SARTONIANA

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Sarton Chair of History of Science
Ghent University

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Introduction

R. Rubens

The 27th volume of Sartoniana you are about to read is again dedicated to the history of sciences.

The Sarton Chair and Lectures of the University of Ghent are already 28 years old and still continue to contain lectures scattered around all the disciplines of human inquiry.

In the first lecture by the chair Holder Dr. Chemla from Paris another approach to Eastern Science is advocated. We should not only try to grasp the knowledge of Chinese mathematicians but also understand why they synthetised and rationalised the physical world in a totally different paradigm.

The lecture of the faculty of law by Dr. Lück informs us to-day about an important part of German law history. The difference between the "Flaming Law" and the Sachenspiegel not only is interesting for a general study of law but also for the common history. It informs us about a migration from Flanders to Branderburg 800 years ago. Similar to the current discussion about basic principles of law between Western and Eastern cultures, the study of that period and migration informs us that so many centuries ago, the influx of migrants from another country definitely influenced law.

Dr. Lameire gives a nice lecture about the history of nephrology. By using examples coming out of his clinical experience it becomes evident that nephrologists are active in a lot of different endeavors of human society. We need them as well in seismologic circumstances as wartime.

The history and the picture of the cat has mesmerized the human mind since antiquity. The elegant studies of Dr. Aerts inform us about different aspects

of the animal in human history. Nobody can imagine how many faces and appearances this companion of man had during the ages.

The lecture by dr Heilbron connects sociology with the positive philosophy of Auguste Comte. By reading his lecture you get an insight into the historical foundation of sociology as a scientifical discipline.

Finally the lecture of Dr.Yablonski unfolds the principles of mathemathics in chemistry. It proves again that no scientific discipline can escape from mathematical abstraction and rigour.

We hope you enjoy reading this pallet of sciences again.

SARTON CHAIR LECTURE

Laudatio Karine Chemla

Liesbeth De Mol

In 1980, a mathematics postgraduate from the "Ecole Normale Supérieure pour jeunes fille", determined to pursue a career in mathematics proper, was contacted by the director of her school to tell her about the possibility of a Singer-Polignac scholarship to go abroad for a year. She decided to write a project on the relation between science and culture, a topic that was being discussed in a group around Ilya Prigogine at the time. For her, the best way to reflect on this topic was to leave French culture as far behind her as possible: China seemed like a perfect solution. She also started to learn Chinese and became very passionate about the language. However, since it was not straightforward to get a Chinese visa, she also decided to adapt her project to the Chinese embassy's expectancies and wrote a project on the history of Chinese mathematics. Upon her return from China, she did not do what everyone was expecting her to do, writing a Ph.D. in mathematics. Instead she wrote a dissertation on the history of Chinese mathematics and became a permanent researcher with the CNRS. So began the academic career of Karine Chemla. She is here today as one of the leading scholars in the history of Chinese mathematics and, I should add, as one of the most passionate and open-minded researchers I know.

George Sarton, who devoted most of his life to promote history of science as a fundamental and independent discipline, always insisted on the significance of the internationalization of the history of science. He has made an appeal, on several occasions, that such internationalization implies that we need to take distance from a point of view centered around Western civilization. To him, "t*he history of mankind is too obviously incomplete if it does not include, on the same level as the Western experience, the immense experience of the East. We badly need the knowledge and wisdom of Asia*"

(Sarton 1916, p. 359). As such, it is very fitting that Karine Chemla is here today as the new Sarton chair: her work testifies of an open mind towards the Eastern world without making the assumption of certain order relations between the East and the West. The fact that she successfully applied for an advanced ERC grant with a project that focuses mostly on sources produced in Mesopotamia, China and the Indian subcontinent, is only a further witness of the international dimension of her work.

One of her most important contributions, in collaboration with Guo Shuchun, is the critical edition and French translation of the *Nine Chapters on Mathematical Procedures*. She worked no less than 20 years on this book! The *Nine chapters* were probably "*completed in the first century CE and considered a ``Canon'' (jing) soon thereafter*" (Chemla 2009a, p. 214). As a canonical text, it was extended over the ages with commentaries which are also included in the edition. This edition is not just a translation but provides the reader with detailed introductions to the text and its commentaries. It also includes over 150 pages of notes and a detailed glossary of technical terms. Through a very careful analysis of the text and the practices that surrounded it, it is shown how the *Nine chapters* were not just a collection of recipes, but were rather understood as encompassing the whole of Chinese mathematics. As such it was a true Canon and its commentaries show the level of sophistication Chinese mathematics had reached. One of the keys to understanding this is that, unlike Western mathematics, with its focus on theorems and axioms, Chinese mathematics, as developed in the *Nine Chapters* and its commentaries, focuses on procedures, algorithms and their meaning, structure and interrelations. As Karine Chemla explains, "*[the commentators describe] a structure of mathematical procedures in which all procedures are understood to flow from a limited number of fundamental and very general operations*". As such, "[it] *can be best understood in a context where generality is granted much weight*" (Chemla 2008, p. 40-41).

However, Karine Chemla's work is certainly not only about giving Chinese mathematics its proper place in the history of mathematics. The strength of her work lies in the methodology it develops and which is characterized by historical rigor. She insists on the significance of understanding the main objects of a historical text as *historical* objects intertwined with a historicized practice. The meaning of notions such as "algorithm" or "problem"

should not be taken for granted. They have multiple meanings that have evolved with time and place. As a consequence, before interpreting a text, one should ask oneself first, *how* to read that text. It is only through such reading, as Karine Chemla points out, that we can overcome the assumption "*that mathematical practice has been uniform in space and time"* and that we can start to "*[restore] the diversity of mathematical practice*" (Chemla, 2009a, p. 244).

Karine Chemla's insistence on asking the right methodological questions not only enables her to reconstruct, interpret and evaluate a particular mathematical practice in its proper time and place but it also allows her to reflect on a more theoretical level and hence, generalize from more local contexts. Indeed, if one wants to know the meaning of "algorithm" within a particular tradition one also engages with the more general question: "what is an algorithm?" If one wants to tackle the question how to read a text, one must also consider such questions as "what is a text?" "Who are the readers of a text?" etc. This kind of theoretical reflection drives the work of Karine Chemla. As she stated in one of her lectures: "*Certainly, I conduct research on the history of mathematics in China and elsewhere, but the main focus of my work lies beyond whatever place or whatever language: I look for the general. I aspire less to contribute to the history of a China from the Bronze age to Deng Xiaoping than I want to understand, in a theoretical manner, how communities of people develop their knowledge*" (Chemla, 2009b). It is exactly this double nature of her work which I value the most: it allows to reconnect historical reflection with philosophical and theoretical reflection, an exercise which, as we all know, is extremely difficult and tricky. Through this combination of historical research, methodological rigor and theoretical reflection her work echoes in more than one sense Sarton's idea of a "*reconcil[iation] [of] the historical with the scientific spirit"* (Sarton, 1924, p. 15), or, to put it differently, *"our knowledge of nature and man cannot be complete or sufficient unless we combine historical with scientific information"* (Sarton 1924, p. 28). However, if we are looking for the general, it is necessary to collaborate across disciplines. Such collaborations, Karine Chemla explains, allow us to "*construct together a field which is shaped by different approaches and different competences specific to each of them*" (Chemla 2009b).

Through such collaborative efforts to construct a solid theoretical basis, Karine Chemla continues, it becomes possible to "*go against the centrifugal forces that affect, at this very time, our domain."* and to stop *"[the threat] to the study of knowledge […] of being systematically truncated in one way or the other"* (Chemla 2009b). Sarton always insisted on the significance of openness and interdisciplinarity in his own work as a strategy to go against the overspecialization of his time. Of course, he was living in other times.

Nonetheless, we see that also today science is still threatened by overspecialization. It is rooted not only in the overflow of information made available through modern computing and information devices but also in a science policy that stimulates quantity over quality, competitiveness over generosity. This is why I think it is so important that there are researchers like Karine Chemla, who not only conduct fundamental research in their field but are also able to convey an atmosphere of generosity through a spirit of directness and openness towards the other.

References

[1] Karine Chemla and Guo Shuchun (2004), *Les neuf chapitres. Le classique mathématique de la Chine ancienne et ses commentaires*. Paris: Dunod.

[2] Karine Chemla (2008), *Canon and commentary in ancient China: An outlook based on mathematical sources*, Max-Planck Institut für Wissenschaftsgeschichte, Preprint 344.

[3] Karine Chemla (2009a), *On mathematical problems as historically determined artifacts. Reflections inspired from ancient China*. Historia Mathematica, 36, 3, pp. 213-246.

[4] Karine Chemla (2009b), Lecture for the receipt of the silver medal of the CNRS in 2008 (12-10-2009) (in french).

[5] George Sarton (1916), *The History of Science*, The Monist, vol. 26, nr. 3, 1916, pp. 321-365.

[6] George Sarton (1924), *The new humanism*, Isis, vol. 6, nr. 1, pp. 9-42.

The Dangers and Promises of Comparative History of Science

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I. Introduction: Needham's opposition to Spengler's vision of history of science

Anyone doing research outside East Asia on the history of science in China owes a debt to Joseph Needham (1900-1995). In the history of science, he is well-known for many essay-articles as well as for being the author, or rather the editor, of *Science and Civilisation in China*, a multi-volume encyclopaedia whose publication began in 1954 and which deals with virtually every aspect of the history of science and technology in China. However, this is not the sum of Needham's career and broader activities. To evoke a few other dimensions of this multi-faceted man, Christian-Socialist Needham began his scientific life as a biochemist, specializing in embryology. He experienced and denounced the rise of fascism and National Socialism in Europe, later contributing to the war effort as the Director of the Sino-British Cooperation Office in Chongqing between 1942 and 1946. This position was his first significant engagement for a

[1] I have pleasure in extending my thanks to Professor Rubens, president of the Sarton Committee, and to the entire Committee for having invited me to hold the Sarton chair in the 2013-2014 academic year. I am grateful to Liesbeth De Mol, for her heartfelt plea and her reading of this text. Professor Paul Van Cauwenberghe, Professor Marc Boone, as well as my colleagues from Ghent, Maarten van Dyck, Albrecht Heeffer, Rita Malfliet, and all the others, have been extremely helpful and contributed in making the stay in Ghent the most pleasant experience. I would also like to thank Richard Kennedy for kindly helping me prepare the final version of this article. The research leading to these results has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) / ERC Grant agreement n. 269804.

worldwide scientific cooperation, a task he carried on while being, from 1946 to 1948, the first head of UNESCO's Natural Sciences Section.[2]

Given this background, one tends to pay close attention, when in various Parts of Volume 5 of *Science and Civilisation in China*, published in 1974, 1976 and 1980, he repeats warnings such as the following:[3]

> "There is a danger to be guarded against, the danger of (…) denying the fundamental continuity and universality of all science. This could be to resurrect the Spenglerian conception of the natural sciences of the various dead (or even worse, the living) non-European civilisations as totally separate, immiscible thought-patterns, more like distinct works of art than anything else, a series of different views of the natural world irreconcilable and unconnected. Such a view might be used as the cloak of some historical racialist doctrine, the sciences of pre-modern times and the non-European cultures being thought of as wholly conditioned ethnically, and rigidly confined to their own spheres, not part of humanity's broad onward march. *However*, it would leave little room for those actions and reactions that we are constantly encountering, *those subtle communicated influences which every civilisation accepted from time to time.*"[4]

To my knowledge, throughout *Science and Civilisation in China*, these are the first times Needham mentions Oswald Spengler (1880-1936) – twenty years or more after the beginning of the publication in 1954. Why does Needham refer here to Spengler, this anti-democratic thinker who was so influential, in Germany and beyond between the two world wars, in particular for his book *The Decline of the West*, whose two volumes

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2 For biographical details and a historically informed approach to Needham's ideas in the history of science, see [1], in particular the chapters by Gregory Blue and Patrick Petitjean. See also Petitjean's articles mentioned below.

3 The publication of *Science and Civilisation in China* began in 1954 and was still unfinished when Needham died in 1995. Needham divided it into seven "Volumes." From Volume 4 onwards, the Volumes were in their turn divided into "Parts," each of which had the size of a thick book. In this article, the use of "Volume" and "Part" in relation to *Science and Civilisation in China* follows Needham's terminology. A Volume usually began with an "Author's note." Starting from Volume 4, except for Parts entirely written by a single other author (like Part I of Volume 5, authored by Tsien Tsuen-Hsuin), Needham's "Author's note" was regularly repeated at the beginning of each Part, with variations that are quite meaningful. This is the case for Parts II, III, IV and V of Volume 5. The quotation that follows occurs in [2: xxii, 3: xxiv-xxv, 4: xxxvii], that is, Parts II, III, and IV of Volume 5, and not in Part V, that is, [5]. I quote the 1980 version, using italics to indicate where this version differs from other versions.

