Discipline formation as hybridization

The historical study of discipline formation is a relatively underdeveloped research area in the historiography of science. It questions how the modern academic system of disciplines has emerged and how differentiation in it has taken place by investigating the factors involved in the construction or breaking down of disciplinary boundaries. This research focus is interesting for at least four reasons. First, the process of discipline formation is an ongoing process. Thus, knowledge about discipline formation in the past can help us to gain a better understanding of the process of discipline formation in the present. Second, the search for historical foundations of knowledge claims can benefit from an understanding of the frameworks in which these knowledge claims have come about. Many attempts have been made to capture this relationship for example by Toulmin (fields), Kuhn (paradigms) or Lakatos (research programmes). Preference is given here to the notion of the discipline because the term is less broad than other larger unit terms and hence offers the most concrete guiding lines for historical exploration. Third, the study of the differentiation of disciplines leads to considerations of their interactions and may point to interesting similarities between current disciplines that are often thought to be oceans apart. Fourth, taking the discipline as a space in which social and epistemic dimensions of science are deeply interwoven may provide a useful solution to the problems.

The title of this paper refers to the television programme Bob the Builder. It captures the constructivist efforts behind the new form of language study of which Franz Bopp was the main leading figure. In French the title of the same programme is Bob le Bricoleur which reminds one of Lévi-Strauss’ notion of bricolage which had an inroad into science studies mainly through efforts of Barry Barnes. I thank Dr Daan Wegener for suggesting me both this very apt title and the reference to the work of Lévi-Strauss after I presented an earlier version of this paper at the Descartes Centre in Utrecht.
The present contribution to the study of discipline formation is twofold. First, a perspective on discipline formation is proposed that I have called ‘hybridization’.

Second, in the main part of the paper a case study is explored, namely the emergence of historical and comparative linguistics (henceforth comparative linguistics). This case study is of interest both for the study of the history of linguistics and for the understanding of the making of the humanities in the nineteenth century. Moreover, the generalizations on discipline formation were developed from the case study as well.

When we speak of discipline formation we must wonder what these disciplines are that are being formed. Defining the term ‘scientific discipline’ is however not an easy task. The German historian Hubert Laitko has suggested that in order to be called a scientific discipline the discipline should meet three conditions: 1) have an object of research that has to be specific enough; ‘Nature’ for example is too wide, the study of life and living organisms is suitable, 2) have a sophisticated level of method and theory and 3) show stability over a longer period of time. Here Laitko thinks of all aspects of institutionalization such as chairs, journals, training of students etc.

This definition has some heuristic value but is hard to employ in practical historical research because of its static character. It is for example difficult to imagine a set of norms with which it can be determined whether a new field of study has achieved enough sophistication in terms of theoretical claims and methods of research to be called a discipline. Studying the stability of a discipline also requires more than just pointing at the existence of chairs and journals. In the case of Bopp we will investigate how his chair was created, what conditions were involved, who supported him, who objected to the new chair etc. Such dynamics are more easily studied from the perspective of discipline formation. Perhaps these dynamics should be made part of the definition of scientific disciplines themselves which are never static units but always in motion.

Laitko’s definition also leaves room for the ‘naive’ view on discipline formation. Especially his first criterion fosters the idea that new disciplines emerge as a result of specialization in a field, for instance because certain problems proved to be so demanding that they required study of their own, yielding a separate discipline. In contrast to this naive view of discipline formation as specialization, it is argued here that new disciplines are always the result of a mixture of various elements. We may think of the interaction between aspects of existing disciplines out of which new ones emerge. These new disciplines break through existing boundaries and form new alliances consisting of parts of previously disjoint fields of study. It has been pointed out that new disciplines often start
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out as interdisciplinary undertakings, and that afterwards this interdisciplinary character tends to become ‘forgotten’ and the discipline is seen as a separate and complete unit.3

The notion of hybridization however is intended to cover more than just a mixture of elements from existing scientific disciplines into new ones. My case study below shows that it is in addition essential to include social, cultural and institutional aspects as well in order to capture the new discipline in its entirety. These aspects are not just ‘external’ or extra-scientific factors exerting influence and steering discipline formation in particular directions but they become inextricable elements of the disciplines themselves.4 Thus the notion of hybridization should be interpreted in the broadest sense possible.4 The new hybrid reflects ideas from the culture in which it emerges, the values that reign supreme at the place of its emergence (including its specific institutional setting) and from the various fields of study it has borrowed ideas from. All these aspects are put in a mixer and the new substance coming out of it is the new discipline.5

We may also view the hybrid as a junction on which many roads intersect. After all a hybrid is literally a bastard: genetic lines have crossed and have created a new life form that did not previously exist. The challenge for the historian is to find out the specific mixtures per discipline, for there may be differences between the importance of the determining factors from case to case. But these distinctions can only be made afterwards. At the onset of research the historian who seeks to understand the formation of a new discipline should consider as many possible determining factors as he can think of.

This broad notion of hybridization bears strong similarities to Lévi-Strauss’ idea of ‘bricolage’. Lévi-Strauss used the term ‘bricolage’ to contrast it to methodically planned research and thinking. ‘Bricolage’ consists of assembling given things by the environment or accumulated in the course of previous research, but not made especially for the new task at hand. The bricoleur simply makes do with what he encounters. In contrast to engineering there is much less planning going on in ‘bricolage’ which is much more intuitive. The engineer creates the means for the completion of his work, the bricoleur redefines the means that he already has. It is important to note that the role of the individual is central in assembling and assigning meaning to the assembled things. In our case study below it is justified to assign Franz Bopp the role of the individual doing the ‘bricolage’, as he was indeed the central figure in the new discipline of comparative linguistics.

For Lévi-Strauss such an analysis of Bopp would be impossible. He argued that ‘bricolage’ stood in sharp contrast to the scientific process: ‘Science brackets out events and secondary qualities to arrive at the essentials and primary qualities.’8 Modern science for Lévi-Strauss was a well ordered endeavour and followed
clear rational trajectories. He made a difference between Neolithic and modern science to underline this point. To him wild and magical thinking (hence the title of his work) belonged to the pre-modern era. Modern engineers and modern scientists by contrast engage in methodically planned research. ‘Bricolage’ therefore has no place anymore in the modernized world.

