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## **Natural Philosophy and Natural Science around 1800**

### **1. Introduction**

The development of science since the Renaissance can be characterized as an expansion of the knowledge of phenomena, as increasing specialization, as a growing of empiricism with many techno-practical consequences. It can also be considered as an institutionalization of science and the dominance of research, as emancipation from theology and philosophy, as separation from the humanities or a loss of historico-theoretical interests within the natural sciences.

The terms philosophy or philosophical – especially in connection with natural science and medicine – had up to the eighteenth century different meanings: metaphysical foundation of nature and natural science, theory and methodology of scientific research, causal explanation of natural phenomena and natural processes, or total, general and systematic description or representation of a certain area of nature or a specific discipline.

### **2. Enlightenment**

The dialogue between science and philosophy depended on the internal developments of science and philosophy and their changing relationships. The eighteenth century was a period of fundamental innovation – in the field of physics, chemistry, geology and biology as well as in the relationship between science and philosophy.<sup>1</sup>

In the chemistry of that period, the concept of the elements and their combination was transformed by the controversy between phlogistic and antiphlogistic schools of thought. By 1800, the new oxygen theory (A.L. Lavoisier 1789) had established itself, whereas the doctrine of forces and processes was being developed mainly by

<sup>1</sup> See BÖHM (1964); CROSLAND (1962); ENGELHARDT VON (1979); HOOYKAAS (1966); PARTINGTON (1961-70); RITTERBUSH (1964); ROGER (1963; 1971); SCHIMANK (1973); STRÖKER (1967); VERRA (1992).

the adherents of the old phlogiston theory (T.O. Bergman 1775, J.B. Richter 1792-94, C.L. Berthollet 1803); these two approaches then combined with atomic and electrical theories to give rise to the new chemistry (J. Dalton 1808-27, H. Davy 1812, J.J. Berzelius 1808-18). The concrete concept of an element became bound to what was directly observable, while the absolute concept of element was replaced by a relative one, involving the postulation of indivisible substance. It was, however, only after the turn of the century that the so-called imponderable substances – light, heat, magnetism and electricity – were dropped from chemistry. The concept of a compound referred to substances which could be dissolved into simpler substances and then reconstituted out of what they had been dissolved into. Organic substances were also conceived of as compounds, an attitude which bore fruit in Friedrich Wöhler's artificial preparation of urea in 1828. Special pre-eminence was accorded to specific substances or forces, the basic arrangement being a mathematized classification or natural history taxonomy. Since no real integration was achieved, the decades between 1780 and 1830 did not give rise to a coherent or closed system of elements, compounds, forces and processes in chemistry. But this was taken up or realized by philosophers of that time, especially by Hegel in his philosophy of nature.

In biology or the organic disciplines of natural history living phenomena, newly-discovered in the last decades of the eighteenth century, demonstrated the limits of both Cartesian mechanism and the approach by means of chemical processes. Albrecht von Haller (1753) through the attention he paid to sensibility and irritability, C.F. Wolff (1759) by means of his theory of epigenesis, G.L.L. de Buffon (1778) by his temporalizing of nature, J.F. Blumenbach (1781) by concentrating upon reproduction, stimulated new lines of enquiry in the life sciences.

“Vitalism” is not a term of that century, appearing only at its end, but already common were the terms “vis vitalis”, “principe vitale”, “fonction vitale”, “force vitale”, “vital power”, “living principle”, “vitalità”.<sup>2</sup> Perhaps the first use of “Lebenskraft” can be found in the German translation of Haller's *De partibus corporis humani sensilibus et irritabilibus* (1753) in 1772. The first German book with the title *Lebenskraft* was published by F.C. Medicus in 1774, followed by a lot of books and articles with similar titles; the most important ones were written by C.F. Kielmeyer (1793), J.D. Brandis (1795), J.C. Reil (1796), T.G.A. Roose (1797), J.F.A. Ackermann (1797-1800), all of them explicitly in a Kantian, or at least in a non-metaphysical sense and in general limited to the empirical sphere of nature.