4 Italics are mine and indicate changes between versions of this statement. In Parts II and III, instead of "However," we find "Moreover." In Parts II and III, the last sentence reads: "Moreover it would leave little room for those actions and reactions that we are constantly encountering, deep-seated influences which one civilisation had upon another. "

appeared in 1919 and 1922, respectively, and whose English first translation was published in 1926?[5] What is the context that incites Needham to return to this author? Addressing this question will lead us to reflect about comparative history and its various practices in a way that might prove useful.

Among the key theses that *The Decline of the West* promoted, and to which Needham alludes here, was the idea that "cultures and civilizations" were the key meaningful entities with which to analyse history. According to Spengler, like biological organisms, these entities experienced an ascending period (their "birth", to which Spengler referred as "Kultur"), and a phase of decay, which he called "civilization," before they eventually died. In particular, Spengler was prophesying the "decline and fall of modern civilization."[6] Moreover, in Spengler's view, these entities each developed their own analogous arts, sciences and other cultural artefacts, all completely singular, specific to the culture in which they took shape, and all incommensurable with those of the others. Finally, for him, these entities were all bound to die out and disappear, including "modern science," perceived as the science of the West.

Needham's declaration against Spengler's theses that I find particularly striking restates some of Needham's main tenets, which inspired the writing of *Science and Civilisation in China*. And in it, each word, I claim, was carefully chosen. Let me comment on some of them.

Most significantly, Needham insists on the "continuity and universality of all science", and here it is important not to misunderstand what he meant. The theme of the "continuity of science" is regularly reasserted in *Science and Civilisation in China*, which helps us interpret what is at stake for Needham. It has often been understood that in such statements Needham primarily emphasized the "universality of science."[7] In my view, here his stress is more on what he calls the "human unity", that is, on the fact that humanity holds together and cannot be meaningfully divided. One of the virtues of the history of science, for Needham, is that it highlights the solidarity between all parts of mankind.

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5 For an assessment and analysis of Spengler's ideas, and the reception of his book, written by a witness who will be important for us below, see [6], reprinted in [7: 119-43].

6 The thesis is explicitly mentioned in [4: xxxvi].

7 Typically, in the extremely interesting section entitled "The threads of universality", Blue [8: 51-6] examines the issue of universality in detail, while the related issue of continuity remains in the shadow.

In relation to this emphasis on continuity comes the idea that, in the end, the purpose of the history of science is – for example, in Volume 5 – to write, the "history of man's enquiry into chemical phenomena as one single development throughout the old world cultures." Clearly, such a vision stands in opposition to the idea that "the sciences of pre-modern times and the non-European cultures" could be "thought of as … rigidly confined to their own spheres".[8] On one side, for Spengler, mankind is divided into distinct groups, on the other, knowledge is in the plural. These are in fact two sides of the same coin. Indeed, Spengler makes sense of the history of science by considering mankind divided into various groups, separate from each other, and seeing, in Needham's words, "the natural sciences of the various … civilisations" – let me emphasize the plural in "sciences," here like above – "as *totally separate*, immiscible thought-patterns, …irreconcilable and *unconnected*." (my emphasis).

In the same few pages of his "Author's note," and also repeated in different Parts of Volume 5, Needham feels the need to distance himself more than once from Spengler, in essentially the same terms as those analysed previously. In the context of a vision such as Spengler's, he emphasizes, the project of a single history, – we would say a "global history," which Needham conceives as a history showing how various bodies of knowledge could be subsumed into a single science –, is meaningless, relativism and incommensurability reigning supreme.[9] Interestingly, in the same pages

[8] In fact, in several places in which Needham reasserts the "absolute continuity" of the human effort in the development of knowledge, he opposes this view to Spengler's. An example thereof is found in the same pages as those in which our key statement occurs ([2: xxi, 3: xxiii, 4: xxxv, 5: xxvii-xxviii], where we read: "Throughout this series of volumes it has been assumed all along that there is *only one unitary science of Nature,* approached more or less closely, built up more or less successfully and *continuously*, by various groups of mankind from time to time. This means that one can expect to trace an *absolute continuity* between the first beginnings of astronomy and medicine in Ancient Babylonia, through the advancing natural knowledge of medieval China, India, Islam and the classical Western world, to the break-through of late Renaissance Europe when, as has been said, the most effective method of discovery was itself discovered. Many people probably share this point of view, but *there is another one* which I may *associate with the name of Oswald Spengler*, the German world-historian of the thirties whose works, especially *The Decline of the West*, achieved much popularity for a time." (my emphasis)

[9] In these pages, Needham repeats: "According to him [Spengler], the sciences produced by different civilisations were like *separate* and irreconcilable works of art, valid only within their own frames of reference, and *not subsumable into a single history* and a single ever-growing structure." [2: xxi, 3: xxiii, 4: xxxv, 5: xxviii] (My emphasis) Note that again, in the position ascribed to Spengler, "sciences" is in the plural, which contrasts with the singular of Needham's "single ever-growing structure". Needham's position has to be distinguished from that of a naïve assumption that science is a priori universal.

and for similar reasons, Needham distances himself from Thomas Kuhn's view on the history of science.[10]

Needham is ready to grant that works of art or other cultural artefacts could possibly be incommensurable. However, in his view, "for mathematics, science and technology, the case is altered." The "essentially constant" "properties" of the "environment" in which "man has always lived" should warrant that, in these specific cases, knowledge of this environment has validity beyond the frames of reference in which this knowledge was gained.[11] Perhaps here, Needham considers the case of mathematics in a simplistic and slightly misleading way. We return to the question later. Note, however, that on this issue too, Needham is more nuanced than the theses that have been frequently ascribed to him. In his view, "the ancient and medieval sciences [bore] an obvious ethnic stamp."[12] Moreover, for him such a "stamp" had been eliminated through their incorporation into modern science – a debatable point, which I shall leave uncommented. Further, most interestingly, Needham demanded that "ethnic characteris-

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[10] "Just recently a relevant polemical discussion has been going on among geologists. Harrington (I, 2), who had traced interesting geological insights in Herodotus and Isaiah, was taken to task by Gould (I), maintaining that 'science is no march to truth, but a series of conceptual schemes each adapted to a prevailing culture', and that *progress* consists in the *mutation of these schemes*, new concepts of creative thinkers resolving anomalies of old theories into new systems of belief. This was evidently a Kuhnian approach, but no such formulation will adequately account for the *gradual percolation of true knowledge through the successive civilisations, and its general accumulation*. Harrington himself, in his reply (3), maintained that 'there is a singular state of Nature towards which all estimates of reality converge', and therefore that we can and should judge the insights of the ancients on the basis of our own knowledge of Nature, while at the same time making every effort to understand their intellectual framework." (Needham 1974: xxii; Needham 1980: xxxvi), footnote a (my emphasis). In statements such as the one underlined above, exegetes have tended to read Needham's emphasis on the cumulative nature of science. In the light of my analysis here, I suggest that the emphasis lies equally on the continuity between all civilizations. Note how at the end of this quotation, Needham suggests the historian's focus should remain twofold. The quotation faithfully illustrates his understanding of the reasons why circulation and accumulation are possible.

[11] "(…) while one can easily see that artistic styles and expressions, religious ceremonies and doctrines, or different kinds of music, have tended to be incommensurable, for mathematics, science and technology the case is altered – man has always lived in an *environment* essentially *constant* in its *properties*, and his knowledge of it, if true, must therefore tend towards a *constant structure.*" (my emphasis) (Needham 1974: xxi; Needham 1976: xxiii; Needham 1980: xxxvi; Needham 1983: xxviii.)

[12] The following quote clearly shows how in 1973, Needham [9: 418] holds both views at the same time: "the ancient and medieval sciences (though bearing an obvious ethnic stamp) were concerned with the same natural world and could therefore be subsumed into the same oecumenical natural philosophy". In the same vein, Needham asks the following revealing question: "When in history did a particular science in its Western form fuse with its Chinese form so that all ethnic characteristics melted into the universality of modern science?" [10], quoted through its republication as [11: 397].

tics" be considered symmetrically, that is, that from this perspective ancient Greece, as well as modern Europe, should be considered in the same way as other areas of the planet.[13] The key issue of his opposition to Spengler thus appears to be Needham's refusal to consider parts of mankind as disconnected and science as possibly the object of parallel histories.

II. Guarding us against a form of comparative history, or Spengler's ghost

On the basis of this preliminary analysis, we can now return to our question: why does Needham formulate his opposition to views like Spengler's explicitly in Volume 5, while he had kept silent on this question up to that point in *Science and Civilisation in China*? Two main reasons can be identified, and to me they seem interesting to ponder.

The first reason relates to the fact that in Part V of Volume 5, Needham deals with the history of physiological alchemy. This topic brings about historiographical difficulties that, for Needham, call forth Spengler's ghost. The point appears clearly in the fifth Part of Volume 5, in the passage following the two paragraphs just evoked. In these paragraphs,

we saw Needham restating his rejection of Spengler's views, and claiming that with respect to the issue of incommensurability, "for mathematics,

[13] In the "Author's note," repeated in all Parts of Volume 4, we read: "As for the discoveries and inventions which have left permanent mark on human affairs, it would be impossible even to summarise here the Chinese contributions. (…) In these circumstances it seems hardly believable that writers on technology have run up and down to find reasons why China contributed nothing to the sciences, pure or applied. (…) Another method is to admit that China did something but to find a satisfying reason for saying nothing about it. Thus a recent compendious history of science published in Paris maintains that the sciences of ancient and medieval China and India were *so closely bound to their peculiar cultures that they cannot be understood without them*. The sciences of the ancient *Greek world*, however, were truly *sciences as such, free of all subordination to their cultural matrix* and fit subjects with which to begin a story of human endeavour in all its abstract purity. It would be much more honest to say that while the social background of Hellenistic science and technology can be taken for granted because it is quite familiar to us from our schooldays onwards, we do not yet know much about the social background of Chinese and Indian science, and that we ought to make efforts to get acquainted with it. In fact, of course, *no ancient or medieval science and technology can be separated from its ethnic stamp,*[d] and though that of the *post-Renaissance period* is truly universal, it is *no better understandable* historically *without a knowledge of the milieu* in which it came to birth." Quoted from [12: xlvii-xlviii]. The statement is repeated verbatim in Part I, (published in 1962, pp. xxv-xxvi) and Part II (published in 1965, pp. xlv-xlvi). Footnote d refers to [13: 448], where the issue of culture-rootedness and universality of science had already been discussed.

science and technology the case is altered". These topics are precisely those treated in the previous Volumes of *Science and Civilisation in China*. The two paragraphs in question shed light on the type of challenge that, by contrast, physiological alchemy presents to him and which he addresses immediately after in the "Author's note" inserted in Part V. The way in which he formulates the challenge is telling:

> "*Nevertheless* (…) we are conscious that [this section on physiological alchemy] is rather different from those which have gone before it (KC: that is, mathematics, physics, technology…) and from those which will follow it. In order to understand the physiological alchemy of China, one has to *enter a world of natural philosophy entirely unlike that of Western tradition* (…). The sheer *un-European-ness* of Chinese physiological alchemy deeply impresses. (…) It was very clearly itself and nothing else (…)" [5: xxviii] (my emphasis)

These expressions betray Needham's discomfort: for him, physiological alchemy definitely belongs to the scope of the history of science, and yet he feels uneasy that this case could justify the claim that a body of knowledge might be potentially "rigidly confined to its own sphere" and "culturally bound." In other words, as Needham appears to concede, he feels that dealing with this new topic threatens to compel him to side with Spengler. What allows him, in this case, to ward off Spengler's ghost is proof that this knowledge nevertheless circulated westwards, that it has echoes in several modern disciplines, and that it thereby demonstrated it was "not wholly antithetical to modern science."[14]

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[14] To illustrate these points, let me quote fully the paragraphs added by Needham in Part V of Volume 5, immediately after the two statements quoted above in footnotes 9 and 11 respectively: "*Nevertheless*, in presenting to the world this part of Volume 5 [KC: i.e., on physiological alchemy], we are conscious that it is rather different from those which have gone before it and from those which will follow it. In order to understand the physiological alchemy of China, one has to enter a world of natural philosophy entirely unlike that of Western tradition, and to attune oneself to a theology and a realm of religious feeling quite foreign to the common presuppositions of the 'Peoples of the Book'.(…) The sheer un-European-ness of Chinese physiological alchemy deeply impresses. True, it had some connections with Indian thought and belief, yet it was very clearly itself and nothing else, essentially materialist in character (…). In view of the *deep contrasts between Western and Eastern spirituality, a leap of sympathetic understanding* is required in approaching Chinese physiological alchemy, a readiness for new experience of the 'other', as was so well seen by C.G. Jung (…). *Yet* physiological alchemy was *not wholly antithetical to modern science*, as has sometimes been thought. (…) For all these reasons, we believe that most of physiological alchemy merits the name of proto-science rather than pseudo-science." (Needham1983: xxviii, my emphasis)

The fact that for Needham, the evidence that knowledge circulates is a key point in refuting Spengler's vision also appears unambiguously at the end of the quotation with which I began this article, when he writes, to counter Spengler – I quote again: "*However*, it would leave little room for those actions and reactions that we are constantly encountering, *those subtle communicated influences which every civilisation accepted from time to time*." The phenomenon of the circulation of knowledge manifestly plays a key role in his conception of the unity of mankind. We return shortly to this issue.

