfair contract could be avoided. Ethics tend to deal with what is right. However, as mentioned in the guidelines of Florida real estate continuing education, **an act can be legal, but unethical.** Good ethical practices have to do with trustworthiness, honesty and competence.

Depending on the specific issue the collateral damage can lead to incredible and spectacular cases of **legal business practices of dubious ethics** (Investopedia): One of 14 cases reported is summarized: «Bryan P. Marsal, Co-CEO of Alvarez & Marsal, CEO of Lehman Brothers oversaw the proceedings for the largest bankruptcy in history, the Lehman Brothers bankruptcy filing in September 2008. During a presentation to a group of business people, he was asked to comment about the status of ethics in business. His answer, 'there are none'. Marsal's response put a spotlight on the legal yet unsavory behaviors that permeated the financial crisis and led to some big reforms, particularly through the Dodd-Frank Act of 2010».

In other words, a healthy society needs a legal framework mirroring the necessary healthy ethical codex. In such a case, it must be possible to enforce an ethical conduct.

This result prompts the need for a worldwide harmonization of the legal and ethical framework for the benefit of mankind. Such a harmonization is a very challenging task since, e.g., it would first be necessary to harmonize the existing legal framework in the United States, which differs from state to state.

It has to be kept in mind, **that we can travel to the moon and soon beyond, but we are not able to predict the next financial crisis or the next stock market bubble.** Why, is it a question of research funding? We just know that that the **volume of productive capital** of the real economy **is small** compared to the **volume of speculative money in circulation.** In this context, the economic world is compared to the universe, which according to the second law of thermodynamics will in the end suffer from the so called «heat death». In this economic model heat is equivalent to capital. Hence, the question arises, whether the heat or capital death (**Avakian A et al, 2014**) of the economic universe is inevitable? What are the consequences of the death of capital in the world market? Such a problem can only be resolved in the framework of a **worldwide**



Fig.3.2: The Three Wise Monkeys. (Courtesy: Wikipedia Commons)

cooperation for realizing a win-win situation of all central banks involved, since according to our model previously derived the world system of banks is the heart of **the world society** (axiom 9) **pumping blood (money) to the economy and keeping the society in a healthy state.**

In consequence, **finance and service sectors need special attention** to avoid further financial crises leading to worldwide economic disasters due to the lack of compliance with an ethical codex. Shall we accept this situation by burying our head in the sand like an ostrich? Are we as a **Homo sapient**, better off closing our eyes, not listening and not discussing this problem like the three wise monkeys (Fig. 3.2)? Is such a behavior wise?

4. Conclusions Beyond Business Ethics in the Pharmaceutical Industry

Society can be deemed to be as a biological living being. This term was defined as world society but to some extent, this concept is independent of scale and can be applied also for a community, company or nation. This concept not only allows exploring the necessary prerequisites for securing the public acceptance of medicinal nanoparticles (**Leuenberger 2021**) and pharmaceutical products in general, but can be extended to all technologies that improve quality of human life. For this purpose, the following three additional axioms are required.

Axiom 10: Common denominator of all Religions = Ethical Codex.

Axiom 11: Common denominator of Marketing and Politics = Trustworthy Communication.

Axiom 12: Common denominator of all Trustworthy Sciences = Scientific Integrity.

The 12 axioms support the idea that all sciences converge and are leading to an end of the schism between natural sciences and humanities as already mentioned in the publication «What is Life?» (**Leuenberger, 2019**).

Trustworthy science is teaching us that solutions depend on the framework conditions leading to the following conclusions:

- Successful negotiations and conflict management is a political issue.
- Trustworthy politics need to be based on scientific and data integrity.
- The legal framework needs to concur with the ethical codex.
- Law and Ethical Conduct need to be enforceable.
- The optimization of the framework is not a national but a global issue and the ICH, International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use, needs to be complemented by an
- International Council for Harmonization of Laws and Ethical Conduct.

It is evident that, for securing the survival of mankind, additional measures are needed.

As an example, the **horseshoe crab** (Wikipedia), existing for more than **400 million years**, is still living in peace with its environment. In comparison, mankind as **homo sapiens** (Wikipedia) has existed for only **200–400 thousand years!**

Horseshoe crabs (Horseshoe crab – Wikipedia) are considered as living fossils and their blood has a blue color (of higher royal descent?) since the oxygen carrying hemocyanin (instead of the human hemoglobin) contains copper instead of iron.