The influence of philosophy and even of theology on these scientific developments was by no means negligible. Physico-theology played an important role in Albrecht von Haller's thinking, as well as in that of Charles Bonnet. Buffon withdrew central tenets from his theory of the temporalization of nature after having

<sup>2</sup> CIMINO and DUCHESNEAU (1997).

to face protest from the theological faculty of the University of Paris. The dispute concerning the relationship between body and soul depended on the philosophical and theological presuppositions of the century. The fact that epigenesis and preformation can be legitimized by means of natural theology, is a clear demonstration of the neutralization or relativization of the ways in which these fields of enquiry were then being associated.

During the course of the eighteenth century an increasing number of scientists and physicians rejected the influence of philosophy and advocating purely empirical, specialized science. The natural sciences and medicine established their independence from philosophy.<sup>3</sup> At the same time history lost its value for science, as Lavoisier declared explicitly in his *Traité de chimie* (1789): “Ce n’est ni l’histoire de la science, ni celle de l’esprit humain, qu’on doit faire dans un traité élémentaire”.<sup>4</sup> At the institutional level of the university in many countries, the Philosophy faculty, in which the Natural Sciences in general were located, was becoming independent of its former role of merely providing an introduction to Theology, Jurisprudence and Medicine. At the same time, however, it was losing its general or fundamental function within higher education.<sup>5</sup>

This whole state of affairs – involving as it did physical, chemical and biological progress, specialization, and the growing separation of science and philosophy – constitutes the general historical background to the philosophical approaches to nature in Germany in the writings of Kant, Schelling, Hegel, Goethe, Humboldt, Schopenhauer, and of the many so-called romantic scientists and physicians.

To this historical and professional context Galvani and Volta also belong, who were discussed by philosophers and at the same time influenced not only natural science but also natural philosophy.

### 3. Romanticism and Idealism

The epoch of Romanticism and Idealism around 1800 was an engaged and substantial reaction of several naturalists, physicians and philosophers against the general development of science and philosophy of the eighteenth century – a reaction as correction and complement, not as contrast or total alternative. The philosophical interpretation of nature of that epoch exercised a deep influence on the natural sciences and medical disciplines, especially in regard to the organism, disease and the relationship between man and nature.

Romantic natural scientists and speculative philosophers criticized the science of

<sup>3</sup> In regard to the naturalist and physician G.E. Stahl and his relationship with philosophy, see ENGELHARDT VON and GIERER (2000).

<sup>4</sup> LAVOISIER (1789), p. 13.

<sup>5</sup> KANT (1798).

their time, but they in no way challenged the value and justification of an empirical and mathematized approach to nature, though they rejected the separation of natural science from philosophy and the absolutizing of its positivistic perspective. They pleaded and argued for the unity of natural phenomena and natural sciences, the responsibility of man for nature, and the unity of nature and culture. Without a philosophical and theoretical basis, no science and scientific progress, according to them, ought to be possible; without this basis nature, man and society equally would be endangered. Empiricism should be combined with theory, physics with metaphysics. Essential observations and inventions as well as institutional innovations and the foundation of scientific journals derive from romantic naturalists, but they did not form the central point or value of this movement.

These decades around 1800 represent a singular phase in the history of science and of the philosophy of nature. Neither before nor since has it been so complex and at the same time so at variance with natural science. This epoch possesses great importance: in itself, with regard to the general situation of science at that time, to the internal as well as external causes of its change, and from the point of view of contemporary reflections on science and society, on the relationship between natural and human sciences, and on the attitude of man toward nature.<sup>6</sup>

Generally, for these decades one can differentiate a variety of positions in regard to the relationship between philosophy and science: empirical science with its corresponding theory of science and methodology of scientific research (Nollet, Senebier, Zimmermann, Cabanis), the transcendental philosophy of nature (Kant, Fries), the speculative philosophy of nature (Schelling, Hegel), and the romantic *Naturforschung* with different positions. In contrast to present scientific publications, observations and experiments in the natural sciences of the Romantic era were always combined with reflections on history, society, arts, philosophy and religion.