The second reason why, in Volume 5 of *Science and civilisation in China*, Needham's "Author's note" repeatedly returns to his antagonism towards Spengler brings us to our main topic in this article. Needham manifestly disagrees with a contributor to this section of the enterprise. *Science and civilisation in China* is an encyclopaedic endeavour, bringing together contributions by various collaborators. Needham mentions their names in the title page of each Part. In Part IV of Volume 5, Needham publishes a contribution by Nathan Sivin devoted to "the theoretical background of elixir alchemy." However, Needham feels the need to distance himself from the form of comparative history advocated by Sivin. The correlation between his developments about Spengler and this issue is easily demonstrated.

Exactly the same paragraphs that in Part V of Volume 5 were followed by the embarrassed explanations we have just evoked about physiological alchemy are followed, in Parts II, III, IV, by the following unambiguous statement:

> "This point [KC: that is, the point about Spengler and incommensurability] would not perhaps need emphasis if certain scholars, in their anxiety to do justice to the *differences* between the ancient Egyptian or the medieval Chinese, Arabic or Indian world-views and our own, were not sometimes tempted to follow lines of thought which might lead to Spenglerian pessimism.[15] (…) For example, our own collaborator, Nathan Sivin (…)" [16]

[15] Interestingly, this is the point where Needham inserts the note about Kuhnian approaches mentioned above (see footnote 10).

[16] (Needham 1974: xxi-xxii; Needham 1976: xxiii-xxiv; Needham 1980: xxxvi.) We see how in the quotation Needham shows mankind divided in relation to the interest in "differences" he attributes to some scholars.

The point is not for us to discuss whether Needham is right or not, nor to determine whether Sivin was mistaken or not. It is rather to understand, through Needham's perception of it, the problems attached to a form of comparative history of science. Let me thus examine, in this perspective, Needham's argumentation a bit further.

Sivin, Needham says, urges us not to speak of "Chinese biology." Contrary to what one might assume, the point here is *not* to avoid speaking about "something Chinese", but rather to avoid using the term "biology," namely, a category, Sivin insists, that is foreign to the actors. The point cannot be denied. And yet, separation is already at play. The problem for Needham is the program he understands Sivin suggests developing as an alternative for a "fruitful comparative history." It requires, Needham points out, to take China separately and to restore "integral complexes of ideas with their interrelations and articulations intact,"[17] thanks to the historian's recovery of the specific goals the practitioners were after. The problem such an agenda raises in Needham's view is, I believe, clear when he emphasizes that, according to this approach, "Chinese science must, in other words, be seen as *developing out of one state of theoretical understanding into another* (…)."[18]

If we follow Needham, this practice of history of science has several implications. First, there would be a "Chinese science," I can testify to the fact that I often still hear colleagues speaking in these terms. Secondly, it would be legitimate to consider China a priori as separate, and even, methodologically speaking, China *should* be first considered separately, "in its own frame of reference."[19] Thirdly, it would make sense to consider the devel-

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[17] Needham puts this statement between quotations marks. (Needham 1974: xxii; Needham 1976: xxiv; Needham 1980: xxxvi-xxxvii.)

[18] My emphasis. (Needham 1974: xxii; Needham 1976: xxiv; Needham 1980: xxxvi-xxxvii.)

[19] The following quotation shows that this is one of Needham's worries and how he relates this point to Spengler. He writes: "In a different place Nathan Sivin has written: 'The question of why China never *spontaneously* experienced the equivalent of *our scientific revolution* lies of course very close to the *core of a comparative history of science*. My point is that it is an utter waste of time, and distracting as well, to expect any answer until *the Chinese tradition has been adequately comprehended from the inside*.' The matter could not be better put; we must of course learn to see instinctively through the eyes of those who thought in terms of the Yin and Yang, the Five Elements, the symbolic correlations, and the trigrams and hexagrams of the *Book of Changes*. But here again this formulation might suggest a purely internalist or ideological explanation for the failure of modern natural science to arise in Chinese culture. *I don't think that in the last resort we shall be able to appeal primarily to inhibiting factors inherent in the Chinese thought-world considered as an isolated Spenglerian cell*." (my emphasis) (Needham 1974: xxii-xxiii; Needham 1976: xxv; Needham 1980: xxxvii).

opment of Chinese science "out of one state of theoretical understanding into another", as if it were legitimate, again, to consider this process as occurring separately. We may assume that for Needham such a program, again, left "little room for those actions and reactions that we are constantly encountering, *those subtle communicated influences which every civilisation accepted from time to time.*" Against the background outlined above, we understand how he perceived, in such a program, the threat of seeing a vision such as Spengler's resuscitated.

Here, Needham exposes the assumptions of a certain practice of comparative history, in ways that are worth reflecting on. By its very project, this practice assumes entities as separate and forming wholes that have to be understood as such. Further, such a form of comparative history aims at "confronting" – this is the word ascribed to Sivin – the wholes thereby constituted, looking primarily for differences and contrasts.[20] One understands the concern that such a use of history might contribute to the constitution of entities like peoples or cultures as separate, and, I add, as uniform.

In Needham's view, the concern was not merely theoretical. It was also inspired by developments at the time, which he perceived as "similar." In these developments, history of science encouraged the view that there were different sciences and that different peoples should live by different sciences, embodying different communitarian values. This is what Needham points out, when, in the same pages, he mentions the example of Said Husain Nasr, for whom there are "Islamic sciences," which should be viewed as separate and should be considered "from an Islamic viewpoint." Not surprisingly, Needham deplores in such an approach "two fatal drawbacks: it denies the equality of the forms of human experience, and it divorces Islamic natural science from the grand onward-going movement of the natural science of all humanity." [21] We recognize the themes emphasized above. Since the time when Needham was writing these lines, similar trends have become quite widespread in all societies around the world, and they thrive today.[22] How, in our work as historians of science, we provide

[20] Ito [14] discusses the emphasis on contrasts and differences in certain forms of historiography dealing with East Asia. In the same pages Needham goes on discussing along the same lines Sivin's conception of comparative history (Needham 1974: xxvi-xxvii; Needham 1976: xxix; Needham 1980: xli.)

[21] (Needham 1974: xxiv; Needham 1976: xxvi; Needham 1980: xxxviii-xxxix).

[22] See, for instance, [15], on the movement of "Vedic mathematics" in the Indian subcontinent.

material fuelling these developments is a question Needham forces us to consider.

To summarize, Needham's concern, as I understand it, was the possibility of contributing a division of mankind through the way in which we write history of science. This is what he sees at the horizon of a practice of comparative history, whose focus is placed on differences and whose method assumes a priori that separate wholes exist, understandable only within their own frames of reference.

III. Back to the earlier years of UNESCO

Needham's emphasis on the history of humanity as a whole, and more precisely on the unity of mankind in history, has a history, which is interesting to explore for my purpose. It strongly evokes the context of UNESCO in the years immediately after its creation, that is, at the end of the 1940s. The stress on the solidarity of all parts of humanity evokes in particular the discussions around UNESCO's project of a *Scientific and cultural history of mankind*, which Patrick Petitjean has recently studied and in the eventual definition of which Needham played an important role.[23]

The project had been officially initiated in 1947, following upon an earlier suggestion by historian Lucien Febvre. Febvre, a historian specialized in early modern history and one of the founding fathers, with Marc Bloch, of the *Annales* School, was involved in many international institutions after the Second World War, including UNESCO. From its inception, this project of a *Scientific and cultural history of mankind* had also been supported and promoted by biologist Julian Huxley, who had been elected to be the first Director General of UNESCO in 1946, as well as by Needham, who was the head of that organization's "Natural Sciences Section" at the time.

The choice of focussing on a history of science and culture was intimately connected with the purpose of writing a history that would promote the unity of mankind and, as a result, peace. As Febvre emphasized in a note

[23] In this section, I rely on Patrick Petitjean's recent research on the topic. See in particular the documents published, and the arguments made, in [16, 17, 18]. However, I can only evoke a few aspects of this history, referring the reader to these publications for a more complete treatment.

published in the first months of 1949, in order to write not on what had divided mankind, but rather on what had united it, one had to do away with a history focused on political events and wars and concentrate rather on science and culture as domains in which peaceful exchanges had never ceased.[24] Interestingly enough, these domains were precisely those to which historians working in the framework of the *Annales* School had called attention.

On May 5, 1949, Febvre presented a first outline for the work. He formulated the aims he assigned to the *Scientific and cultural history of mankind* in quite striking terms, as follows: "Now, to speak precisely, the book of which I come to give an outline is not a book of ordinary science. Its objective is to act upon the minds of people in order to extirpate the fatal virus of war. To act upon the minds of men and of women, to be sure, but, above all, upon the minds of children."[25]

This is precisely the concern driving the project of inquiring into the unity of mankind in a historical fashion, echoed as we have seen in Needham's "Author's note" examined above. Febvre's outline for this "history of humanity" represents, in my view, the cleverest scheme possible for a historiography striving to fulfil this task. According to this conception, Volume I (Febvre 1953: 959) should call upon the contributions of various fields: anthropology, psychology, linguistics, ethnology, and sociology, to address "the problem of the unity of the human race in its diversity." Analysing the differences between ethnic groups, between peoples, the origin, nature and extent of these differences, focusing on the historical importance of "racial interbreeding" in the perspective of showing that "There is no pure race in the human kind" and that "all existing groups are the products of multiple crossings", such were some of the goals set to these fields. General issues relating to the "paths followed" by the "development" of "the various human groups," to the comparison between these paths and to the possibility of implementing changes based on these observations were also high on the agenda.

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[24] [17]. The theme is taken up in the report on the *Scientific and cultural history of mankind.* Febvre, in his capacity of "promoter of the enterprise," presented in May 1949 to the International Council for Philosophy and Human Sciences. This document was published both in French and English as [19]. For this argument, see pp. 956-957.

[25] [19: 954-5]. In French: "Or, précisément, le livre dont je viens vous présenter une esquisse n'est pas un livre de science ordinaire. Il prétend agir sur les mentalités pour en extirper le mortel virus de la guerre. Sur les mentalités des hommes et des femmes, sans doute: mais avant tout sur celles des enfants". Quoted in [18: 21].

Volumes II and III would precisely focus on circulations in general (Febvre 1953: 959, 961.) They would deal with the history of the means of communication and would also address how items related in particular to science and technology had "circulated from one group to the other…" The point was to highlight that "humanity" had been "in motion from its origins, constantly shifting about in an endless series of transcontinental migrations." Volumes IV and V would "take up" what each part of the world, conceived in geographical terms, has "received from other parts of the world and what they have given in exchange." As a result, such an inquiry should show how each part of the world is primarily constituted of contributions coming from the others. Moreover, it would highlight why it is impossible to consider one part of the world as separate from the others. This is precisely what Febvre sets as a goal: "From this picture would emerge the idea that the partitioning of the world is nothing but a fiction and that the earth has never ceased to change, to enrich itself, and to propagate itself, by a flood of peaceful interchanges." [26] We are at the antipodes of a historiography a la Spengler. Finally, Volume VI would present a synthesis from the viewpoint of a history of humanity, that is, a "recapitulation of the great phases of the historical development of humanity, of the great stages of interchange and borrowing."

In Febvre's idea, the main purpose of the intended volumes was the training of teachers responsible for teaching history. In 1949, turning his back on a traditional teaching of national histories, which would "never tend to reconcile the various peoples," Febvre was imagining "a new kind of teaching, (…) by definition, consecrated to peace." This was the aim ascribed to a "history of humanity."[27] However, still in the context of UNESCO, Febvre also developed the idea of reforming the teaching of national histories along similar lines.[28] In 1951, with François Crouzet, he

[26] (Febvre 1953: 959, 961), also quoted in [18: 21], which shows that Needham supported this scheme. Crouzet and Crouzet-Pavan quote the report at greater length in [20: 337-40], where they also discuss this type of historiography and elements of the history of the project.