However, as Barry Barnes and others have argued, modern scientists typically do act as ‘bricoleurs’ and are thus still as Neolithic as ever. These authors see ‘bricolage’ in full contrast to Lévi-Strauss, as the heart of modern science. It is fair to say that this constructivist view on science has gained the upper hand in both sociology and history of science in the past decades. While Lévi-Strauss’ sharp distinction between modern and pre-modern science was certainly incorrect I must add that I am not inclined to accept all the implications of the constructivist movement in historiography of science. Quite often constructivists put stress on the contingency and the discontinuity of scientific development. Hybridization is used here as a more restricted term than ‘bricolage’ because it is confined to discipline formation only. While disciplines are certainly not immutable they may still lend the scientific process more continuity and perhaps also more unity than many constructivists would grant it.

In another sense the notion of hybridization has a broader application than ‘bricolage’ in its original use which required all the elements to be perfectly clear to the persons assembling them in new ways. By contrast, in unravelling the hybrids created in the past the historian should keep an eye on the role of factors that were not directly accessible to the historical actors as well, such as the subconscious influence of certain values, concepts or ideas. It is part of the job of intellectual historiography to uncover these ‘hidden’ aspects of past thinking.

Still the notion of ‘bricolage’ captures a lot of the spirit of the persons involved in a discipline at its inception. Just as in creative thinking, which is expansive and inclusive, the discipline in its first steps is open and works in all kinds of directions. Later, disciplines become more restrictive and reductionist and increasingly stronger boundaries with other disciplines are drawn. In this paper, the focus will be primarily on the expansive and inclusive phase in relation to the emergence of comparative linguistics. The idea of hybridization in a broad sense is perhaps a bit vague at the moment and naturally requires further sophistication, but hopefully the case study below serves to make the idea plausible and worthwhile for further application in the study of discipline formation.
Introduction to Franz Bopp, the discovery of Sanskrit and Romantic ideas

Franz Bopp (1791-1867) was born in Mainz but later moved to Aschaffenburg, soon to become part of the Kingdom of Bavaria. His most important teacher there became Karl Windischmann (1775-1839) who taught history and philosophy and who was a great admirer of Friedrich Schelling’s ‘Naturphilosophie’. Together with Windischmann he studied Über die Sprache und Weisheit der Indier, by Friedrich Schlegel. This was one of the first comparative language studies after the discovery of kinship between European languages and Sanskrit. The work had a profound influence on Bopp and was in part responsible for his specialization in language studies. He went to Paris and London, where the specialists in the field were situated at the time. Bopp then returned to Germany and got his doctoral degree in Göttingen for which his Analytical Comparison (1820) served as a thesis. Via good contacts with the influential Wilhelm von Humboldt he then moved to Berlin and obtained a professorship at the relatively young University of Berlin (founded 1810). Bopp held this position for more than four decades until his death in 1867.

During his years at the Berlin University Bopp concentrated on two things. First there were the Eastern languages, among them most importantly the Sanskrit language which needed to be fully mastered by himself and subsequently by his students. Thus Bopp wrote a Lehrbuch des Sanskrits and he rewrote parts of Panini’s grammar of the language. This study of the Eastern languages was also related to the study of Eastern culture. Original Indian texts, mainly from mythology, were read and interpreted. Such cultural interests were however no more than a side effect of Bopp’s main occupation. This second occupation was: to demonstrate the relations between members of the group of languages which came to be known as the Indo-European language family. This was a huge project which Bopp laid down in his Die vergleichende Grammatik, first published in 1833 and reworked two times in his life by adding new languages to the group, for example the Slavic languages. He also expanded the detailed comparisons between the respective grammars and lexicons in each of the new editions.

Bopp was not the only person who occupied himself with these studies. Although attention waned in France and England there were a few others active in Germany namely the Schlegel brothers, the Grimm brothers and Wilhelm von Humboldt. In Denmark, the work of Rasmus Rask was prominent as well. However, Bopp was the central figure for a number of reasons. First, Bopp took up everything there was to know first-hand from the specialists abroad. Second, he maintained good contacts with the other Germans who got interested in comparative linguistics. Of these the Grimm brothers and Humboldt were living in
or close to Berlin as well. Third, the other scholars, with the exception of A.W. Schlegel, never occupied a chair at the university. Bopp acquired such a chair in the early stages of his career in Berlin. It is also very significant that he obtained the first chair ever with a teaching commitment called 'Allgemeine Sprachkunde', which must be seen as the forerunner of what is now known as general linguistics.19

The new name indicated a disconnection of the comparative study of language from philology in which focus on textual explications is central and language is studied only in connection to historical and cultural research. The erected chair also created a platform for the continuity of Bopp’s studies into future generations. One of his students was Georg Curtius, who became an important figure in the attempts to reconcile comparative linguistics with philology which will be briefly discussed at the end of this paper.

For all these reasons it is thus justified to study the rise of comparative linguistics by focusing on one scholar only. To be sure, before Bopp there had been forms of comparative study of language.20 However, the comparative study of language came to be seen in a completely different light for two reasons. Both of these were equally instrumental in upgrading comparative linguistics to a separate academic discipline.

The first of these was the very discovery of the kinship between the Sanskrit language and European languages such as Latin, Greek, English and German. This discovery was made by the Englishman William Jones in 1785. In his efforts to obtain more control over the local population in India he started studying their language and noted similarities in words as well as in grammar between Sanskrit and his own language (pitar-father, bhratar-brother, shta-stand etc.).21 Van Hal (this volume) points out that this discovery did not engender a radical new approach to the study of the relations between languages. At first scholars tried to incorporate the discovery of the kinship between Sanskrit and European languages within existing models such as the Scythian theory. A fundamental rethinking of the ideas about kinship between languages only came about under the aegis of Bopp’s generation.

It is quite possible that the reason for this delay has to be found in the other great difference with the study of languages before the nineteenth century: the climate of Romanticism. Romanticism is an umbrella term covering many, often even contradictory ideas.22 Several of these ideas played an important role in the study of language that Bopp undertook. Many German intellectuals at the time had a longing for the East. They had a high respect for Indian philosophy and their mythical stories. It was believed that deep wisdom could be found in these texts, deeper than Western (Greek) thinking had ever produced. Ex oriente lux was the slogan: light comes from the East. This so-called ‘Eastern Renaissance’ was an important aspect of Romanticism: it was part of it but at the same time
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shaped its content and direction. The study of the Indian languages fitted these orientations well, but at the same time increased their intensity.23

Friedrich Schlegel’s Über die Sprache und Weisheit der Indier was written in the spirit of the Eastern Renaissance. He classified languages in this work into two main groups: the inflectional and the non-inflectional languages. The inflectional languages were spoken by people of higher cultures and of higher spirit.24 Of the latter the people from ancient India represented the highest category and the Sanskrit language was the profound expression of this. Much of the book is filled with a great appreciation of Indian mythical stories and the lessons that can be drawn from them. The analysis of kinship between the languages was not very deep and profound. It cost Bopp considerable difficulty to wrest himself free of Schlegel’s authority, but eventually he had to abandon Schlegel’s linguistic ideas: most notably his classification in two language groups.25 Bopp also freed comparative study of language from speculative romantic preconceptions. The technical and empirical work he was engaged in for most of his life must in part be seen as a reaction to such ideas.