Above all Kant and Schelling influenced the Romantic movement of the natural sciences from the end of the eighteenth to the beginning of the nineteenth century, but other philosophers and earlier positions also provided important stimulations. Exponents of this movement include the naturalists and physicians A.C.A. von Eschenmayer, J.W. Ritter, J. Görres, G.H. von Schubert, H. Steffens, L. Oken, H.C. Oersted, C.J.H. Windischmann, I.P.V. Troxler, C.G. Carus. The philosophical dependence or orientation was not constant: changes in the biographical development and combinations of different fundamentals were common. Romantic natural science is in itself not a unity; specific features and individual developments can be noted: divergent conceptions of nature, science, society, history and culture,

<sup>6</sup> AYRAULT (1961-76); BENZ (1948); BRINKMANN (1978); CARDINALE (1983); CUNNINGHAM and JARDINE (1990); ENGELHARDT VON (1979a); FAIVRE (1974); GODE-VON AESCH (1941); LEIBBRAND (1956); LOVEJOY (1941); POGGI and BOSSI (1994); PORTER and TEICH (1988); ROTHSCUH (1978); SNELDERS (1970); STEINBÜCHEL (1948); WIESING (1995).

different responses to the victory of positivistic natural science and the separation of natural science from philosophy during the nineteenth century.

Goethe represents a specific position with his combination of aesthetics, science, philosophy and biography, with his proximity and distance to romantic and speculative natural philosophy. Hegel describes Goethe's position as "sensuous consideration of nature" ("sinnige Naturbetrachtung") in difference to his own "notional consideration" of nature ("begreifendes Erkennen").<sup>7</sup> The "original phenomenon" ("Urphänomen") according to Hegel leads into a "twilight, spiritual and comprehensive in its simplicity, visible or tangible in its sensuousness", and in this respect represents a transition from empiricism to philosophy.

Alexander von Humboldt takes a position between empiricism, art and philosophy and aims in his own words to an "empirical view of nature as a whole in the scientific form of a portrait of nature".<sup>8</sup> His scientific approach differs from the romantic physicians as well as from the philosophers of nature, with whom he maintained personal contacts and kept up a correspondence. A true philosophy of nature according to Humboldt will never endanger empirical science.

Indebted to Kant and Goethe and sharply opposed to Hegel's natural philosophy ("panlogism"), as well as to contemporary natural science ("materialism"), Schopenhauer too occupies a characteristic place in the spectrum of positions around 1800. He likewise cannot be counted among the romantic scientists, as he approved of their search for a "basic type of Nature" ("Grundtypus der Natur"), but rejected their "hunt for analogies" ("Jagd nach Analogien").<sup>9</sup> Schelling's philosophy of nature was criticized by Schopenhauer as a senseless mixture or false identification of physics with metaphysics.

The systematization of these different positions finds its confirmation through the self-descriptions of the naturalists and natural philosophers of that time. Natural philosophy is not natural science or scientific theory or methodology of empirical research. The romantic naturalists themselves underlined their distance from the speculative form of natural philosophy – despite the unquestionable influence especially of Schelling for their metaphysical understanding of nature and science. They formulated their critique of positivistic science, of Kant's transcendental philosophy of nature, and of the speculative method of Schelling and Hegel. In the eyes of the romantic naturalists contemporary science was lost in senseless details, its characteristics were crude empiricism and vain theory.

According to Ignaz Paul Vitalis Troxler, the absolute which underlies nature and the spirit cannot be grasped – neither by "intellectual contemplation" ("intellektuelle Anschauung") nor by "reasonable faith" ("Vernunftglaube"); any word for the

<sup>7</sup> HEGEL (1965), § 246, pp. 45-7.

<sup>8</sup> HUMBOLDT VON (1845-62), I, p. 33.

<sup>9</sup> SCHOPENHAUER (1819), II, p. 171.

absolute is only a “sign” of it.<sup>10</sup> Also Johann Wilhelm Ritter confirmed: “the highest a priori deduction is a misunderstanding, and human beings cannot master it”.<sup>11</sup> According to the romantic naturalists, faith, feeling and dreams – in addition to understanding or reason – could contribute to natural science and its progress, but their findings or results had to be confirmed by experience; the romantic naturalists did not glorify the irrational.