[27] (Febvre 1953: 957). Petitjean and Domingues [18: 42-6] note the multiple projects of writing "general histories" of science, "universal histories" or "world histories" that flourished at the time. Among them, they mention George Sarton's *Introduction to the history of science,* 1927-48. Baltimore: Williams & Wilkins. We have quoted Needham's criticism of some presuppositions in one of them (see footnote 13). More generally, Petitjean and Domingues evoke the different options that they embody with respect to the history of science.

[28] Crouzet and Crouzet-Pavan [20: 318-25] outline the circumstances in which, in the context of his participation to the work carried out at UNESCO, Febvre adopted the idea of acting through the writing of textbooks.

presented the manuscript of a History of France whose title makes the project explicit. It reads: "International origins of a civilization".[29] The point was to show how France was, in every respect, constituted from elements and contributions coming from all over the world. The manuscript of that book was only published in 2012, under a title chosen by its editors and perfectly fitting the authors' intention. The title reads: *Nous sommes des sang-mêlés. We are of mixed blood.*[30] The completion of such a historical project was best suited to exposing the theoretical problems attached to considering a part of the world as separate. We recognize the similarity of inspiration with the project Febvre had formed for the *Scientific and cultural history of mankind*.

However, in the end, the outline Febvre had prepared for the *Scientific and cultural history of mankind* was not adopted. A debate took place later in 1949, at the end of which the project had taken a significantly different direction.[31] Needham summarized the new version of the project in a letter written in the first days of 1950 to Cortesao, to whom the realization of the project had been entrusted.[32] Some of its added features are striking for my purpose in this article. Needham's summary shows that the same ideas as we saw earlier were still providing the main guidelines. The stress was still laid on "the mutual indebtedness of all peoples" and on the contribution of

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29 Part of the manuscript, put online at the following address: http://unesdoc.unesco.org/images/0014/001423/142305fb.pdf, was circulated in the context of UNESCO. Its first pages explain the circumstances in which this work was carried out and the goals assigned to it.

30 [21]. UNESCO spread the manuscript, requiring that similar histories be written in different countries. I am not aware of any study of the future of this project.

31 For an analysis of the minutes of this debate, I refer the reader to [18: 25-33]

32 Needham's letter to Cortesao (14/01/1950), quoted in [17], reads as follows (the addition of paragraphs and the emphasis are mine, where the underlined words are in the original): "After an opening part, introducing certain fundamental knowledge about Man and the world in which he finds himself, there would be a second part describing the series of chronologically successive *stages* in the *progress* of *humanity* in social organisation and control over, and understanding of, Nature.

The third part will be concerned with exchanges and *transmissions* in all branches of human knowledge, practice and experience; *demonstrating the mutual indebtedness* of *all peoples*, and bringing out the fact that there is *no people* or *culture* which has *not contributed* elements of essential value to the total human patrimony.

The fourth part will outline the various *patterns of the great cultures and civilisations*, their *particular world-outlooks* which were *characteristic* of them, and which, *though not transmitted* in former times, are *now fusing* into the *world-picture of universal man*.

The fifth concluding part would be of a synthetic character. In so far as the attainment of *perfect historical objectivity* might be considered to be *impossible*, the committee felt that *emphasis* might well be placed on the factors which have *united mankind throughout history, rather than on those which have divided the various peoples*." Petitjean and Domingues [18] also describe the later further transformations of the project until its eventual completion in the 1960s.

all peoples and cultures "to the total human patrimony." It was still asked to place emphasis "on the factors which have united mankind throughout history, rather than on those which have divided the various peoples." However, some new historiographical foci had crept in, and from my perspective they significantly modified the spirit of the project. Febvre's main idea of the hybrid character of every civilization had given way to a milder formulation. The notion of peoples' and cultures' "contributions" was more forcefully promoted than that of their debts to other parts of the world. Finally, specific cultures and civilizations, with their "particular world-outlooks," were re-entered the picture, even if with a proviso. The worm was back in the fruit.[33] As Petitjean's conclusion in [17] emphasizes, these were in the end the main foci of the books published.

In Needham's summary, these "particular world outlooks" were supposed not to have been "transmitted in former times" – note the idea that transmission trims knowledge and separates what can be shared from what is specific. They were also supposed to disappear in modern times through their "fusi[on] into the world-picture of universal man". We recognize, here and above, UNESCO's main doctrines in its early years, as well as Needham's key ideas in *Science and Civilisation in China*. More generally, this new sketch for the *Scientific and cultural history of mankind* outlines a framework closer to what *Science and Civilisation in China* embodies.

To achieve these aims, *Science and civilisation in China* also grants, in its way, pride of place to the comparative method in the historian's project. However, in this context, the method is of a completely different nature. Comparison aims, in this case, to identify sameness, and this is most often in this way that transmission of knowledge between two parts of the planet is argued for. In any event, this was how the "contributions", or the "firsts", of peoples or cultures were for the most part established in *Science and Civilisation in China*.

Highlighting the transmission of knowledge and thereby peoples' contributions was supposed to highlight the unity of mankind and that of knowledge. For someone like Needham, who wanted to emphasize "factors that had united mankind", it is a bitter irony that, in practice, the race for contri-

[33] When, in 1953, the *Cahiers d'Histoire Mondiale* published two documents related to the history of the *Scientific and Cultural History of Mankind* project, including [19] quoted above, the introduction written by the editors, namely probably Febvre himself, makes clear that Febvre is aware of the dramatic changes brought to the nature of his project.

butions has proved rather divisive too. Such a problem would not have affected a history of the type Febvre was calling for.

To analyse more closely the problems attached to this form of comparative history from a historiographical viewpoint, I would like to return to a piece of research I did in the 1990s and that was in the vein as I just outlined. Criticizing my old self will make no one unhappy. Moreover, I can misrepresent myself at will, without running into any danger, at least I hope.

IV. A critical glance at my early account of the history of algebraic equations

The pieces of work, to which I now return, deal with episodes in the early history of algebraic equations, and, more precisely, quadratic equations.[34] Here is a rough sketch of what I established at the time.

The earliest mathematical book handed down in China through the written tradition, *The Nine Chapters on Mathematical Procedures*, was probably completed in the first century of the Common Era.[35] Below, I shall abbreviate its title to *The Nine Chapters*. The book testifies to the existence, at the time in China, of a concept of equation – more precisely, of quadratic equation –, a concept which is quite specific.[36] In contrast to equations as we understand them in the first place, that is, as the statement of an equality, the type of equation to which *The Nine Chapters* attests is a numerical operation, like division. What do I mean by this?

An analogy with division will help me clarify my claim. Division can be approached in two ways. Either, it is the solution to a problem set in the form of an equality, such as "3 apples are worth 3000 dollars, what is the

[34] Let us consider the simplest situation possible: for us here, an equation is a statement that involves data as well as an unknown (which we shall call x), and that is formulated in such a way that it should allow a practitioner to determine the value of the unknown. A quadratic equation is a statement in which only x and its square x^2 occur, and no higher power of the unknown. In [22], I outline the main idea and the research program to be executed in my view at the time. [23, 24, 25] carry out parts of the program. [26] sketches the realization of the last part. However, I intended to go back to that latter part in greater detail. In what follows, I only outline the new way in which I now approach the documents once dealt with, keeping for another publication the task of developing the argument with all needed details.

[35] [27] gives a critical edition and a French translation of the text of this Classic, as well as that of the ancient commentaries selected by the written tradition to be handed down with the Classic.

[36] See [27: 689-93, 732-5], for the Chinese text, its translation, and its interpretation.

price of one apple?", or division is an operation which has two operands – a dividend and a divisor – and yields a quotient by a mathematical work applied to these operands. In the common conception of division today, we usually perceive the latter feature as being the most prominent. However, to understand the status of quadratic equations in ancient China, we should not forget about the former. Indeed, in *The Nine Chapters*, equation, I claimed at the time, was *not* perceived as the statement of an equality, as we emphasize today when, focusing on its statement, we identify the equation with an assertion such as: $a = x^2 + b\,x$ – where x is the unknown sought. Rather, in the context of *The Nine Chapters*, *exactly like division*, equation was perceived as the numerical operation solving the problem to which the statement corresponds. Moreover, this numerical operation had two operands, respectively called "dividend" (a) and "joined divisor" (b).

An equation of the kind encountered in *The Nine Chapters* thus presents analogies with division in several ways. First, it is a numerical operation that, like division, yields a result by a mathematical procedure applied to its operands. In this context, for both operations operands are written with respect to a place-value decimal position and the algorithms rely on these expansions to yield the result sought.

Secondly, equation is analogous to division because clearly its operands have names reminding us of those for a division. In fact, the execution of the operation-equation (this is how, in what follows, I shall refer to this type of equation) is also analogous to the computation of a division as it is attested to in *The Nine Chapters*.

Finally, the text of *The Nine Chapters* refers to a surface on which numbers were represented with counting rods and on which operations were executed. Prior to the 10th century, we have no illustration of what happened on this calculating surface. However, from the references to the computations we find in our sources, we can reconstruct the layouts for division and for that operation-equation used in relation to *The Nine Chapters*, and we see that the layouts for both operations were quite similar: the so-called "dividends" in both contexts were all placed in a middle row, whereas the "divisors" were put in lower rows, the result being obtained digit by digit and progressively put into upper rows (see table 1).

Table 1: The layouts of division and the operation-equation in The Nine Chapters

Division On the calculating surface		Equation On the calculating surface	
quotient		(result-root)	
dividend	*a*	"dividend"	*a*
divisor	*b*	"joined divisor"	*b*

One could say – as I argued twenty years ago – that the equations to which Chinese sources testify until the 17th century are *all* of this kind. They were all given the identity of numerical operations. This identity stands in sharp contrast with what we find elsewhere in the world, and, to begin with, in al-Khwarizmi's *Book on algebra*, completed in the first half of the 9th century and devoted to quadratic equations.[37]

For al-Khwarizmi, the quadratic equation is primarily an equality, of the type "a square plus ten roots are equal to thirty-nine dirhams", where the term "root" refers to the unknown, and the term "square" to the square of that unknown [28: 100] This type of equation is thus closer, in this respect, to what, in modern terms, we write as $x^2 + b\,x = a$. This specificity of al-Khwarizmi's equation, through which it differs from what we saw in China, is closely related to how al-Khwarizmi works with equations. Indeed, his treatment relies in an essential way on equations as being statements of equality, primarily through the fact that he transforms them *qua* equalities. Moreover, al-Khwarizmi solves equations, by applying a sequence of operations to their coefficients (that is, the numbers *a* and *b* introduced above) – this is the so-called "solution by radicals." In brief, both the *nature* of the equation and the *way* of *solving* it stand in opposition to what Chinese documents attest to.

Several decades later in the Arabic world, al-Khayyam's (1048-1131) work testifies to a dramatic increase in the scope of equations dealt with and a key change with respect to al-Khwarizmi's approach to their solution. Most importantly, in addition to al-Khwarizmi's solution by radicals, al-Khayyam now seeks the solution of an equation in a geometric way, by the

[37] Recently al-Khwarizmi's *Kitab al-Jabr wa-al muqabala* was critically edited and translated in [28].

intersection of curves (more precisely, in fact, by the intersection of conic sections).[38] Such an approach presented a correlation with some ancient Greek writings, while remaining completely different from what the Chinese sources contain.

By contrast, in Sharaf al-Din al-Tusi's book *On equations*, completed at the end of the 12th century and recently published by Roshdi Rashed [30], we encounter a striking phenomenon. Al-Tusi combines al-Khwarizmi's and al-Khayyam's approaches to, and ways of working with, equations with a third approach that, as far as we can tell, is not documented earlier in Arabic sources and that powerfully evokes Chinese sources. Indeed, the layout of the equation is the same (see Figure 1): the constant term is in a middle row, the "divisors" are in lower rows, and the root of the equation appears gradually in the upper row. As in Chinese sources, the coefficients are written with a place-value decimal system and, as for a division, the root is obtained digit by digit. In both contexts, the same techniques are applied to the operands of the equation (the coefficients) in this layout to yield the root. Finally, the procedures used to solve the equation are similar.

عدد الجذور. فيكون بهذه الصورة: ١١٢٩٩٢ ؛ لأن المرتبة / السّميّة للجذر
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Figure 1: The numerical writing of the quadratic equation 112992 = x^2 + 31 x in Sharaf al-Din al-Tusi's *On equations* [30: vol. 1, 26].