Nonetheless, several key romantic ideas played a profound role in Bopp’s view on languages too. They were perhaps less ‘mystical’ but still became cornerstones of his research programme which he never altered later in his life. The most important of these was his view of languages as separate organisms. It has been noted that the organic metaphor provided an ‘Erklärungsprinzip’ in many more areas during the Romantic period, to which we still owe words in our language such as ‘to organize’ or ‘organization.’26 This metaphor also had a profound impact on the study of language. Whereas some had seen language as an organ of thinking and thus as part of the organism of a person, the metaphor was taken a step further by scholars like Bopp.27 They saw the language itself as a complete organism in which all parts related to one another to create larger wholes (i.e. sentences and texts). This metaphor brought three further perspectives on language with it: the idea of decay, the notion of the inner life force and the search for primitive forms of language. These three notions are also often taken as being characteristic of Romanticism.

Since they were considered as living things, languages were believed to go through an initial period of birth and growth, followed by a period of decay. All languages would slowly become less perfect, less harmonious and finally decease. All the European languages that were part of the Indo-European language group such as German, English and French, but also Latin and Greek, were thought to be in a process of steady decay. An inner life force, the deep essence of a language, was seen as the motor of this process.28

This cyclical view of growth and decline of languages entailed the idea that there once had been a perfect form of language. Even Sanskrit, although much
higher rated than Latin or Greek, had already started to decay. It was thought that there must have been a Proto-Indo European language (PIE). PIE was the ‘Urform’ of the whole group of Indo-European languages. In it, form and meaning were related to each other in perfection, coupling simplicity to the highest form of expressivity. The goal of the whole comparative research project was to reconstruct this lost language. It was thought that if laws of decay could be found in accessible linguistic material, it would be possible to extrapolate these laws and backtrack beyond some of the Indian languages to PIE. Although every language was seen as a separate organism, the members of the Indo-European language group could also be seen as variations of one organism: PIE, only differing by distinct ways of decline. Bopp and others were not so clear about this distinction.

What is clear is the effect that organicist thinking as applied to language study produced: it led to the study of language only for the sake of languages themselves. Up till then languages were always studied in relation to other concerns: cultural and historical ones as in philology, or the study of the workings of the mind and an investigation of (perfect) reasoning in philosophy, or theological considerations. These were not among the primary concerns of comparative linguists. They looked at languages solely for an understanding of the life of the linguistic organism. Biological metaphors were certainly not new in language study. Natural terms such as root, kinship, stem etc. had been applied to the study of language from Antiquity onwards. However, the metaphor of the organism went far beyond that and brought with itself a host of ideas and conceptions which guided research in new directions. Together with the discovery of Sanskrit and the kinship of this language to European languages this was the great renewal in language studies in the first decades of the nineteenth century.

It is important to note that the study of language ‘an sich’ also fitted the model of the new Berlin University well. Wilhelm von Humboldt, together with Friedrich Schleiermacher, was the chief architect of this new university. The key idea was the search for knowledge as an end in itself and the way to enhance this search was to create an alliance between teaching and research (‘Einheit von Lehre und Forschung’). Modern universities follow this model, but at the time this was a novelty. Universities used to be institutions which for the most part prepared students to find a job in the higher echelons in one of the governments of the German states or as a doctor, lawyer etc. The restructuring of the academic system in Berlin was unique and it is significant for the present study that Bopp very much wanted to be part of it. Thus he wrote in one of his letters to Humboldt: ‘So sehr ich Baiern in anderer Beziehung liebe, so ziehe ich als Gelehrter bei weitem Preussen vor. Die Preussische Regierung weiss die Wissenschaften ohne alle Vergleichung besser zu würdigen und zu befördern. Darum ist es angenehm ihm
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To get to Berlin Bopp first had to convince Maximilian I Joseph, the king of Bavaria. The king argued that he had not invested so much money in Bopp’s training to see Prussia walk away with the profit. Bopp replied with a long letter containing interesting arguments why the king should not feel offended. The king had to understand that knowledge obtained in Prussia was also valid in Bavaria and that, consequently, the star of the Bavarian king would always be connected to the fruits of Bopp’s work no matter where this work was carried out. Secondly, Bopp offered to repay all the investments made by the Bavarian government for his professional training. Bopp also told the king he would have been willing to further his career in Munich if the circumstances there were more suitable for him. But this was not the case. He could not be offered a serious research position and found the climate hostile to the directions in which he wanted to take his research. In reply to Bopp’s arguments, the king granted him a temporary occupation in Berlin, perhaps because the two states were befriended at the time. As it happened, this temporary grant was never withdrawn, and Bopp stayed in Berlin for the rest of his life.\textsuperscript{37}

This little episode reveals how values concerning scientific research, training and the status of knowledge became inextricable parts of the new discipline Bopp created. We have already noted that Bopp was the only one who occupied a permanent chair with which comparative linguistics \textit{de facto} got a foothold in the academic system. Iffy history is dangerous, but what if Berlin had not given him the opportunity? What if no research climate could have been found that fitted Bopp’s way of studying language? It might have been much more difficult to pursue his research agenda and as a consequence, comparative linguistics would perhaps not have emerged as a distinct discipline. The conclusion I draw is that the institutional values prevalent in Berlin were a factor in the success of comparative linguistics and became part of the new hybrid itself. The first few elements of this hybrid have now been dismantled. By investigating the various interpretations of the organic metaphor we can unravel further elements; we will do so mainly by looking at the relations of comparative linguistics to other fields of study.

\textbf{How to reconstruct PIE: Borrowing ideas from other disciplines}

All the ideas that merged and constituted the new field of comparative linguistics found a place under one umbrella. The organic metaphor served as a guiding and overarching principle. Bopp used the metaphor in two main senses: synchronic and diachronic.\textsuperscript{38} These will be treated separately in turn.
The synchronic interpretation and the relation to comparative anatomy

The synchronic interpretation of the organic metaphor lacks a temporal aspect. It uses the idea of the organism to constitute a whole to which the parts then relate via the functions they perform with respect to the (functioning of) the whole. Much of Bopp’s technical work was of this character. He compared languages with respect to the ways in which they performed various functions. For Bopp the central aspect of the organism was the conjugation system. To him, the verb was central to linguistic expressions and he attempted to study modifications of the verb's basic form. Modifications express different grammatical categories such as tense, mood, aspect, voice, person, number, gender and case. He attempted to find patterns in languages with respect to these modifying systems. This was a difficult task, because one had to find out what exactly the basic forms, and what the modifications were and which functions the modifications expressed. When the modification system or ‘skeleton’ of a language was established, the rest of the language could be warped around it.