To extend the time of the human being on earth it is urgent to establish the necessary framework conditions being supported by the world community of the United Nations.

In this context, the challenges are manifold and solutions need to be engineered by a **Think Tank of the United Nations.**

- For reducing the problem of the overpopulation of the earth: A worldwide birth control is a prerequisite which was known



Fig.4.1: Rendezvous with coastal Horseshoe crabs. (Wikimedia Commons)

already at the time of the high culture of ancient Egypt. In this context, it is important that the society provides the means that the elderly population does not need to be financially supported by their children. For this purpose, the economic systems worldwide need to be strengthened leading to the conclusion that the United Nations must provide a

- **Marshall Plan** (Wikipedia), for countries suffering from economic problems and to avoid a mass migration of people looking for a better life. Thus, there is
- **No necessity to build walls** between nations and a worldwide new Marshall Plan will boost the world economy, after suffering from the Corona pandemic.
- In addition, the world economy needs a **Green Deal** as a powerful **engine** to avoid natural catastrophic events as a result of the climatic change, **boosting innovations** as a result of new economic and research avenues.
- **Trade wars and sanctions** are not part of a **free-market policy** leading to a «win-win» situation of all parties involved.
- In general **wars are part of the Law of the Jungle leading to the extinction of mankind.**
- **Trust** among all parties **needs to be cultivated and validated** among other issues by agreeing to the **policy of an open sky.**
- Such radical rethinking needs to be supported by powerful tools of **Negotiations Engineering and Conflict Management** leading to the application of
- **Science Diplomacy** (Wikipedia) instead of exercising the **Law of the Jungle** (Wikipedia) that the strongest nation is dictating what has to be done. In this context, it is evident that each society

should have the freedom of adopting its own political system without being forced by a third party. At the same time, it can be anticipated that every country could agree on the following point that

- In the optimal case politics at communal, county, state, national and international levels are based on **scientific integrity** (**Swiss Academies of Arts and Sciences, 2008**) and on an ethical conduct.
- This is a very demanding issue regarding politicians in leading positions having the skills and knowledge to do their job for finding a «win-win» solution for all parties involved.
- The ancient Greek society significantly coined the term **aristocracy** (Wikipedia), meaning rule of the best. In this context, an approach based on scientific integrity and integrity of data will be helpful for choosing the best politicians to be in charge.
- Thus, it is up to the society to define the skills and the curriculum of his, her scientific education, needed to fulfil the job of a leading politician.
- It is necessary to say that a politician in charge needs to have the skills of a manager and a high moral and social competence.
- Tellingly, the founding fathers of the Swiss Constitution of 1848 realized that an optimal educational system, in the spirits of **Jean-Jacques Rousseau** (Wikipedia) and **Johann-Heinrich Pestalozzi** (Wikipedia), is the prerequisite for establishing a society being able to adopt a functioning democratic system.
- In such a situation, the individual human being is able to make the informed choice regarding political programs, which can be trusted by the society and by the politicians in charge. Hence, in the optimal case the individual is able to make the right choice



Fig.5.1: Lonely she-wolf killed by a pack of wolves while entering the pack's territory in the Grisons, Switzerland on January 20, 2021. What was the reason: Overpopulation of wolves or entering unwelcomed into others' territory? (Courtesy: Governmental Office of Hunting and Fishery of the Canton of Grisons)

and does not need any guidance to identify what is the win-win solution for all partners involved.

- However, it is not the goal of Switzerland, as it respects the **freedom of culture**, to export its political and cultural system.
- Last but not least, it must be kept in mind that the **educational system is of primary importance for the society**.