According to Schelling and Hegel natural philosophy does not compete with natural science.<sup>12</sup> Natural philosophy “is nothing but physics, but it is only *speculative* physics”,<sup>13</sup> Schelling confirmed; the correctness of philosophical deductions would be demonstrated by the “coincidence of the product appearing in experience with that which has been constructed”.<sup>14</sup> Hegel constantly emphasized the difference and identity subsisting between philosophy and natural science: “It is not only that philosophy must accord with the experience nature gives rise to; in its formation and in its development, philosophical science presupposes and is conditioned by empirical physics. The procedure involved in the formation and preliminaries of a science is not the same as the science itself however, for in this latter case it is no longer experience, but rather the necessity of the notion, which must emerge as the foundation”.<sup>15</sup>

The sceptical or negative judgements of Schelling and especially Hegel about the romantic concepts are no less distinct. Moreover, they express their distance from Kant and positivistic science. For Hegel the essential deficiency of the Romantics lay in their inability to interrelate notional and phenomenal dimensions immanently. In his view they possessed only a “dim concept of the idea, of the unity of notion and objectivity, and of the fact that the idea is concrete”.<sup>16</sup> In regard to the misunderstanding and distortion of his philosophy of nature, Schelling publicly renounced (in 1807) further publications in this field: “Since I have seen the misuse which is made of the ideas of natural philosophy, I have resolved to keep to verbal communication over the whole matter until a time when that is no longer a concern”.<sup>17</sup>

The unity of natural phenomena, the worth of organism and life, the association of nature and culture, the derivation of human beings from nature, and their responsibility for nature are underlined by the romantic naturalists and the speculative philosophers. The observations and theoretical conclusions of Haller,

<sup>10</sup> TROXLER (1808), pp. 28-9.

<sup>11</sup> RITTER (1810), II, p. 173: “Die höchste Deduktion a priori ist ein Mißverständnis, und der Mensch ist nicht ihr Herr”.

<sup>12</sup> COHEN and WARTOFSKY (1984); HASLER (1981); HECKMANN and KRINGS and MEYER (1985); HORSTMANN and PETRY (1986); PETRY (1987); PETRY (1993); SANDKÜHLER (1984); ZICHE (1996).

<sup>13</sup> SCHELLING (1799a), p. 274.

<sup>14</sup> SCHELLING (1801), p. 652.

<sup>15</sup> HEGEL (1970), I, § 246, p. 197.

<sup>16</sup> HEGEL (1964), § 231, p. 441.

<sup>17</sup> SCHELLING (1807), p. 303.

Bonnet, Wolff, Blumenbach, Erasmus Darwin, Kielmeyer and many others of the eighteenth century are taken up by these scientists and philosophers in the beginning of the nineteenth century. It is between 1797 and 1802 that the term “biology” was coined several times with varying meanings (T.G.A. Roose 1797, K.F. Burdach 1800, G.R. Treviranus 1802, and J.P.B.A. de Lamarck 1802). The response to this in the realm of philosophy is intense and fundamental. Kielmeyer’s famous lecture *On the Relations of the Organic Forces* (*Über die Verhältnisse der organischen Kräfte*) of 1793 on the gradation of organic forces is characterized by Schelling as the beginning of the “epoch of a totally new science of nature”.<sup>18</sup> This naturalist is regarded in France as “père de la philosophie de la nature”,<sup>19</sup> although his own orientation was explicitly a Kantian one.

The interpretations of nature are guided by metaphysical and mathematical principles, by formal categories like difference and similarity, analogy, polarity, potency and metamorphosis, but also by specific phenomena and processes of particular spheres of nature. All philosophical understanding must depend on science, on empirical facts. A “speculative” deduction, which does not mean irrational or poetic deduction of nature and reality – and here lies the difference between the romantic naturalists and Schelling and Hegel – exceeds the capacities of man; faith, revelation, intuition, presentiment are opposed to the means of notion and intellectual perception or contemplation.