It is clear that this method of decomposition and comparison came from comparative anatomy. The great master of this, also relatively young, discipline was Georg Cuvier (1769-1832) of whom the story went that he could reconstruct a whole animal on the basis of one bone. Although no direct reference to Cuvier, nor to the German anatomist Blumenbach, can be found in the work of Bopp, it is present in Schlegel’s Über die Sprache und Weisheit der Indier. There Schlegel writes: ‘Jener entscheidende Punkt aber, der hier alles aufhellen wird, ist die innere Structur der Sprachen oder die vergleichende Grammatik, welche uns ganz neue Aufschlüsse, über die Genealogie der Sprachen auf ähnliche Weise geben wird, wie die vergleichende Anatomie über die höhere Naturgeschichte Licht verbreitet hat.’ The modifying systems Bopp worked on were baptized here as comparative grammar by Schlegel. As said Bopp was deeply influenced by Schlegel in the beginning of his career. He had to denounce some of Schlegel’s theories later on, but the characteristic comparative working style was maintained throughout his career. An interesting aspect of the quote above is the connection Schlegel makes between the work of comparative anatomists and diachronic study of languages (‘Genealogie der Sprachen’). These connections can indeed be found in the work of Bopp if we look at the diachronic interpretation of the organic metaphor.
In its diachronic interpretation the life cycle is central to the organic metaphor. We have already discussed this above in connection to the influence of romantic ideas on comparative linguistics. Especially interesting is the way scholars of Bopp’s time tried to find regularities with which the development of languages over time could be described and understood. There are thus forms of continuity here to be found with Enlightenment thinking which can be captured by the slogan ex occidente lex: laws come from the West. Three types of laws can be found in Bopp’s work. The first is Grimm’s famous law of sound change (1822). Jacob Grimm (1785-1863) found regular patterns of sound change for the German language. The development was always from voiceless to aspirative to voiced and again to voiceless. Thus p,t,k sounds became f,th,x/h later in German/Gothic.

The remarkable consistency of these patterns was striking indeed and Bopp was greatly impressed by them, although he did not do much work on sound change himself.

Bopp devoted more effort to another regularity he found in languages over time. In a chapter of his Vergleichende Grammatik, ‘Gewichtsmechanismus der Personalendungen’, he put forward the theory that the heavier the vowel in the stem of the word the shorter the affixes tended to become. Bopp thought a pull of the centre was responsible for this effect and he saw a law of gravitation at work in languages. Clearly we find Newtonian physics as an inspiration here for theoretical explanations in comparative linguistics.

Another general law can be found in Bopp’s agglutination theory. Where Schlegel had set inflectional languages apart Bopp no longer did so. The inflectional languages were supposed to modify the verb according to some natural inner mechanism. Bopp found no evidence for this and claimed that all modification initially had to be explained by a process of ‘gluing’ morphemes together, or in other words, the putting together of elements from the outside, i.e. by speakers of that language. This opened new research avenues for comparisons from the diachronic perspective, since one could try to distinguish between ‘original’ agglutination and later language specific forms of agglutination.

Bopp did not completely part with the idea of an inner life force. He saw it operating in the relation between form and meaning. Since the Indian languages were monosyllabic, he thought that in the perfect language each syllable or morpheme had had a unique meaning. According to Bopp, this unique correspondence relationship, which yielded a fully transparent language, was the result of a harmonious inner force. Obviously, other forces must have been responsible for later decay of the transparency, but Bopp has never been explicit about the
causes for the decline. The laws he used were of a more descriptive kind. Again Bopp’s empiricist attitude prevails but the ‘mixed style’ which combines both approaches: on the one hand painstaking empirical observation and inductive generalization and on the other hand explanation in terms of non-mechanical forces, that Elffers sees operative in Von der Gabelentz (this volume) was not at all alien to Bopp.

The heterogeneous blend exposed so far consists of aspects of Romanticism, methods and ideas borrowed from the natural sciences and a specific institutional niche that helped Bopp to carry out a threefold research programme. First, he wanted to create a coherent description of the organism of all Indo-European languages. Second, the physical and mechanical laws capturing the changes in languages over time had to be specified. Third, all this had to lead to the original forms of the language group which determined all the subsequent grammatical relations. To complete the picture, attention needs to be paid to the question how Bopp’s programme related to other fields in the humanities such as philosophy, history and above all the most nearby discipline philology.47

Connections between comparative linguistics and the humanities

According to Olga Amsterdamska, comparative linguistics needed to legitimize itself through alignment with the natural sciences: ‘Although these multiple but vague references to various natural sciences do not testify to any direct influence of physiology, anatomy, physics, or chemistry on comparative grammar, they apparently reflect a need to claim for the new discipline the methodological rigor of the natural sciences.’48 Such claims are made more often and are possibly the result of a present-day bias towards the natural sciences as the standard of scientific scholarship.49 During Bopp’s lifetime the humanities were however still dominant and fields such as philosophy, history and philology were thought to be of prime importance. It is therefore unlikely that in order to gain credibility and legitimization the new study of language had to look like a natural science. As a matter of fact interesting and illuminating connections between comparative linguistics and the humanities can be drawn which show that acceptance of the new discipline was also related to the discipline’s fitting in with views on life developed in the humanities.
Goethe, Schelling and others started to develop a modern kind of natural philosophy in which some of the key romantic ideas found a place. There are striking resemblances between especially Goethe’s philosophy and Bopp’s views on the study of language. Goethe saw nature as a dynamic process that nevertheless obeyed mechanical laws. These mechanical regularities however were to be found operative within organic wholes. In Goethe we do not find evolutionary ideas yet. His view of nature was dynamic, but he saw the variations produced by nature limited by the primitive forms that underlay all organisms of a particular species. We found the same combination of the search for mechanical laws of development within organic wholes and the search for primitive forms in Bopp’s study of the Indo-European language group. Moreover the idea of the inner life force was present in the work of Goethe too. He spoke of a ‘Bildungstrieb’ which was responsible for changes in the outward appearances of organisms. This is why Goethe attached great importance to the direct experience of phenomena and to the accurate description of these outward appearances. This too accorded well with Bopp’s empiricist attitude: for Bopp hypotheses could only be based on factual material, he hardly speculated beyond what he could see. Finally, Goethe attached great importance to the comparative way of study as can be seen in the following quote: ‘Die vergleichende Anatomie beschäftigt den Geist mannigfaltig, gibt uns Gelegenheit die organischen Naturen aus vielen Gesichtspunkten zu betrachten.’