5. Summary and Outlook

Ethical codex exists in science, but should be harmonized globally. In the area of pharmaceuticals, the scientific technical harmonization of regulations is largely achieved (ICH) to protect business and customers. However, harmonization beyond technical requirements (especially for marketing and business activities) is complex and difficult to realize globally. Thus, it may be necessary to first establish a national codex. As a matter-of-fact, sophisticated tools exist to manipulate the consumer. After mentioning that, history is teaching us that business has even prevailed in the ethical conduct of religion. Unfortunately, existing business policies and practices do not go into details enough regarding the implementation and enforcement of an ethical conduct. In conclusion, six additional axioms are proposed to better understand our world. In particular, the ethical conduct must be the common denominator of all religions, of marketing, politics, and trustworthy sciences. The natural sciences and humanities should converge. Several framework conditions are proposed (like the set-up of an International Council of Harmonization of Laws and Ethical Conduct) which should secure the survival of mankind! In this context, the Law of the Jungle, which served mankind throughout its existence has to be abandoned. This demand is not only based on our ethical codex but is based on the limited size of the jungle and available resources:

The limited size (habitat) is also a problem of the recolonization of wolves in the Swiss alpine forests of the Canton Grisons. On January 20, 2021, a single she-wolf trying (by accident?) to enter another wolf territory was killed by the pack of wolves defending the habitat (Fig.5.1).

This event prompts the request to officially regulate the number of wolves to prevent an overpopulation and to avoid that wolves need to kill each other.

The situation that a lonely wolf enters by accident the forbidden territory can be compared to a disturbed person entering the property of an owner who was told, to be on the safe side, to «shoot first and to ask later», not vice versa. From the business point of view the pack of wolves defending its territory can be also compared to a drug gang, which does not allow for a member of another gang to expand business goals.

This event also shows the astonishing similarity of behaviour between man and wolf, which will, in the end, **lead to the extinction of man and wolf!**

Thus, the human being needs not only to **adopt a strict birth control to escape the fate of Fig.1.4 but needs to explore new avenues, so that mankind will survive.**

Among other measures for reaching this goal is to boost postgraduate courses such as «Negotiations Engineering & Conflict Management» at the Federal Institute of Technology in Zurich, which is discussed in the contribution by Nora Meier & Michael Ambühl, **Chair of Negotiation and Conflict Management**, in this SWISS PHARMA issue 43 (2021) No.4.

The origin of a conflict can be as simple as a misunderstanding, a lack of trust, a lack of transparency, a lack of eye-level communi-



Fig.5.2: Shows trial and execution of the Basel-Land rebels in 1653. These events, dating back more than 200 years ago, are, today, largely forgotten and were not part of «Die Schweizer» of SFR, **Medienportal 2013**. (Courtesy: Wikimedia Commons)

cation in a hierarchical system, a lack of a harmonized legal framework, a lack of emotional intelligence and control, a simple power play, and in the worst-case scenario – quoting Schiller’s **William Tell (play)** (Wikipedia) «The most pious can’t stay in peace if it does not please his evil neighbor».

Lack of trust is a difficult issue: The Canton of Basel was split into two half-cantons in 1833 with the provision to reunite later, if the population agrees. All attempts of a reunification failed however, a partnership was established to resolve problems of common interest such as the financial support of the University of Basel and problems regarding hospital planning for the population living in both half-cantons (Basel-City, and Basel-Land).

Evidently, society has a life and a consciousness, being able to recall unpleasant events dating back roughly 200 years.

In this context, in the 19th century (around 1840), the population recalled the events which happened during the peasant war of 1653 (**Hostettler U, 1991, Leuenberger H, 2019b, 2020**) leading to the public execution of the rebels by the Mayor of the City of Basel, **Johann Rudolf Wettstein** (Johann Rudolf Wettstein – Wikipedia) (Fig.5.2).

The society’s consciousness 200 years ago, recalling the events of the peasant war in 1653, however, helped to adopt the Swiss Federal Constitution of 1848, leading to an end of numerous peasant revolts since the time of **William Tell** (Wikipedia) and of the **Rütlichschwur** (Wikipedia) in 1291, considered as the date of the foundation of Switzerland.

A comprehensive study of the origin and consequences of smaller and larger peasant uprisings is still missing to understand the execution of Hans Waldmann (**SFR, Medienportal 2013**), mayor of Zürich, the confidential message of Niklaus von der Flüe (**SFR, Medienportal 2013**), and the **Appenzell wars** (Wikipedia).