The conceptions of the romantic naturalists of nature and science are based on the identity of nature and spirit; the laws of nature are supposed to correspond to spiritual laws. The *Deduction of the Living Organism* (*Deduktion des lebenden Organism*) of 1799 by Adam Carl August von Eschenmayer depends on the presupposition “that precisely this object comes under the necessary conditions of self-consciousness”.<sup>20</sup> The correspondence between nature and spirit follows, according to Troxler, from the fundamental “animation” of nature. In this perspective Henrik Steffens declares: “Do you want to know nature? Take a look inside yourself, and in the stages of your spiritual development, you may have the chance of looking on nature’s stages of development. Do you want to know yourself? Observe nature, and her works are of the same essence as your mind”.<sup>21</sup>

Nature in the perspective of the romantic naturalists must be conceived as a union and interrelationship of all phenomena and processes, dependant on metaphysical principles and immanently combined with the world of man. Gotthilf Heinrich von Schubert is guided above all by the principle of an internal or spiritual link between all natural phenomena: “The history of nature has to do not just with individual, finite, immanently perishable beings, but with an imperishable basis of

<sup>18</sup> SCHELLING (1798), p. 619.

<sup>19</sup> LAURILLARD (1833), p. 9.

<sup>20</sup> ESCHENMAYER VON (1799), p. 334.

<sup>21</sup> STEFFENS (1808), p. 102.

all that can be seen, which unites it all and gives it soul. It teaches a love which loves in all things, a universal soul which sets everything, even that which is most remote and apart, in a living interplay that gives to all that can be seen, from the firmament of heaven to the ephemeral insect, one rhythm of time and law of life".<sup>22</sup>

What is decisive is the specific character of the organic or the organism. Often the proofs of the unity of nature rely on a translation of organic categories into inorganic; the whole of nature is conceived as a single organism. Each absolutization of the principle of mechanics is criticized – in the natural sciences as well as in medicine, for example in the interpretation of disease and therapy. Besides causality (“causa efficiens”), finality (“causa finalis”) is not neglected. The central point is the union of nature and spirit, of body and soul. The insights into the unconscious, into the irrationalism and the nature of dreams, gained at that time especially by the naturalists and physicians Schubert and Carus, were more fundamentally studied in the twentieth century (Freud, Jung).

To understand nature as a total organism is to conceive its genesis, its genetic development. All natural phenomena know development and have changed with time. But these changes must be understood according to the romantic naturalists always in combination with the ideal systematics of nature and its forms and processes. Furthermore they should correspond with the systematics of the psychical faculties and mental capacities of man and the historical phases of the development of science.<sup>23</sup> The historicization of nature is connected with the historicization of the knowledge of nature, or the objective and the subjective dimensions of the historical conscience are brought into a union; the separation of the history of science and empirical scientific research – a result of the nineteenth century and generally accepted in our days – is not the concept of science of the romantic naturalists.

The development of nature is conceived as an ideal evolution, as metamorphosis of ideas, as “Idealgenese” and not as evolution in the Darwinian sense, as “Realdeszendenz”. In 1801 Steffens developed a “theory of evolution” (“Evolutions-Theorie”), where he deduced the multiplicity of plants and animals from a dynamism of expansive and contractive forces; by this dynamism the “Totalorganisation” of nature is realized. Oken too rejects the conception of a real change: “To say that the earth and metal have been elevated to coral conveys as little as to say that the earth as such has really changed into coral, when he asserts above that it has become metal, or air has become sulphur”. Changes, death and new formation are only the surface, the manifest and external side of nature; in the essential, substantial sphere no real beginning and no real ending are possible: “all is to be taken in a philosophical sense”.<sup>24</sup>

Schelling and Hegel too reject the idea of real transformation. Schelling sees in the

<sup>22</sup> SCHUBERT VON (1826), I, p. 4.

<sup>23</sup> ENGELHARDT VON (1979).