That Bopp was reluctant to enter into speculation is also shown by the fact that he rarely allowed himself to put forward theoretical, let alone philosophical comments. Thus we do not possess an explicit statement of Bopp’s theoretical preoccupations. This has led scholars to conclude that Bopp was merely a technician who did not work with nor towards much theory. On this view, Bopp only left a mark on linguistics through his very technical working style. Since romantic ideas were prevalent and professionally elaborated in various fields at the time, and since the resemblances between above all Goethe’s and Schelling’s ‘Naturphilosophie’ and Bopp’s linguistic research programme are so striking, my hypothesis is that Bopp did not feel the need to articulate his theoretical claims and underpin these philosophically, because there was such a strong philosophical system present in the background. The few hints in some letters of Bopp and the ‘Vorredes’ in the first two editions of the Vergleichende Grammatik we do find support for this hypothesis.
History

‘Vergleichen wir mit diesen vergangenen Zuständen die gegenwärtige Zeit, so dürfen wir uns freuen, geschichtlicher Sinn ist überall erwacht...’ \textsuperscript{55} With this sentence Friedrich Carl von Savigny perhaps captured the spirit of the times best of all. The nineteenth century is known as the century of history and I believe Koselleck rightfully indicated that a major change in thinking about time in the period between 1750 and 1850 occurred. Historical research can be carried out in various ways. At the time of Bopp three ideas stood out which were operative in his linguistic work. First, there was the idea that history follows patterns and that these can be captured in a lawlike manner. The diachronic use of the organic metaphor clearly led to the search of laws of decay in languages. Second, historical research may also be synonymous to empirical research in the sense of pure fact gathering. As some have noted, such fact ‘hunting’ was present in comparative linguistics.\textsuperscript{56} Third, there is the hermeneutical approach to history, aimed at understanding specific places and periods. This approach was theoretically worked out for the first time by one of Bopp’s colleague’s in Berlin, Friedrich Schleiermacher.\textsuperscript{57}

The hermeneutical approach seems most distinct to Bopp’s work but it was however not fully absent from his research and teaching. He agreed with Humboldt, who started to investigate languages out of an anthropological interest, assuming that every people (‘Volk’) had shaped a language according to the working of their spirit.\textsuperscript{58} In spite of the gradual process of decline from PIE the Indo-European languages were in, the working of this spirit was something to admire. Bopp was also not too dogmatic about the supposed laws and regularities that could be found in the history of languages. ‘Kein Regel ist ohne Ausnahme,’ and ‘Mathematische Beweise können die Sprachwissenschaften nicht liefern,’ are two quotes that illustrate this.\textsuperscript{59} Moreover, we should not forget that Bopp also taught Asian literature and culture.

Philology

In this ‘cultural’ way of approaching history via language study Bopp appeared to be close to philology. Still, his comparative work meant a huge challenge to (classical) philology. First, the monopoly of the philologists on the study of language was challenged. Second, and more importantly, the cornerstone of the world view of the philologists was overthrown. They had always worked with the idea that the cradle of humanity lay in Greece and the Roman Empire, and they saw it as their business to show that German culture was a worthy heir to this tradition. The comparativists however shifted the focus of attention, and also of apprecia-
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tion, towards the Far East. Thus we could expect conflicts in Berlin where philology was a strong discipline, guided by scholars such as August Boeckh (1785-1867) and Karl Lachmann (1793-1851).

Comparative linguistics was indeed met with a hostile attitude among philologists. For a number of reasons they believed that if language was studied in the new way, scholarship would give way to dilettantism. First, the comparativist working style was descriptive rather than normative. Where philologists sought to establish standards for good language use, the comparativists merely described the data they could find. Second, it was argued that one could not possibly master so many languages in sufficient detail to make sophisticated comparisons. Both morphological comparisons and etymological derivations appeared to be speculative and full of mistakes. Furthermore, syntax, one of the cherished fields of study of the philologist, was neglected by the comparativists. Not everyone was happy with the Eastern Renaissance either, since some thought the East was dark and dangerous rather than enlightening.

Bopp personally had to deal with a few sharp reactions. One commentator wrote: 'Die Boppard ist ein Ort am Rhein, die Bopp-art sind Pedanterein,' and as we can infer from a letter of Bopp to Humboldt at the beginning of his professorship his lecture series 'Lateinische und Griechische Etymologie' was blocked. Students were discouraged to visit his lectures and indeed did not show up. It lasted until 1835 before Bopp offered another course in etymology: 'Griechische Etymologie mit Vergleichung des Sanskrits.' Some of these sharp reactions can possibly be explained by the fact that philology itself was still busy finding its proper place in the academic system and hence was very sensitive to legitimization challenges. It may therefore seem surprising that a real clash between Bopp and the classical philologists did not come about. On deeper inspection, a number of reasons can be found to explain this.

First, Bopp enjoyed support by the dean of the faculty: August Boeckh. Boeckh saw philology as the mother discipline of all disciplines and in this broad conception any new ‘science’ that could contribute to the understanding of the workings of human culture and above all human spirit was welcome. Moreover, Boeckh had a strong historical interest and thus he highly valued the historical aspect of comparative studies of language. Bopp could initially also lean on the support of Wilhelm von Humboldt and ministers of the government with whom he got acquainted via Humboldt. As a person, he was very capable of building and maintaining good social contacts. Gentleman-like conduct was also in part dictated by the social rules of behaviour of the Prussian elite, to which university professors belonged. The boundaries between formal meetings and informal club gatherings were not strict at the time. This meant that Bopp and his ‘opponents’ met each other regularly, sometimes several times a week at
lectures, banquets and the like outside university walls. Polite behaviour was needed to keep occupying a place in these club meetings. Personal characters suited for this obviously helped but behaviour was also shaped to fit the social demands.

Apart from these social considerations, recognition of the usefulness of comparative linguistics grew with the years. Bopp was a serious and hard-working man who proved to be a fine scholar not just in Eastern languages but also in the classical ones. Further, it is interesting that Lachmann developed a system for finding original texts (‘Urtexts’) out of later distorted versions and interpretations. This bears a similarity to Bopp’s attempts to reconstruct an undistorted PIE. Philologists noted that there was a normative element in comparative studies after all since the whole project was aimed at finding a perfect language that presumably had existed a long time ago. Lachmann eventually even contributed to this research project when he developed a sound law for Latin! The original hostility had in most cases given way to an appreciation of two forms of studying language. Although this appreciation was not always easy to deal with, as Grimm noted: ‘Es gibt zwei Arten von Sprachstudiums, die auch wohl in mir zu Zwiespalt gekommen sind.’