In my earlier publications mentioned above, I emphasized that before al-Tusi, such ways of approaching and conceiving equations were attested *only* in Chinese sources. The comparison showing a similarity, along with this approach to equations as numerical operations appearing to be specific to China, led me to postulate, as I think Needham would have done, transmission in this respect from China into the Arabic world, and then, relying on Rashed's further study of transmission [31], even further westwards.

Such a comparison brought, in my view, interesting benefits, which I believe are still worth pondering. This has partly to do with the situation dealt with, and this is where I return to the idea that Needham might have envisaged the case of the circulation of mathematical knowledge as being

[38] Al-Khayyam's mathematical works were published in [29].

simpler than it actually is.[39] Indeed, in the case outlined, algebraic equations were documented in *both* the Arabic world and China. However, interestingly enough, the concepts evidenced were *different*. The ways of working with equations were *also different* as were the ways of *solving* them. Evidence of conceptual diversity in the past, for what is for us one and the same concept, is an interesting by-product of the comparative approach, raising appealing philosophical questions.

Moreover, in this case, al-Tusi's book attests to the fact that these various concepts and approaches had been merged into a single whole. It evidences that a synthesis of former bodies of knowledge, and not a mere juxtaposition of them, had been carried out. Comparison thus brought to light the mathematical work that had been necessary to combine the concept and approach of equation seen as an arithmetic operation, which seemed to come from China, with other concepts and practices evidenced in the Arabic world. This episode suggests synthesis as a key operation deserving historians' attention. Such syntheses have hardly been studied as such, in the history of mathematics and yet they appear to constitute essential operations, in particular in the context of a world history. Comparison further showed that far from being by essence irreducible to each other, the various concepts identified before al-Tusi's synthesis could actually be combined with each other through the work of actors. Seen from another angle, comparison also showed that al-Tusi's approach to equations was the result of hybridization between several traditions, probably two coming from the Arabic world and one from China. It thereby called attention to the hybrid nature of our knowledge. It finally highlighted in particular the non-linear character of conceptual history, a phenomenon widely attested and yet still awaiting systematic inquiry.

Now, let us return to the topic of this article, that is, to the practice of comparative history that lay at the basis of my conclusion at the time. In a sense, this older piece of work of mine was much in the vein of the type of comparative history Needham advocated and practiced, when, from a comparison that revealed similarities between sources, he concluded that circulation had taken place. This was in general the type of reasoning on which basis he often claimed that knowledge elaborated in China had become part of human patrimony.

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[39] See Needham's statement quoted in footnote 11. In fact, the argument developed here has a validity that goes beyond the case of mathematics.

However, as I shall now argue, my approach to these episodes in the history of algebraic equations had also embraced features of the first type of comparative history I have identified earlier.

Why do I feel the need today to review my earlier account in a critical way? My claim is that, twenty years ago, seeking to strengthen the conclusion that circulation had taken place, I was led to focus on specificities of approaches to equations in China and on their contrasts with other traditions. The logic of the argument I was making thus led me to overdo the uniformity of the concept of equation in China, without paying due attention to the differences between equations evidenced in different Chinese sources. In particular, I embraced uncritically the view of a single tradition with respect to equations in China. We recognize a disease typical of the first form of comparative history as exposed by Needham, which is to focus on what is similar among Chinese sources and what is different between them and sources produced elsewhere. My comparative approach led me to a form of historical account that basically amounted to an identification of "The Chinese equation" – that is, the equation specific to China – and to a survey of its specific development. These elements were tools required by my approach to the circulation of knowledge. One of the consequences was that the hypothesis I made in this respect was formulated in too coarse a way. How do I wish now to revise my earlier account?

V. Taking mathematical cultures into account

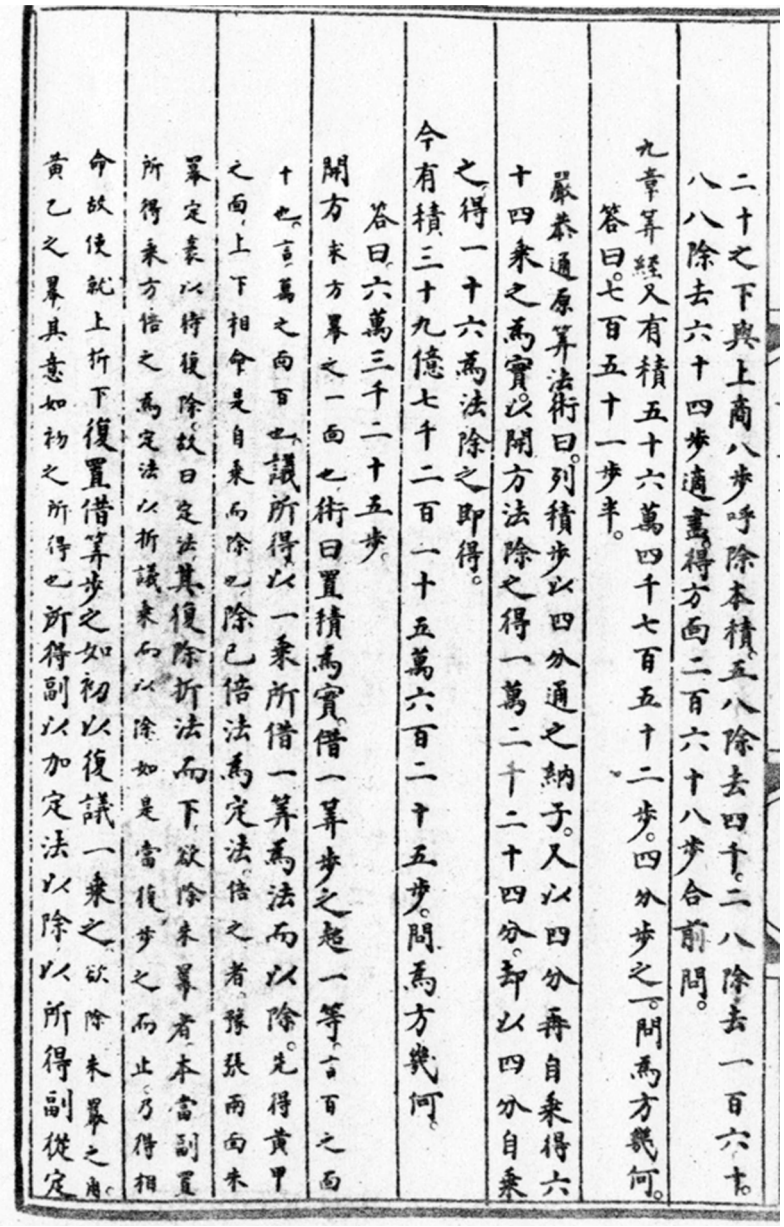
I suggest now that, if it remains true that equations as documented in Chinese sources were numerical operations, this account is too coarse and captures only part of the phenomena dealt with. To go beyond this first account, one needs to interpret Chinese documents in a finer way, and this can be only done through methodological work. The case of equations in China, as I shall now outline, illustrates *how* it is only through introducing *in a certain way* a context in which these documents were produced that one can offer a finer interpretation. The context in question will *not* be "China" as a whole, but rather, a context much closer to actual practice of the actors, that is, the "mathematical cultures" in relation to which the various sources attesting to work on equations in China were composed.

By the term "mathematical culture", to put it loosely, I refer to a "given way of practicing mathematics."[40] I claim that one can identify several different mathematical cultures in Chinese history. These various cultures present overlaps as well as breaks, which may explain why they have been so far overlooked. Without entering into the details of how this could be done, let me simply illustrate this claim by showing how differences between the writings composed in the context of these different cultures manifest differences between these contexts.

To begin with, let us return to *The Nine Chapters*, a book that was, as we have seen, probably completed in the 1st century of the Common Era and on which commentaries were composed and handed down through the written tradition. This set of sources attests to a concept of, and approach to, equation, some features of which I outlined earlier. Other features will appear if we consider the mathematical culture to which these sources testify and that can be perceived through a way of writing down mathematics. Figure 2 shows a page of *The Nine Chapters* with its commentaries, in a 15th century edition. We see that mathematical writing is purely discursive. On the other hand, the discourse refers to a calculating surface, which practitioners use while engaging with the text. As we have seen, numbers were materially represented with counting rods on this surface. The commentaries also refer to diagrams for plane geometry and blocks for space geometry. Analysis of the way in which commentators speak of artefacts for visualization had led me to argue that diagrams were material objects too, on which practitioners added colours, and which they divided into pieces and manipulated. In other words, practitioners in this context carried out mathematical activities with purely discursive writings and various types of material objects.

By contrast, the mathematical writings evidencing a work on equations in the second time period I distinguish have undergone a mutation. We can take Liu Yi 劉益's *Discussing the Source of the Ancient (methods)* 議古根源 (abbreviated below into *Discussing the Source*), probably composed in the 11th century, as illustrating both the practice of mathematics and the approach to equations in this second context. Apparently, now, the practice of mathematics has migrated onto paper, even though there are still material objects accompanying the text. In relation to this mutation, the type of mathematical

[40] I have presented in greater detail my approach to "mathematical cultures" in [32, 33].



二十之下與上商八步呼除本積五八除去四十二八除去一百六十八八除去六十四步適盡得方面二百六十八步合前問。

九章算經又有積五十六萬四千七百五十二步。四分步之一。問為方幾何。

答曰。七百五十一步半。

嚴恭通原算法術曰。列積步以四分通之納子。又以四分再自乘得六十四乘之為實。以開方法除之得一萬二千二十四分。却以四分自乘之得一十六為法除之即得。

今有積三十九億七千二百一十五萬六百二十五步。問為方幾何。

答曰。六萬三千二十五步。

開方求方冪之一面也。術曰。置積為實。借一算步之超一等。百百之面十也。百萬之面百也。議所得以一乘所借一算為法而以除。先得黃甲之面。上下相命是自乘而除也。除已倍法為定法。倍之者。豫張兩面求冪定袤以待復除。故曰定法。其復除折法而下。欲除末冪者。本當副置所得乘方倍之為定法。以折議乘而以除。如是當復步之而止。乃得相命故使就上折下復置借算步之如初以復議一乘之。欲除末冪之面。黃乙之冪。其意如初之所得也。所得副以加定法以除。以所得副從定

Figure 2: A Typical page in our early source material – A page of *The Nine Chapters*, with its ancient commentaries, dealing with square root extraction. Edition included in the 15th century imperial encyclopaedia *Grand Classic of the Yongle period* (永樂大典 *Yongle dadian*).

writing to which our sources attest are of a radically different kind. As Figure 3 illustrates, these writings incorporate representations of the calculating surface as well as mathematical diagrams. The use of these elements presents similarities and differences with respect to what can be reconstructed for our first time period. For instance, diagrams still make use of colours. However, the use has undergone change and the meanings attached to them have been modified.