<sup>24</sup> OKEN (1805), p. 53.



phenomena of the organic world the results of an alternation of productivity (“natura naturans”) and inhibition (“natura naturata”) of the original natural force, which cannot pass immediately to another level of fixation. “Thus the claim that the various organizations have actually been shaped by a gradual development from each other is the misunderstanding of an idea”.<sup>25</sup> Evolution pertains also, according to Hegel, to notion and its development, not to real phenomena and their changes: “Thinking consideration must reject such nebulous and basically sensuous conceptions, such as, for example, the so-called emergence of plants and animals out of water, and of the more highly developed animal organisms out of the lower etc.”<sup>26</sup>

In numerous articles and books, the naturalists of the Romantic epoch outline their concepts of society and history, and leave this area not at all only to philosophers and historians, as it is so common in our days.<sup>27</sup> In contrast to present scientific publications, observations and experiments in the natural sciences of the Romantic era are combined with reflections on history, arts, philosophy and religion. The stress was on different points and disciplines; the union is realized more successively or simultaneously – but always the universal claim, the interdisciplinary perspective is maintained. By this fact the epoch of Romanticism offers the possibility of studying the relation of concepts of nature with concepts of society in the conscience and language of the scientists themselves, and not only by means of a systematic or logical analysis from the historical standpoint.

According to the romantic naturalist, the understanding of man and society without consideration of scientific knowledge, without regard to the natural basis, must remain insufficient. The development of the individual and social being is submitted to change, to history. Also in the area of man expansions and contractions guide development, and are responsible for stagnation and acceleration, for revolutions and turning points of human history. Society derives, according to Steffens, from a moving force, which he identifies with the formative or dynamic force (“Bildungstrieb”) of nature. Particularity is justified, but at the same time must serve the whole.

Scientists who devoted themselves to only one science were considered uncultured, governments which did not support this universality were criticized. History and natural science belong to each other, man ought to be naturalized, nature ought to be humanized. Lorenz Oken wished to take the natural sciences as the basis for his journal *Isis* (1818-48), because through them especially, man gains his “real culture” (“eigentliche Bildung”), because especially they teach him, “where his

<sup>25</sup> SCHELLING (1799), p. 63.

<sup>26</sup> HEGEL (1970), I, § 249, p. 212.

<sup>27</sup> Some bibliographical indications: ESCHENMAYER VON (1817); KIESER (1818); OKEN, numerous articles in his journal *Isis*; STEFFENS (1809); STEFFENS (1812); STEFFENS (1817); WAGNER (1815); see also the autobiographies by Schubert, Steffens, Burdach, Ringseis.

place is and the place of the environment”, whereas theology and jurisprudence according to him should not be included, because they retreat from humanity.<sup>28</sup>

The history of mankind, of races and peoples, is combined with nature by the metaphysical identity of nature and spirit as well as by real phenomena and concrete processes. Each epoch of history has its relative value, what is decisive is the idea of evolution as a whole. The “dark” Middle Ages gain new estimation in the Romantic era. With its end, history returns to its beginnings, the whole is realized; the “Kingdom of God” (“Reich Gottes”) will dominate in the “World of Nature” (“Naturwelt”); through historical development, art, science and religion are unified with life.

Society and political progress are influenced by the sciences and their progress. The new sense of nature, the sense of the romantic naturalists, is promoted by art, philosophy and religion, and should fundamentally transform human life, should destroy old forms of society and help to build up new social conditions, should produce morality. In the view of the romantic naturalists the governments and states close their minds too much against the new, the ideal and philosophical understanding of nature, and their resistance finds an ally in anti-metaphysical contemporary science.

Nature has history and history has nature. The history of man depends, in the eyes of the romantic naturalists, on the history of nature and conversely the history of nature on the history of man. The mediated history of man and nature should lead to a new history of man and nature. This new history will realize a fundamental, original identity of nature and man, of being and consciousness, which was in the beginnings at the basis of everything. The concepts of integration are different, they follow from different philosophical and religious positions.

Nature and man share the same destiny. Man is a natural being, in man nature developed up to the spirit. By understanding nature, man increasingly conceives his own union with nature and now begins to care for her cultivation. History had its beginning with a period of identity between nature and spirit. Afterwards there was a period of separated development of natural history and the history of mankind. This twofold development should now pass to an epoch of union and freedom; this is a process of the naturalizing of man and the humanizing of nature. The exploitation and destruction of man should be as impossible as the psychical reduction and the denial or neglect of nature in social concepts and social reality.