The author of this article believes, and respectfully assumes, that Niklaus von der Flüe proposed in his confidential message not to forbid the Lucerne carnival and not to punish the peasants who criticized the governments during the week of the **Carnival** (Wikipedia) since it is an advantage for the governments to know the real problems of the peasants unrest, to avoid revolts (**Leuenberger H, 2019b, 2020**). The tradition to **celebrate** – during the days of Carnival – **freedom of speech being masked** is deeply rooted in the **Swiss society and its soul**. The Schnitzelbank singer is a bard (**Car-**

nival of Basel – Wikipedia) that sings **satirical verses** about current events in Basel or from around the world.

Niklaus von der Flüe's message (**Leuenberger H, 2019b**) was evidently related to the Lucerne Carnival (Fastnacht), being not recorded in the **Stanser Verkommnis** (Wikipedia) and was kept confidential since 1481 for obvious reasons. As a result, the carnival in Switzerland could and can also today be compared to a **theatre production with masked actors** having the **right to criticize** the government and events **without being prosecuted for defamation**.

Trust among the partners of the first Swiss Confederation was a prerequisite and needed, in addition, soft skills in the area of communication, negotiation and conflict management.

Trust is inherently fragile and must be preserved. In this context, the parties need to agree about measures to control that a contract is executed. In addition, **the legal framework must comply with the ethical codex to avoid that a contract being signed is broken** following the Machiavellian advice «If people were all good, this proposal would not be good; but since they are bad and would not keep the given word either, you have no reason to keep it toward them» (**Suter A, 1997**).

The author of this article regrets that during his studies at the University of Basel he didn't enroll in specific courses to be trained in soft skills such as to represent a point of view in the best possible way, to carefully study how people communicate knowing the fundamentals of transactional analysis as described in the book of Harris **I'm OK – You're OK** (Wikipedia) as a method for solving problems in life. In this context, I thank Sandoz (today, Novartis) that I was invited to enroll in management courses covering such topics.

Thus, optimal skills in the area of communication/negotiation lead to a «win-win» solution of all partners involved.

In the current world situation, the implementation of **science diplomacy** (Wikipedia), **negotiations engineering**, **conflict management**, and so on, **based on scientific integrity and integrity of data, is an absolute must for the survival of mankind**.

The emerging disciplines of computational science and artificial intelligence (AI) will lead to additional challenges. In this context, ethical issues play a very important role leading, as an example, to the «Declaration on the ethics of brain-computer interfaces and augment intelligence» by **Zeng Y et al (2021)**. Brain-computer interfaces (BCIs) are a transdisciplinary field of, but not limited to, brain science and artificial intelligence. This seminal publication by Zeng et al (Chinese Academy of Sciences) is remarkable, promoting the chance that a world-wide agreement is feasible.

In the publication «Conflict Management and Negotiation» **Shargh et al (2013)** defines how managers in an organization can efficiently manage conflicts and how good managers optimally handle negotiations. The authors from Iran show that a conflict is not necessarily a negative phenomenon and an average level of conflict could raise the performance level. If ethical issues are observed, a sustainable solution of a conflict can be reached.

Needless to say, the convergence of all sciences may trigger a new university educational reform, which will include much more. This latter point will be discussed in detail by Marcel Van De Voorde in this SWISS PHARMA issue 43 (2021) No.4

Thus, future university graduates will be more flexible, following nature's principle that flexibility is the key factor in a fast-changing environment. A major role will play transdisciplinary research being supported by the Swiss Academies offering the **td-net online**

course, which is described in detail (<http://www.transdisciplinarity.ch/en/td-net/Kompetenzvermittlung/tdMOOC.html>), in the February 2021 Newsletter. On the other hand, it has to be kept in mind that transdisciplinary research is not the only element, but additional measures are needed for an optimal new university educational system as discussed by Marcel Van De Voorde. In this context, the question arises, whether the Swiss Pharmacy Curriculum (article by G. Borchard, Ch. Moll) and the Swiss dual educational system at the University of Applied Sciences of Northwestern Switzerland (article by G. Imanidis), both contributions to be published in this SWISS PHARMA issue 43 (2021) No.4, may serve as a first step of such a new model since the graduates are educated as «generalists» and are able to fulfill a broad range of professional activities?

6. Acknowledgements

Daniel Lionberger (**Leuenberger 2020**), Jean Renoir, Marcel Van De Voorde, and Felix Wüst are acknowledged for proof-reading the manuscript and for their constructive comments. I thank Gunjan Jesmani and Ute Skambraks (De Gruyter) for their kind support.

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