While legitimatization for the new discipline was achieved by hard work within a favourable environment, engendering respect for the achievements of the new discipline and showing its usefulness for the rest of philology, a tension remained between two distinct styles of research, in which language was treated in fundamentally different ways. This tension came about during the second stage of institutionalization of the discipline, when disciplinary boundaries became much more contested than under Bopp. A student of Bopp’s, Georg Curtius (1820-1885), pleaded on several occasions, in Boekhian style, for intense cooperation between the study of language for its own sake and the study of language for cultural understanding. August Schleicher (1821-1868) on the other hand, advocated a complete division between the two fields. For him comparative linguistics should be seen as a natural science which he called Glottik, in analogy with Physik and Botanik. The methods and theoretical claims of Glottik belonged to natural science and should not be mixed with philological methods at all.

Both Curtius and Schleicher came up with reasons for the decline of language, an issue neglected by Bopp. They explained this with reference to economic principles. Humans invariably prefer simplification and abbreviation of expressions. However, in Schleicher’s theory the role of individual speakers in language change came to reside far in the background, whereas Curtius allowed more room for the psychology of individual speakers or groups of speakers in his explanations of language development. Curtius’ approach was thus closer to the cultural study of
language than Schleicher’s. The latter’s position is striking from a Humboldtian perspective, in which the study of the development of languages is the prime target for humanistic studies. To hold the position that this development is not due to the actions of individual speakers, but should be seen as completely natural scientific phenomenon appears very strange indeed. This is a good point to stop our account of the formation of the discipline of comparative linguistics since with Schleicher general linguistics has nothing to do anymore with the making of humanities! How it could have come about that such a radical position was taken up, can however only be understood by appreciating the hybrid formed by Bopp in the first decades of the nineteenth century.75

Conclusions

A lot of issues have merely been touched upon in the present paper and much more can be said about all of them. Still, I believe it is possible to draw a number of conclusions from the material presented here. First, the thesis of discipline formation as hybridization has been underpinned by a case study. The hybrid that came to be known as comparative linguistics consisted of ideas stemming from Romanticism, most notably the metaphor of the organism, and ideas borrowed from natural science fields such as comparative anatomy and physics. It had strong connections to philosophy and the awakening of modern historical understanding. It also shared the new academic values of the Berlin university model. All these aspects somehow united into one whole. It is difficult to describe this whole otherwise than by using the word ‘discipline’.

Three interpretation issues that stand out with respect to Bopp in the secondary literature can also be applied to the hybrid comparative linguistics. Was the work done in this discipline of a purely technical kind or did it have a theoretical side as well? Was the research done just comparative or really historical comparative? And should we place the new discipline firmly within the period of Romanticism or was it no more than a continuation of many ideas that were already formed in the Enlightenment?

With respect to all three issues I believe it was a bit of both. First, Bopp used the organic metaphor in both synchronic (pure comparisons) and diachronic (adding the historical dimension) ways. Second, his work does indeed look very technical but that does not mean a theoretical background was absent. Third, there was indeed continuity with the Enlightenment, but Romanticism brought new elements to the study of language: the idea of language as an organism, the view on historical development as a process of decay and the use of the concept of an inner life force deeply influencing language change. These ideas retained a
firm hold on general linguistics, at least throughout the nineteenth century in Germany. No attention has been paid to an assessment of these novelties. I have suggested that the level of disciplines as a category of historical analysis may lend just enough structure to study the development of knowledge claims over longer periods of time. With sufficient care further analysis of the knowledge claims made in Bopp’s time in light of the current state of the art in comparative linguistics should be possible.\textsuperscript{76}

Finally, I would like to draw some generalizations with respect to discipline formation from the case study of comparative linguistics. What circumstances or what factors are needed to make the discipline get a hold in the academic system? From this study three of these factors stand out.\textsuperscript{77} First, there was relatively little pressure on the new discipline and therefore not much time was lost in fighting for legitimation. Bopp could set himself to work on the comparisons and the scholarship he showed in doing so earned him respect and as a consequence the new discipline gained credibility.\textsuperscript{78} This total devotion of a leading scholar to one field of study is a second factor in the success of a discipline.\textsuperscript{79} For the period that has been discussed, the focus on one individual to study the genesis of a discipline is justified. We have not just unravelled an artifact because in Bopp’s work ideas of others were incorporated and because of the institutionalization of comparative linguistics continuity of this form of language study into future generations was guaranteed. But there is no need to be dogmatic about this. In many other periods it might be more useful to look at groups of scholars when the formation of disciplines is studied. Third, Bopp had a strong overarching concept at his disposal, namely the idea to view language as an organism. Almost all ideas of the hybrid he created could be arranged under the umbrella of this broad concept. Such a sense of coherence is perhaps necessary for a new discipline to succeed.\textsuperscript{80}

However, the organic metaphor, and the comparative method as well, were extremely broad and flexible. The application of them by Bopp therefore left tensions and unresolved issues which came strongly to the fore in the work of his successors. Perhaps the fight between a broad and a narrow conception of a field of study is a more recurrent pattern in the formation of disciplines.\textsuperscript{81} It is striking that in the case of comparative linguistics this type of debate was conducted in terms of an opposition between natural sciences and humanities. The narrow conception defended by Schleicher made comparative linguistics a pure natural science while the broad conception defended by Curtius was aimed to fit comparative research in with philology. To which of these fields, the natural sciences or the humanities, the study of language belongs is an old question that goes back to Plato which was put into new light in the nineteenth century. Since this is such a perennial issue the history of linguistics may prove to be a useful field to study
the interaction between various disciplines from both the humanities and the natural sciences in further depth. Much of such research still has to be done. The same holds in general for many cases of discipline formation. I have argued that for such research a broad hybridization perspective is needed. If this at present may still seem to be a ‘wild’ idea, I can only hope future research will tame it and channel it in fruitful directions.

Notes

1 This is demonstrated in a recent study: E. Suárez-Diaz, ‘Molecular Evolution: Concepts and the Origin of Disciplines’, Studies in History and Philosophy of Biology and Biomedical Sciences 40-1 (2009) 43-53. Breaking down the barriers between internal and external historiography is most forcefully argued for in: S. Shapin, ‘Discipline and Bounding: The History and Sociology of Science as Seen through the Externalism-Internalism debate’, History of Science 30 (1992) 333-69. Shapin argues that the internalism-externalism debate should be about the factors that determine change in science. The emphasis on discipline formation squares well with that argument.