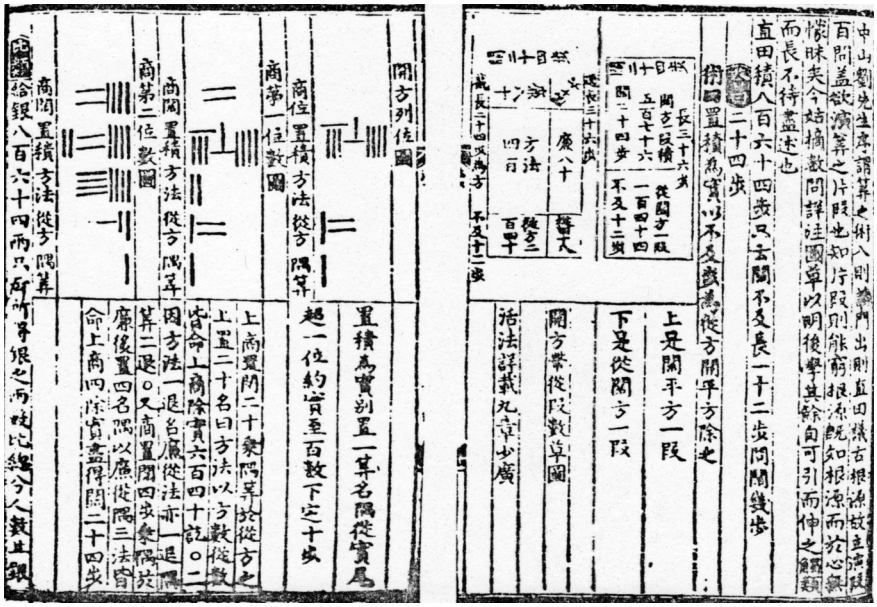
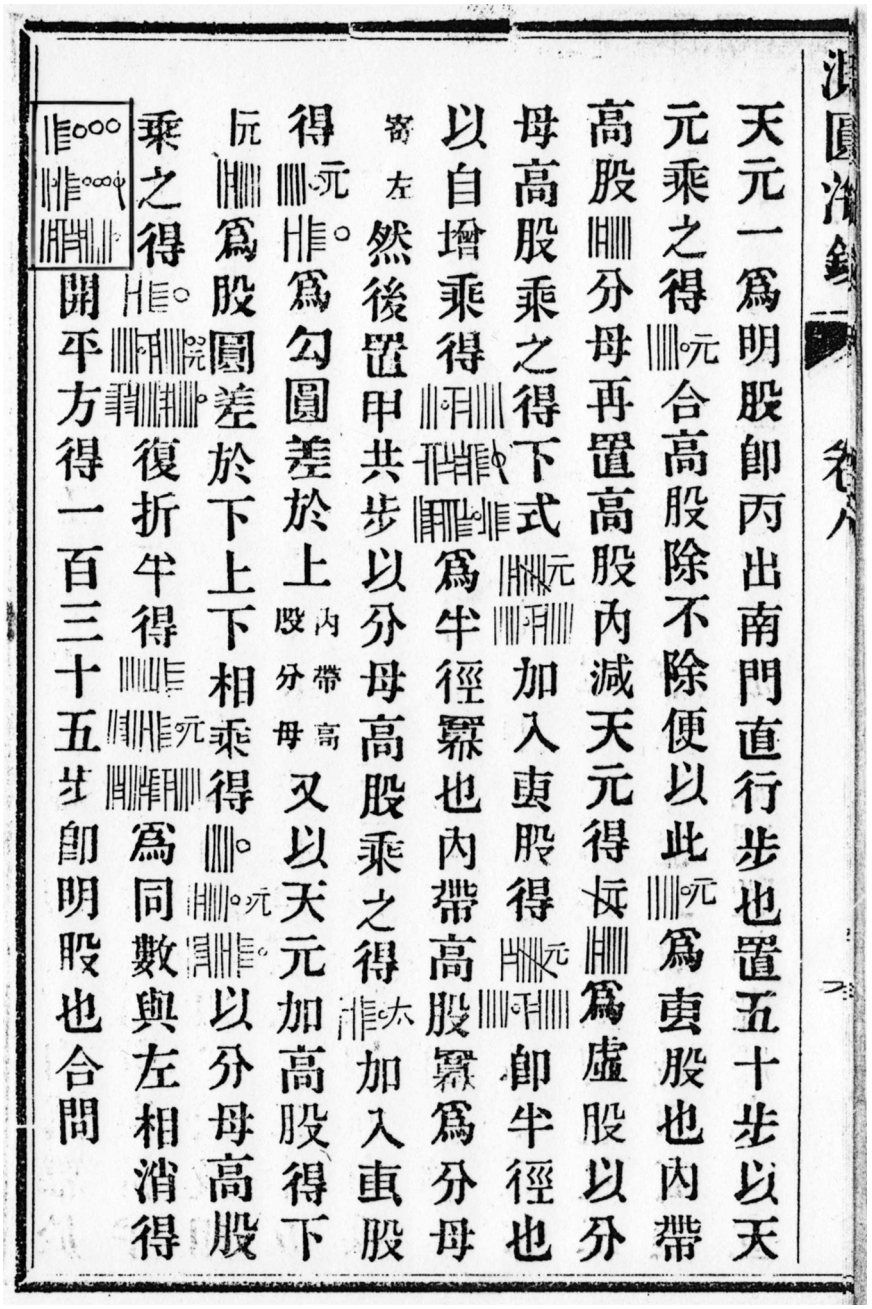


Figure 3: A Typical page in our source material of the second period. Liu Yi 劉益 's *Discussing the Source of the Ancient (methods)* (議古根源, *Yigu genyuan*, abbreviated below to *Discussing the Source*) 11th c., quoted by Yang Hui, Korean print, 1433.

Finally, a third mathematical culture in relation to work with equations can be identified in the 13th century. It is illustrated by part of the work by Li Ye, as shown in Figure 4. His *Sea Mirror of Circle Measurements*, completed in 1248, no longer uses diagrams typical of the previous time period and instead uses symbolic notations, inspired by work on the computing surface.[41]

[41] Li Ye's case is quite interesting in that his second book, compiled in 1259 and entitled *Deploying the pieces for the* [Collection] augmenting the ancient (methods) (*Yigu yanduan* 益古演段), can be read as the establishment of a bridge between these two mathematical cultures. This book was analysed and translated into English in [34].



天元一爲明股卽丙出南門直行步也置五十步以天元乘之得元合高股除不除便以此元爲衷股也內帶高股分母再置高股內減天元得朶爲虛股以分母高股乘之得下式元加入衷股得元卽半徑也以自增乘得爲半徑冪也內帶高股冪爲分母寄左然後置甲共步以分母高股乘之得太加入衷股得元爲勾圓差於上內帶高股分母又以天元加高股得下元爲股圓差於下上下相乘得元以分母高股乘之得復折半得元爲同數與左相消得開平方得一百三十五步卽明股也合問

Figure 4: A Typical page in our source material of a third period. Li Ye 李冶 : *Sea Mirror of Circle Measurements* (測圓海鏡 , *Ceyuan haijing*), 1248.

How can the description of the different mathematical cultures in the context of which equations have been researched in China benefit our account of the history of algebraic equations in China and beyond? To begin with, the description of the mathematical culture, in relation to the equation attested to in *The Nine Chapters* and its commentaries, allows us to capture features of this mathematical concept more fully than was done before. To put it bluntly – I leave the development of the argument for another publication –, the description of several practices with artefacts used in the context of this mathematical culture, that is, the description of how practitioners used the calculating surface, how they dealt with algorithms, how they established the correctness of algorithms, how they handled diagrams, etc., reveals that, at the time, the equation-operation had in fact two facets, one of which I overlooked in my earlier work. In addition to being a numerical operation, as I have outlined above, it also had a diagrammatic facet, each being the support of part of the work on equations.[42] In fact, the equation was established and stated geometrically, in the form of a rectangle, having a given area (the "dividend," that is, the constant term) and being composed of two sub-rectangles, i.e., the square of the unknown and a sub-rectangle, a side of which was the unknown and the other side of which corresponded to the "joined divisor."[43] This structure explains how the two facets of the equation – the numerical facet and the geometrical – were related to each other. The description of the mathematical culture sketched above explains why neither of these facets appeared at the time in the pages of the writings, except through hints that the discourse makes to them. This is the main reason why the description of the way the mathematics was practised, in relation to which a writing was composed, is essential to carry out conceptual history.

Now, bringing these two facets to light allows us to perceive in a new way the continuity between the equation-operation, as dealt with in *The Nine Chapters*, and what we find in Liu Yi's writing, in the 11th century. Figure 3 shows how in the 11th century, the two facets were inserted into the pages

[42] See my introduction to Chapter 9, [27: 671--2, 89-93] as well as the footnotes associated to the French translation. [35] was an important step towards a better appreciation of the importance of this facet in the history of equations in China.

[43] The facts that the diagrams are to be read as assertions and that a mathematical work is carried out on statements made in this way illustrates, on the one hand, specificities of a given mathematical culture, and, on the other, the importance of taking these specificities into account to interpret the sources.

of writings. Further, the description of the mathematical culture in relation to which Liu Yi worked on equations enables us to understand that, as in the earlier context, far from being mere illustrations, the diagrams played a key part in the book. I now refer to them as "graphic formulas", writing down the equation. They are combined with what I call "written diagrams," which record the operation-equation and allow practitioners to work with equations numerically. In particular, Liu Yi uses these "graphic formulas" to state equations, to establish them and to prove the correctness of procedures solving them. Features like colours, which were used in relation to *The Nine Chapters*, are taken up in this context, but with new purposes, like expressing negative coefficients. The book also evidences other important transformations of the concept of equation.

Establishing the two facets of the equations in *The Nine Chapters* also allows us to perceive the dramatic shift, to which the 13th century *Sea Mirror of the Circle Measurement* attests. Now, as illustrated in Figure 4, the geometrical facet of the equation has been entirely erased, whereas work on the equation relies only on numerical inscriptions: its "operation" facet has been promoted to the fore and expanded. In correlation with these features, Li Ye now considers equations of any degree in addition to the fact that they can have positive and negative coefficients. The shift characterized by the disappearance of the diagrammatic aspect would have remained invisible, if its earlier significance had not been brought to light.

This richer account, which focuses not only on the concept of equation, but also on work practices with equations, reveals at least two traditions in China. Both traditions appear to be grounded in an approach to equations of the type illustrated by *The Nine Chapters*. In the first tradition, the concept of quadratic equation evidenced in *The Nine Chapters* is reworked, being reshaped and generalized with respect to its terms, while remaining in the same material and conceptual framework. By contrast, in the second tradition, the numerical facet of the operation-equation evidenced in *The Nine Chapters* is reworked anew, giving rise to a much more general, entirely numerical concept of equation, worked out only through written diagrams, while the diagrammatic facet disappears from the mathematical work. Bringing to light the existence of these two traditions in China helps us understand that the latter vanished, whereas in the 17th century only the former was still alive.

Let me sketch how I envisage that these conclusions might affect the comparison with Arabic sources.

To begin with, the analysis outlined above raises new comparative issues. The first tradition identified in China, characterized by its recourse to diagrammatic means to state and establish equations, now appears to present features similar to those we had observed in al-Khwarizmi's algebra. Our perception of these similarities derives from the fact that we now understand the means this tradition developed to state equations as equalities. However, whereas al-Khwarizmi stated, and worked on, equations as discursive statements, our new historical account reveals that in the context of *The Nine Chapters*, the equality that a quadratic equation states was formulated through, and reworked with, a "graphic formula." On the other hand, it now also appears that al-Khwarizmi and his followers, as well as Chinese authors working within this tradition, all gave rectangles decomposed into sub-rectangles a key role in their mathematical work with equations. Which consequences derive from the differences between the practices of stating equalities and working with them, or between the practices with rectangles? These are new questions awaiting research. In fact, a similar question arises for Liu Yi and Li Ye: their material inscriptions for dealing with equations differ. What are the consequences for the work on equations? One need not have sources in different languages for comparative method to be useful.

If we turn to al-Tusi's book, the issue of circulation is now seen in a different light. First, on the basis of this more detailed account, we see that none of the Chinese sources available to us attests to exactly, and only, the equation-operation, as it appears in Sharaf al-din al-Tusi's account. However, Tusi's numerical approach to the equation presents more important similarities with the first tradition in China. Did transmission occur? I don't know.

But if it did, the knowledge gained on the sources raises new questions. For example, how can we assume circulation occurred? Was it based on written documents, and in that case, on which type of documents? Or did it occur orally, and in that case, through which type of ephemera for the concrete engagement with inscriptions?

Finally, from a conceptual viewpoint, if transmission occurred in relation to this first tradition, it went along with a key transformation, since it elim-

inated the diagrammatic facet of the equation. This remark points to a general issue: the description of the transformations in the concepts of equation that might have been synthesized in that work appears to be a task as delicate as it is needed to gain a better understanding of the work required by the synthesis. Such are now newly open questions.

No definitive answer can be reached, except that Sharaf al-Din al-Tusi's book *On Equations* certainly encompasses approaches to equations that present both similarities and differences with distinct Chinese practices as well as with distinct traditions from the Arabic world. More importantly, however, the new account allows us to understand more clearly the non-uniformity of Chinese sources. Thanks to a comparative method, conducted on Chinese sources themselves, we now see different cultures and different concepts of equations in China, with overlaps and breaks. Perhaps overlaps and breaks, conceived in this broad way, might provide interesting tools to ponder, if we are to write a world history acknowledging similarities without denying differences, whether sources be written in the same or in different languages?

In conclusion, whether documents be written in Chinese or in Arabic, any two sets among them present a pattern of similarities and differences, both essential to better understand each document taken separately, from a conceptual viewpoint as well as from the viewpoint of the mathematical practice to which it adheres. The fact that Chinese documents appear connected through the overlaps they present is no smaller wonder than the fact that Chinese and Arabic documents show similarities. Perhaps the overlaps and breaks that a systematic practice of a comparative method reveals can help us understand how humanity is indeed piecewise connected while still showing local, very local, differences.

References

[1] Raina D, Habib SI, editors. Situating the history of science: Dialogues with Joseph Needham. New Delhi; New York: Oxford University Press; 1999. x, 358 p.