Man has a special responsibility for nature, which at the same time serves his own development. For Novalis, the mission of man is the “cultivation of the earth” (“Bildung der Erde”);<sup>29</sup> nature will become completely spirit through man. According to Ritter, nature can reach through man “the supreme presence and self-awareness”, this harmony will “make men part of a blessedness which is like that of Nature itself”; categorically he urges: “to integrate Nature is the purpose of his

<sup>28</sup> OKEN, *Isis* (1817), pp. 2 and ff.

<sup>29</sup> NOVALIS (1798), p. 427.

existence”.<sup>30</sup> The physician Johann Ferdinand Koreff spoke, in regard of the destruction of the Italian landscape by human beings, of the “sarcasm of Nature at the tombs of history”.<sup>31</sup> This destruction of nature, confirms Carus, in his fundamental opinion that “not only does man need the earth for his life and activity, but also the earth needs man”.<sup>32</sup> The relationship between nature and humanity cannot be only or essentially guided by the concepts of knowledge and of power (Bacon: “knowledge is power”; Descartes: “maîtres et possesseurs de la nature”).

#### 4. Outlook

The development of the relationship between philosophy and science in modern times depends on socio-cultural changes and corresponds at the same time to changes in the concepts of society and culture. The relationships were manifold and differently narrow in the past centuries.

The fact of the existence of romantic *Naturforschung* around 1800 demonstrates, that the general socio-cultural conditions at the end of the eighteenth century do not produce necessarily only one type of science. One needs further historical research and differentiation. The multiplicity of positions requires a concrete social history of romantic *Naturforschung* and natural philosophy, a socio-psychological analysis of its adherents, and an institutional analysis of the universities they attended. Through these historical studies one will get new insights into the relationship between the internal and external factors of scientific evolution during the eighteenth and nineteenth centuries; this refers especially to the concepts of nature, science and culture.

Romantic *Naturforschung* and natural philosophy are to be understood as a contraposition to the development of science in modern times, at the same time also as the immanent fulfilment of this development and not as its total negation. The natural philosophy of Idealism and the philosophical science of Romanticism, side by side with literature and the other arts in general, have no equivalent in other countries, although here and there echoes or parallel tendencies can be observed. The historiographic scheme, by which all sciences around 1800 passed through a phase of Romanticism and Idealism does not correspond to historical reality, not even for the German countries is this scheme accurate.

Scientific criticism in the nineteenth century takes hardly any notice of the distinctions between romantic, speculative and transcendental, scientific and methodological directions in science and philosophy. Romanticism and natural philosophy become a general shibboleth; Hegel, Schelling, Goethe, Schopenhauer, romantic scientists and physicians, and even Kant receive such unjustified epithets. Natural philosophy of all types as well as the romantic *Naturforschung* evoke

<sup>30</sup> RITTER (1806), pp. 3 and 14.

<sup>31</sup> KOREFF (1817), pp. 152 and ff.: “Sarcasmus der Natur am Grabe der Geschichte”.

<sup>32</sup> CARUS (1820), p. 72.

rejection already during the years around 1800. According to Georges Cuvier, natural philosophy or romantic *Naturforschung* is a “jeu trompeur de l’esprit”.<sup>33</sup>

There are new contacts and different relationships between science and philosophy in the nineteenth century, which are not at all restricted only to the German countries.<sup>34</sup> An important phase is the reception and acknowledgement of Kant by several natural scientists – Emil Du Bois Reymond, Hermann Helmholtz and many others. At the same time one can notice further contributions in the field of theory and methodology of science and scientific research. But in comparison with the epoch around 1800, in the subsequent part of the nineteenth century scientists grew increasingly less interested in philosophy and in becoming philosophers in natural science.

<sup>33</sup> CUVIER (1826-36), I, p. 7.

<sup>34</sup> BRAUNSTEIN (1986); GOLDSTEIN (1990); MORAVIA (1972); WALTER (1949).

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