4 R. McCormmach, ‘Editor’s Foreword’, Historical Studies in the Physical Sciences 3 (1971), ix-xxiv points to the influence prevailing institutions and culture can have on scientists’ thinking. The discipline in this sense acts as a mediator between these factors and individual scientists. This idea of mediation, however, reflects Robert K. Merton’s sociology of institutions in which a divide between internal and external realms of science is still maintained. Here we want to proceed by looking at disciplines without that distinction, see also note 1.

5 The term hybridization is not new in science studies. Ben David has even used it in the context of discipline formation: Joseph Ben David, ‘Social Factors in the Origins of a New Science. The Case of Psychology’, in: Scientific Growth, Essays on the Social Organization and Ethos of Science (Los Angeles, 1991). Ben David applies the term differently, however, and focuses on individual scientists that create new roles by fusing parts of known roles together which he calls role-hybridization.

6 This may remind one of Pickering’s idea of the mangle put forward in: The Mangle of Practice: Time, Agency and Science (Chicago 1995). However, in Pickering’s own words the mangle has an anti-disciplinary tendency. Indeed what the exact products of the mangle are is vague, perhaps deliberately so.


On creative thinking, see Sybren Polet, *De creatieve factor: kleine kritiek der creatieve (on) rede* (Amsterdam, 1993). He refers explicitly to Lévi-Strauss in this context.

This aspect was of course what mostly interested Foucault about disciplines.

In Rens Bod, *De vergeten wetenschappen: een geschiedenis van de humaniora* (Amsterdam: Prometheus, 2010) 420 and 436 short references to the notion of hybridization can be found.


We can see this from the list of Bopp’s lectures. In the appendix by Reinhard Sternemann, ‘Franz Bopp und die vergleichende indoeuropäische Sprachwissenschaft: Beobachtungen zum Boppischen Sprachvergleich aus Anlaß irriter Interpretationen in der linguistischen Literatur,’ *Innsbrucker Beiträge zur Sprachwissenschaft* 33 (1984), a complete survey of Bopp’s lectures can be found.


The full title of the chair Bopp obtained in 1825 was ‘Orientalistische Literatur und Allgemeine Sprachkunde.’ In her contribution on Von der Gabelentz in this volume Elfers points out that initially general linguistics was equated to comparative linguistics. It referred to research not confined to a single language but generalizing over languages, hence the term. As she demonstrates the notion general linguistics acquired different interpretations later on as language study developed.


Herbert Uerlings, *Theorie der Romantik* (Stuttgart, 2000) is a good exposition of Romanticism in Germany.
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23 Herder, Schleiermacher, Schelling, Goethe, August Wilhelm and Friedrich Schlegel, Hegel, Schiller and Novalis were all occupied with the rebirth of Eastern culture in the West. See Uerlings, Theorie der Romantik for this but also Peter Watson, Ideas: A History of Thought and Invention from Fire to Freud (New York, 2005).

24 This idea of the working of a ‘Sprachgeist’ or ‘Sprachgefühl’ with which people shape the language they speak played a profound role in German linguistic thinking throughout the nineteenth century. Humboldt is well known for it but the second generation of comparatists, Curtius and Schleicher, used it for their explanations of language change too. Even in the work of Von der Gabelentz at the end of the century the idea figures prominently. See the contribution of Elffers in this volume.

25 Only in 1820 in the Analytical Comparison (and not in 1816’s Conjugationssystem) did Bopp really depart from Schlegel according to Sternemann, ‘Franz Bopp und die vergleichende indoeuropäische Sprachwissenschaft’.


27 Ibidem 16-30.

28 In the next section we deal with the question of how Bopp interpreted this ‘inner life force’.

29 Discussion of the laws Bopp used can also be found in the next section. The irony of the project is that PIE was never reached. Much research got stuck in the enormously elaborate comparisons of known languages. The prevalent empiricist attitude in Bopp was in conflict with hypothesizing about a lost PIE of which no data were available.

30 The Tower of Babel as an explanation of the diversity of languages was in use until well into the nineteenth century. Van Hal argues in this volume that before the nineteenth century relations between languages were mainly studied from an etymological angle.

31 Much of this research was based on extensive comparisons between the grammar and lexicons of supposedly closely related languages. Note that all these relations were not fully understood when Bopp started his work on them. Wolfgang Morgenroth, ‘Franz Bopp als Indologe und die Anfänge der Sanskrit-Lexikographie in Europa,’ in: Reinhard Sternemann (ed.), Bopp Symposium 1992 der Humboldt Universität zu Berlin. Akten der Konferenz vom 24-3-26-3 1992 aus Anlass von Franz Bopp’s zweihundertjährigem Geburtstag (Heidelberg, 1994) 162-172 and Gertrud Pätsch, ‘Franz Bopp und die historisch-vergleichende Sprachwissenschaft,’ in: Forschen und Wirken: Festschrift zur 150-Jahr-Feier der Humboldt-Universität zu Berlin 1810-1960, vol. I (Berlin, 1960) 211-228 demonstrate the crucial role of Bopp in these early stages.


33 Van Hal’s paper in this volume clearly shows that before the nineteenth century genealogical study of languages had to be legitimized with arguments that this research would be fruitful for other domains of learning.


Bopp to Humboldt, 16 July 1823. The correspondence between the two can be found in Salomon Lefmann, *Franz Bopp, sein Leben und seine Wissenschaft* (Berlin, 1891–97).


The exact use of the metaphor is one of the thorny interpretation issues with respect to Bopp. Both Van Hal and Elffers in this volume connect him to the diachronic approach only. I side here with Reinard Sternemann, a distinguished Bopp scholar, who writes: “Organisch” ist bei Bopp fraglos in mehrfachen Sinn zu verstehen.’ Sternemann, ‘Franz Bopp und die vergleichende indoeuropäische Sprachwissenschaft,’ 30. Morpurgo-Davies seems to be of the same opinion when she calls Bopp’s use of the organic metaphor ‘ill defined.’ This is explained from the fact that it was such an omnipresent principle of explanation: Anna Morpurgo Davies, “Organic” and “Organism” in Franz Bopp,’ in: Henry M. Hoenigswald & Linda F.Wiener (eds.), *Biological Metaphor and Cladistic Classification: an Interdisciplinary Perspective* (Philadelphia, 1987), 96.

Hence the title of his earliest work: Über das Conjugationssystem der Sanskritsprache in Verbindung mit jenem der griechischen, lateinischen, persischen und germanischen Sprachen, Nebst Episoden des Ramayan und Mahabharat in genauen metrischen Übersetzungen aus dem Originaltexte und einigen Abschnitten aus den Vedā’s (Frankfurt, 1816).