[2] Needham J. Science and civilisation in China. With the collaboration of Lu Gwei-djen. Vol. 5: Chemistry and chemical technology. Part II: Spagyrical discovery and invention: Magesteries of gold and immortality. Cambridge: Cambridge Univ. Press; 1974.

[3] Needham J. Science and civilisation in China. With the collaboration of Ho Ping-yü, and Lu Gwei-djen. Vol. 5: Chemistry and chemical technology. Part III: Spagyrical

discovery and invention: Historical survey, from cinnabar elixirs to synthetic insulin. Cambridge: Cambridge Univ. Press; 1976.

[4] Needham J. Science and civilisation in China. With the collaboration of Ho Ping-yü, Lu Gwei-djen, and a contribution by Nathan Sivin. Vol. 5: Chemistry and chemical technology. Part IV: Spagyrical discovery and invention: Apparatus, theories and gifts. Cambridge: Cambridge Univ. Press; 1980.

[5] Needham J. Science and civilisation in China. With the collaboration of Lu Gwei-djen. Vol. 5: Chemistry and chemical technology. Part V: Spagyrical discovery and invention: Physiological alchemy. Cambridge: Cambridge Univ. Press; 1983.

[6] Febvre L. Deux philosophies opportunistes de l'histoire: De Spengler à Toynbee. Revue de Métaphysique et de Morale. 1936;43(4):573-602.

[7] Febvre L. Combats pour l'histoire. Paris: Armand Colin; 1952 (1992).

[8] Blue G. Science(s), Civilization(s), Historie(s). In: Raina D., Habib S.I., editors. Situating the history of science: dialogues with Joseph Needham. New Delhi; New York: Oxford University Press; 1999. p. 29-72.

[9] Needham J. The Historian of science as Ecumenical Man: A Meditation in the Shingon Temple of Kongosammai-in on Koyasan. In: Nakayama S, Sivin N, editors. Chinese science. Explorations of an ancient tradition. Cambridge (UK): MIT Press; 1973. p. 1-8.

[10] Needham J. The Roles of Europe and China in the Evolution of Oecumenical Science. Journal of Asian History. 1967;1(1).

[11] Needham J. The Roles of Europe and China in the Evolution of Oecumenical Science. In: Needham J. Clerks and Craftsmen in China and the West: lectures and addresses on the history of science and technology Based largely on collaborative work with Wang Ling, Lu,Gwei-Djen, and Ho, Peng Yoke. Cambridge, UK: Cambridge University Press; 1970. p. 396-418.

[12] Needham J. Science and civilisation in China. With the collaboration of Wang Ling, and Lu Gwei-djen. Vol. 4: Physics and physical technology. Part III: Civil engineering and nautics. Cambridge (UK): Cambridge University Press; 1971.

[13] Needham J. Science and civilisation in China. With the collaboration of Wang Ling. Vol. 3: Mathematics and the sciences of heaven and earth. Cambridge (UK): Cambridge University Press; 1959.

[14] Ito K. In: Chemla K, Fox Keller E, editors. Cultures without culturalism in the making of scientific knowledge2014 (submitted).

[15] Keller A. Vedic Mathematics: Enjeux multiples de l'histoire des sciences en Inde. Actes du 1er Congrès Réseau Asie / Proceedings of the 1st Congress Réseau Asie-Asia Network 2003 24-25 sept. 2003; Paris: Réseau Asie.

[16] Petitjean P. Needham and UNESCO: perspectives and realizations. In: Petitjean P, Zharov V, Glaser G, Richardson J, de Padirac B, Archibald G, editors. Sixty Years of Sciences at Unesco, 1945-2005. Paris: UNESCO Publishing; 2006. p. 43-7.

[17] Petitjean P. The Birth of the "Scientific and Cultural History of Mankind" Project. In: Petitjean P, Zharov V, Glaser G, Richardson J, de Padirac B, Archibald G, editors. Sixty Years of Sciences at Unesco, 1945-2005. Paris: UNESCO Publishing; 2006. p. 85-8.

[18] Petitjean P, Domingues HMB. Le projet d'une *Histoire scientifique et culturelle de l'humanité*: 1947-1950: quand l'Unesco a cherché à se démarquer des histoires européocentristes. 2007. See the preprint at http://halshs.archives-ouvertes.fr/docs/00/16/63/55/PDF/Unesco_et_histoire_de_l_humanite_juillet07.pdf

[19] Febvre L. Rapport de M. Lucien Febvre devant le Conseil International de la Philosophie et des Sciences Humaines. Mai 1949/Report of Prof. Lucien Febvre to the International Council for Philosophy and Social Sciences. May 1949. Cahiers d'Histoire Mondiale. 1953;1:954-61.

[20] Crouzet D, Crouzet-Pavan E. Postface. In: Crouzet D, Crouzet E, editors. Lucien Febvre, François Crouzet Nous sommes des sang-mêlés Manuel d'histoire de la civilisation française. Paris: Albin Michel; 2012. p. 295-392.

[21] Crouzet D, Crouzet E, editors. Lucien Febvre, François Crouzet. Nous sommes des sang-mêlés. Manuel d'histoire de la civilisation française. Paris: Albin Michel; 2012.

[22] Chemla K. De la synthèse comme moment dans l'histoire des mathématiques. Diogène. 1992;160:97-114.

[23] Chemla K. Similarities between Chinese and Arabic mathematical writings. I. Root extraction. Arabic Sciences and Philosophy 1994;4(2):207-66.

[24] Chemla K. Different concepts of equations in *The nine chapters on mathematical procedures* and in the commentary on it by Liu Hui (3rd century). Historia Scientiarum (2). 1994;4(2):113-37.

[25] Chemla K. Les problèmes comme champ d'interprétation des algorithmes dans les *Neuf chapitres sur les procédures mathématiques* et leurs commentaires. De la résolution des systèmes d'équations linéaires. Oriens Occidens. 2000 (3):189-234.

[26] Chemla K. Algebraic Equations East and West until the Middle Ages In: Hashimoto K, Jami C, Skar L, editors. East Asian science: tradition and beyond: Papers from the Seventh International Conference on the History of Science in East Asia, Kyoto, 2-7 August 1993. Osaka: Kansai University Press; 1995. p. 83-9.

[27] Chemla K, GUO S. *Les neuf chapitres. Le Classique mathématique de la Chine ancienne et ses commentaires*. Paris: Dunod; 2004. 1140 p.

[28] Rashed R. Al-Khwarizmi. The Beginnings of Algebra. Edited, with translation and commentary by Roshdi Rashed. London & Beirut: Saqi; 2009.

[29] Rashed R, Vahabzadeh B. Omar Khayyam, the mathematician. New York & Winona Lake, Ind.: Bibliotheca Persica Press; Distributed by Eisenbrauns; 2000. x, 268 p.

[30] Rashed R. Sharaf Al-Din Al-Tusi / al-Muẓaffar ibn Muḥammad Ṭūsī. Œuvres Mathématiques. Paris: Les Belles Lettres; 1986.

[31] Rashed R. Résolution des équations numériques et algèbre: Sharaf-al-Din al Tusi, Viète. Archive for History of Exact Sciences. 1974;12:244-90.

[32] Chemla K. Mathématiques et culture. Une approche appuyée sur les sources chinoises les plus anciennes (revised version of "Matematica e cultura nella Cina antica", translated by Delphine Vernerey). In: Bartocci C, Odifreddi P, editors. La mathématique 1 Les lieux et les temps. Paris: Editions du CNRS; 2009. p. 103-52.

[33] Chemla K. 從古代中國數學的觀點探討知識論文化 (*cong gudai Zhongguo shuxue de guandian tantao zhishilun wenhua*) (An approach to epistemological cultures from the vantage point of some mathematics of ancient China). In: 祝平一 Chu Pingyi,

editor. 中國史新論科技史分冊：科技與中國社會 (Zhongguo shi xinlun kejishi fence: Keji yu zhongguo shehui) (New views on Chinese history Volume on the History of Science and Technology: Science, technology and Chinese society) (in Chinese), volume assembled for the eightiest anniversary of the Institute of History and Philology, Academia Sinica, Taiwan. Taipei 台北: 聯經出版社 Lianjing Publisher; 2010. p. 181-270.

[34] Pollet C. Comparison of Algebraic Practices in Medieval China and India [Ph.D. thesis]. Paris/Taipei: University Paris Diderot/National Taiwan Normal University; 2012.

[35] Horiuchi A. La notion de *yanduan:* quelques réflexions sur les méthodes "algébriques" de résolution de problèmes en Chine aux Xe et XIe siècles. Oriens-Occidens. 2000;3:235-58.

SARTON MEDAL LECTURES

Laudatio H. Lück

R. Opsommer

It is a great honour for me, to introduce Prof. Dr. Heiner Lück, who will receive the Georges Sarton-medal. Heiner Lück was born in 1954 in Nauendorf near Halle an der Saale in what was then the German Democratic Republic. He studied at the gymnasium in Brandenburg and later at the Martin-Luther-University Halle-Wittenberg. In 1983 he obtained his Dr. iur. with a study on the judicial praxis of the Wittenberg law school during the 16th, 17th and 18th centuries. Immediately after, he became an assistant at his alma mater, where in 1988, he obtained his habilitation with a magistral study concerning the legal system in the Electorate of Saxony during the early modern era.

Shortly afterwards, the 1989 unexpected political events forced Heiner Lück to complete an extra study of (West-)german civil law at Giessen University in 1993. In the aftermath of 1989, the years of transition within Germany certainly were not easy for academics with a GDR background. Still, Heiner Lück managed well and was invited to teach at the universities of Greifswald, Zürich and Passau.

Since his early years as an assistant, our colleague showed a remarkable interest for the regional and local legal history of his native nowadays Saxony and Saxony-Anhalt. Therefore it was not a total surprise that in 1994 he became a professor for civil law and for European and German legal history at Halle-Wittenberg University. Contrary to much of his German colleagues, he remained, as if he were a loyal vassal of medieval times, faithful to this university which gave him so many opportunities and which is in fact the most important university (over 20.000 students) of this in Belgium rather unknown German state ("Bundesland") of Saxony-

Anhalt. Heiner Lück is also a member of the Saxonian Academy for Sciences in Leipzig.

As I already mentioned, Heiner Lück teaches German civil law, so he has published some articles on this topic. However the regional legal history in all its aspects (legislation, jurisdiction, customary law, doctrine) was, is and probably always will be his main research item and favorite teaching topic. In all, the total number of articles which he published amounts to over 200. He published nine books and was the editor of another 31 books on the laws of Magdeburg, the laws of the Electorate of Saxony, the history of the universities of Halle and Wittenberg and, most of all, the Saxon Mirror ("Sachsenspiegel").

The Saxon Mirror or survey of Saxonian law, was written around 1220 by Eike von Repgow. It's Germany's most important law book and legal code during the middle ages. Its author originated from the present-day Reppichau, now a small village in Saxony-Anhalt.

In his work, Lück not only tries to serve the academic world but also has an eye for the common people of his native soil. He has published a lot of articles in journals of regional history in Saxony and Saxony-Anhalt and by doing so, he has popularized legal and institutional history to a great extent. Let it be remarked that he even published on the new flag and on the history of the coat of arms of present-day Saxony-Anhalt. And, thanks to him, the citizens of Reppichau even have decorated the outer walls of their homes with paintings copying the miniatures in the medieval manuscripts of the Saxon Mirror, thus turning their village into a monument of the Saxon Mirror.

It is obvious that Heiner Lück is convinced that regional legal history serves both European and local legal history. I won't go into detail on all of his publications. As a pars pro toto I refer to works such as "Über den Sachsenspiegel" (1999, later various reprints), "Wittenberg, ein Zentrum europäischer Rechtsgeschichte" (2006) or his numerous articles in the prestigious "Handwörterbuch zur deutschen Rechtsgeschichte". However his legal history researches are not strictly limited to the ancien régime as can be seen in his study on the commemoration of 150 years law school of the Halle-Wittenberg University (2005). He even did not avoid the more difficult parts of the German history, as can be seen in a separate study of the same law school during the Nazi regime (2011).

Today, Heiner Lück will focus on the question whether the settlers out of the county of Flanders also imported some of their customary law into the Fläming, a region on the border of Saxony-Anhalt and Brandenburg where a lot of Flemings settled during the middle ages. In earlier studies he already proved the enormously important influence of the Saxonian and Magdeburg laws in Eastern Europe. A lot of these conclusions were published in Poland, Hungary and the Czech Republic. He even has a 2007 Polish article on his publication list. This mixed regional/European concept of his research brought him in 2007 to the European capital. At the Representation of the State of Saxony-Anhalt to the E.U. in Brussels, he organized the exhibition "Saxon Mirror and Magdeburg law as a basis for Europe". In paralell with this exhibition and together with three Flemish legal historians (including our Ghent colleague Dirk Heirbaut), an international colloquium on medieval legal history took place. The proceedings were published in the famous Iuris Scripta Historica series of the Royal Flemish Academy of Belgium for Science and Arts.