Schlegel, Über die Sprache und Weisheit der Indier, 28.

In fact his brother August Wilhelm coined the term in 1803: Kuzarchik, *Der Organismusbegriff*, 164.

I have pointed out that Romanticism brought a lot of new things to the study of language. Others have been sceptical about this. For example P.A. Verburg, ‘The background to the linguistic conceptions of Bopp,’ stresses continuity with the Enlightenment and explains Bopp’s ‘failure’ by the romantic conceptions which guided his research in the background. Although I am inclined to see much continuity between the Enlightenment and Romanticism as well, Verburg’s analysis is at odds with the present one since he denies any profound effects of Romanticism on linguistics.


Newton also used the word ‘infection’ for bending of light beams. It might be the case that the use of this term in linguistics is also due to influence of physics. Note that the current consensus is that the contraction phenomenon Bopp observed is genuine but has to be explained by differences in stress.


The terms ‘natural sciences’ and ‘humanities’ are anachronistic as there was no sharp divide between them at the time of Bopp. In Berlin both were represented in the same Faculty of Philosophy. It was not until the twentieth century that physics and chemistry dissociated themselves from it. On the other hand, the term ‘Geisteswissenschaften’ was already current at the time. But ‘Wissenschaft’ should not be confused with the notion of a scientific discipline. It could also be used to indicate some form of knowledge. For
example, ‘die Boppsche Wissenschaft’ was used on occasion to refer to Bopp’s work and scholarship.

48 Olga Amsterdamska, *Schools of Thought: The Development of Linguistics from Bopp to Saussure* (Dordrecht, 1987). As we have seen above, the references to the natural sciences were not vague but quite concrete.

49 Roy Harris, ‘History and Comparative Philology’, in: Nigel Love (ed.), *Language and History: Integrationist Perspectives* (Routledge, 2006), 41-59 is a good example. He is also one of the sceptics about the novelty of comparative linguistics, see note 42.

50 Bopp knew Schelling and corresponded with him. He must have known Goethe’s work, perhaps through Windischmann, but Bopp probably never met him. Goethe visited Berlin only one time in his life and Bopp did not leave the city very often. The ideas of Goethe are taken from J.W. von Goethe, *Die Metamorphose der Pflanzen* (1790), B. Mueller, *Goethe’s Botanical Writings* (Honolulu, 1952), Dorothea Kuhn, *Goethe und die Chemie* (Goethe-Studien, Marbach 1988).

51 Quoted in Kuzarchik, *Der Organismusbegriff*, 168.

52 Wilhelm von Humboldt for example produced a great abundance of philosophical writing.


54 We might not agree with Verburg’s ultimate assessment of Bopp (notes 20 and 42), but the main point of his analysis, that a Romantically inspired natural philosophy figured in the background to Bopp’s linguistic work supports the idea of a covert philosophical backing put forward here.


56 Sternemann, ‘Franz Bopp und die vergleichende indoeuropäische Sprachwissenschaft’.


58 See also note 24. Famous is Humboldt’s saying ‘Der Mensch ist nur Mensch durch Sprache.’ (Lecture ‘Berliner Akademie’ 20 July 1820).

59 Lefmann, *Franz Bopp*, 242 and 252.


63 Lefmann, *Franz Bopp*, 245.

64 In the appendix to Reinhard Sternemann, ‘Franz Bopp und die vergleichende indoeuropäische Sprachwissenschaft. Beobachtungen zum Boppschen Sprachvergleich aus Anlaß irriger Interpretationen in der linguistischen Literatur’, *Innsbrucker Beiträge zur Sprachwissenschaft* 33 (Innsbruck, 1984), a complete survey of Bopp’s lectures can be found.

65 Kurt R. Jankowsky, ‘The Renewal of the Study of Classical Languages within the University System, Notably in Germany,’ in: Sylvain Auroux et al. (eds.), *History of the Language

Boeckh’s visionary overview of philology is: August Boeckh, Encyclopedie und Methodologie der philologischen Wissenschaften (Leipzig, 1877), note the plural!

Lefmann, Franz Bopp, 103.


Lachmann, the key representative of classical philology, reportedly also had excellent social skills: Martin Herz, Karl Lachmann. Eine Biographie (Osnabrück, 1972 [1851]).

Sebastiano Timpanaro, La genesi del metodo del Lachmann (Le Monnier, 1963).

Third edition, Deutsche Grammatik (Göttingen, 1840).


Georg Curtius, Die Sprachvergleichung und ihrem Verhältniss zur classicen Philologie (Berlin, 1845) and Philologie und Sprachwissenschaft (inaugural lecture, Leipzig, 1862).

Highly interesting is August Schleicher, Die Darwinische Theorie und die Sprachwissenschaft. Offenes Schreiben an Herrn Dr. Ernst Häckel, Professor der Zoologie und Director des Zoologischen Museums an der Universität Jena (Weimar, 1863).

In Schleicher we can also see the ‘career’ that metaphors often follow. From a useful label that covers things that cannot be expressed in more exact terms, the metaphor ‘exactifies’ and comes to be seen as something real. Both Christina Brandt, Metapher und Experiment: von der Virusforschung zum genetischen Code (Göttingen, 2004) and Christina Brandt, ‘Die kodifizierte Ordnung der Dinge. Zum Gebrauch von Metaphern in den Wissenschaften’, in: Matthias Michel (ed.), Wissenschaft und Welterzählung: Die narrative Ordnung der Dinge: Fakt & Fiktion 7.0 (Zürich, 2003) provide interesting material to illustrate this phenomenon.


In Lenoir, Instituting Science, a broader discussion on the success factors can be found.

This is also noted for the early stages of genetics by Prof. Ida Stamhuis. She calls a discipline a weak structure. Especially at its inception too much pressure may break such a weak structure down. I thank her for pointing this out to me and also for references to some of the secondary material used in this paper.

It may be one of the reasons why musicology under Helmholtz did not become institutionalized since Helmholtz devoted his attention to a wide variety of scientific fields, as Prof. H.F. Cohen pointed out in his contribution to the conference.

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In R.E. Kohler, *Lords of the Fly: Drosophila Genetics and the Experimental Life* (Chicago, 1994) it is argued that disciplines are not monolithic structures and that they may contain several disciplinary programmes. This might be the case in later stages of its development but at the very beginning it appears that there is no room yet for such diversity.

In Thomas Schlich, ‘Making Mistakes in Science: Eduard Pflüger, his Scientific and Professional Concept of Physiology, and his Unsuccessful Theory of Diabetes,’ *Studies in the History and Philosophy of Science* 24-3 (1993), 411-441 such a type of debate, within the discipline of physiology, is described in detail.