As we can notice, our colleague Lück has a lot of similarities with the famous legal historians of our own university such as François Ganshof, Raoul Van Caenegem or Dirk Heirbaut. These erudites studied the medieval criminal and feudal law of the former county of Flanders. They were convinced that comparative legal history is only possible when there are enough regional studies at hand. What our Ghent colleagues achieved for Flanders, Heiner Lück did brilliantly for Saxony and Saxony-Anhalt.

I would like to end with another European reflection. In 2014 it will be a quarter of a century since the iron curtain was opened and Germany was able to achieve its peaceful reunification. This gave academics all over Central- and Eastern-Europe new possibilities. Heiner Lück is a living testimony of this rebirth of a unified European legal history or ius commune. I am sure that George Sarton would be delighted to see that nowadays all over Europe academics can jointly explore the history of various fields of science. Let us hope that Heiner Lück will continue his regional research on Saxony-Anhalt, hence contributing to the broader knowledge of European legal history.

Select bibliography

[1] Heiner Lück, *Die kursächsische Gerichtsverfassung 1423-1550*, (Forschungen zur deutschen Rechtsgeschichte 17), Cologne-Weimar-Vienna, 1997.

[2] Heiner Lück, Heiner Schnelling and Karl-Ernst Wehnert (eds.), *150 Jahre Juristische Seminar der Martin-Luther-Universität Halle-Wittenberg*, Dößel, 2005.

[3] Heiner Lück and Ernst Eichler (eds.), *Rechts- und Sprachtransfer in Mittel- und Osteuropa. Sachsenspiegel und Magdeburger Recht*, (Ius saxonico-maidebvurgense in oriente 1), Berlin, 2008.

[4] Heiner Lück and Armin Höland (eds.), *Die Rechts- und Staatswissenschaftliche Fakultät der Martin-Luther-Universität Halle-Wittenberg im Nationalsozialismus*, (Hallesche Schriften zum Recht 29), Halle an der Saale, 2011.

[5] Heiner Lück, 'Die europäische Dimension des Sachsenspiegels' in Dirk Heirbaut, Alain Wijffels and Jos Monballyu (eds.), *Sachsenspiegel in Brüssel*, (Iuris Scripta Historica 24), Brussels, 2011, 21-26.

[6] Heiner Lück, *Über den Sachsenspiegel*, 3rd revised edition, Wettin-Löbejün-Dößel, 2013.

Flemish settlements in Central Germany and their law during the Middle Ages

Heiner Lück

I. Introduction

Between Wittenberg, the starting point of the Lutheran Reformation, and the southern border of Berlin, today's capital of the Federal Republic of Germany, there is a flat mountain ridge on the north-eastern side of the river Elbe whose popular name "Fläming" is a constant reminder of the settlement by Flemish colonists in the High Middle Ages. A roadhouse and several signs along the highly frequented motorway A9 from Berlin to Munich draw the traveller's attention to that interesting name as well as to the cultural and natural sights of that old area. Through a vivid tradition and diligently organized events linked to that topic, the connection to the settlement processes during the High Middle Ages is pointed out. These efforts reached their climax in the spring of 2009 when the animal drawn vehicle called "Titans on Tour", which had started in May in Bruges, arrived in Brück/Fläming (Federal State Brandenburg) in June after having covered 1.300 km. This event with a huge public appeal reminded of the start of the Flemish and Dutch settlement of the "Fläming" 850 years ago, which is ascribed to a "call" in 1159 by the Margrave of Brandenburg, Albert the Bear (*Albrecht der Bär*, †1170). Similar steps had already been taken by Wichmann, the energetic archbishop of Magdeburg (1152-1192). The testimony, which is generally regarded as the starting point of the Dutch colonization under the influence of the Brandenburgian margrave, is not evidenced by documents. The chronicler Helmold of Bosau (ca. 1120-after

1177) instead mentions the following in his Chronicle of Slavs ("*Slawenchronik*", 1167-1172). In chapter 89 he tells about the move of Dutch and Flemish people, who left their original home areas at the North Sea in order to find a new economic and social existence in the territories, where originally the Slavs lived. Helmold points out, that the contribution of the Flemish and Dutch immigrants to the consolidation of the Christian religion in these regions was enormous:

> *In tempore illo orientalem Slaviam tenebat Adelbertus marchio, cui cognomen Ursus, qui etiam propicio sibi Deo amplissime prosperatus est in funiculo sortis suae. Omnem enim terram Brizanorum, Stoderanorum multarumque gentium habitantium iuxta Habelam et Albiam misit sub iugum et infrenavit rebelles eorum. Ad ultimum deficientibus sensim Slavis misit Traiectum et ad loca Reno contigua, insuper ad eos qui habitant iuxta occeanum et patiebantur vim maris, videlicet Hollandros, Selandros, Flandros, et adduxit ex eis populum multum nimis et habitare eos fecit in urbibus et oppidis Slavorum. Et confortatus est vehementer ad introitum advenarum episcopatus Brandenburgensis necnon Havelbergensis, eo quod multiplicarentur ecclesiae, et decimarum succresceret ingens possessio. Sed et australe litus Albiae ipso tempore ceperunt incolere Hollandrenses advenae; ab urbe Saltvedele omnem terram palustrem atque campestrem, terram ..., civitates et oppida ... ... et venerunt adducti de finibus occeani populi fortes et innumerabiles et obtinuerunt terminos Slavorum et edificaverunt civitates et ecclesias et increverunt diviciis super omnem estimacionem."*[1]

From the legal history of the Middle Ages, it is sufficiently known that the settlers, who did certainly not only come from the Netherlands and did not only come to the "*Fläming*", brought their own law with them. It was a special law only applicable to that particular section of the population. They were often privileged by that law in their new home, and were not subject to the law applicable for the other groups. In the light of the recent and increasing attention paid to the German legal history in its European context,[2] it is striking that the influences of the Dutch and Flemish colonization have only been mentioned by legal history researchers in Germany.

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1 Stoob (1990), pp. 312/314.
2 HRG 1 (2008), pp. I-II.

Moreover, reviewing the most important journal[3] has hardly brought any results. The first edition of the notable standard reference "*Handwörterbuch zur deutschen Rechtsgeschichte*" (*HRG*) published between 1971 and 1998[4] also hardly offers any insights, except for some commonplaces.[5] Furthermore, in the homelands of the former settlers, for example in today's Netherlands, there are no recent legal history studies covering this topic.[6] Historians on the other hand, especially from the perspective of regional history, have steadily discussed the settlement processes during the High and Late Middle Ages.[7]

Against this background, Dirk Heirbaut from Ghent-University and the speaker have drawn the attention to that interesting and certainly not unknown phenomenon in a short article named "*Flämisches Recht*" in the first volume of the new edition of the "HRG".[8] The bases of the article are, next to Heirbaut's longstanding and extensive studies concerning Flemish law, my own studies regarding the influences of the Flemish legal culture in Central Germany, which are about to be introduced to a larger circle of legal historians at this point. They mainly originated from the investigation of the medieval and early modern judiciary and lawbooks.

The judiciary is particularly suitable for the search of links to Flemish or other legally relevant influences, because it is hardly understandable without taking care of the settlement history.[9] Indications are offered by law codes, because they were probably written to establish clarity about the mixture of population and law which was caused by the colonization. Most likely, this applies to the Saxon Mirror ("*Sachsenspiegel*") which was written by *Eike von Repgow* (ca. 1180-ca. 1235) between 1220 and 1235 in the Eastern foreland of the Harz-Mountains.[10] His provisions concerning the foundation of new villages "on the ground of wild roots" in Land-law III, 79, even seem to provide the legal framework in which the colonization processes had been taking place. The English translation of this important article by Maria Dobozy (1999) reads:

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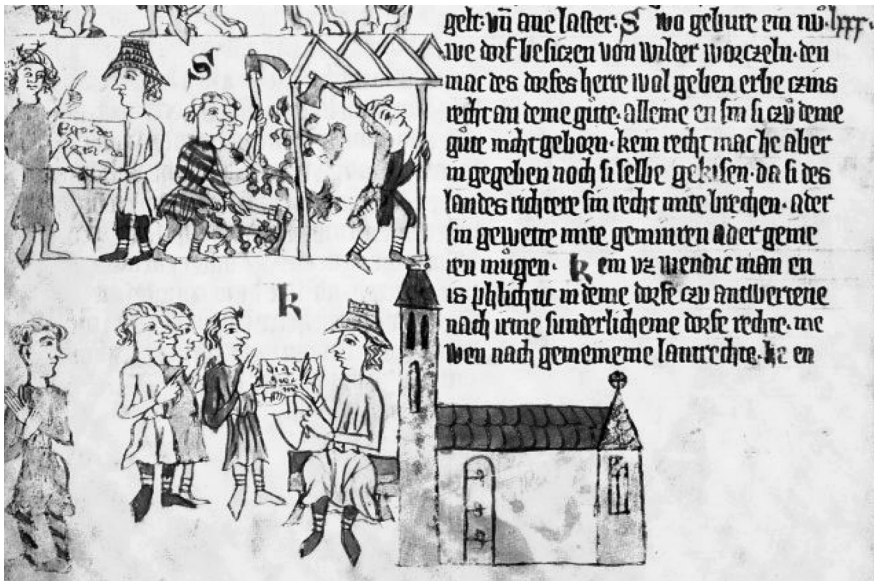
3 Zeitschrift der Savigny-Stiftung für Rechtsgeschichte, Germanistische Abteilung (until 2013 130 Vol.).
4 HRG (1971-1998).
5 Kellenbenz/Philipp (1978); Henning (1978); Schulze (1971).
6 Winter (1953).
7 Schlesinger (1975a); Bünz (2008a); Bünz (2008b).
8 Heirbaut/Lück (2008).
9 Lück (2012a); Lück (1997a), pp. 1 seqq.
10 Lück (2013).

> "When peasants clear land of wild roots [and lay out] a village, the lord of the village may give them the right of inheritance even though they were not born to it. However; he may not give them a privilege, nor may they themselves establish a privilege that would restrict the right of the territorial judge or enable them to reduce or increase his court fine. No outsider is required to answer in the village according to the particular laws of that village, but he must answer according to the general law of the territory unless he brings a suit to claim inheritance of land or property or a debt. … The place where a person brings a complaint is the place where he must also respond to complaints when they are brought against him except for a trial by combat."[11]
>
> *"Swar gebure en nie dorp besettet van wilder wortelen, den mach des dorpes herre wol geven ervetinsrecht an deme gude, al ne sin se to deme gude nicht geboren. Nen recht ne mach he aver ene geven, noch se selven kesen, dar se des landes richtere sin recht mede krenken oder sin gewedde mede minneren oder meren mogen. Nen utwendich man n'is ok plichtich in deme dorpe to antwardene na erme sunderlekeme dorprechte, mer na gemeneme lantrechte, he ne klage dar op erve oder oppe gut oder umme scult. Swar de man klaget, dar mut he antwarden, of men op ene klaget, ane to kampe wart."*[12]

The illustrated manuscripts of the Saxon Mirror, made in the 14th century[13], contain illustrations **(fig. 1)**: The Heidelberg manuscript (ca. 1300) shows (fol. 26v/4) two peasants clearing "wild roots" with two hoes while another peasant is building a house with an axe.[14] To the left of the group, you can see a landlord (with green robe and floral crown = *Schapel*) who hands a document with a triangular seal over to the village headman (*Bauermeister*; recognisable thanks to his straw hat)[15]. With his left forefinger the landlord implies that the village headman and his community will have to follow the law laid down by the document. The text[16] next to the illustration explains

11 Dobozy (1999), p. 137.
12 Eckhardt 1973, p. 262.
13 Lück (2013), pp. 35-37.
14 Koschorreck (1989).
15 Lück (2008a).
16 "Swo gebure ein nvwe dorf besiczen von wilder worczeln, den mac des dorfes herre wol geben erbe czins recht an deme gute, alleine en sin si czv deme gute nicht geborn. kein recht mac he aber in gegeben noch si selbe gekisen, da si des landes richtere sin recht mite brechen ader sin gewette mite geminren ader gemeren mugen" (Koschorreck [1989], p. 221).

Fig. 1: H fol. 26v / 4-5 (Universitätsbibliothek Heidelberg, Cod. Pal. Germ. 164).

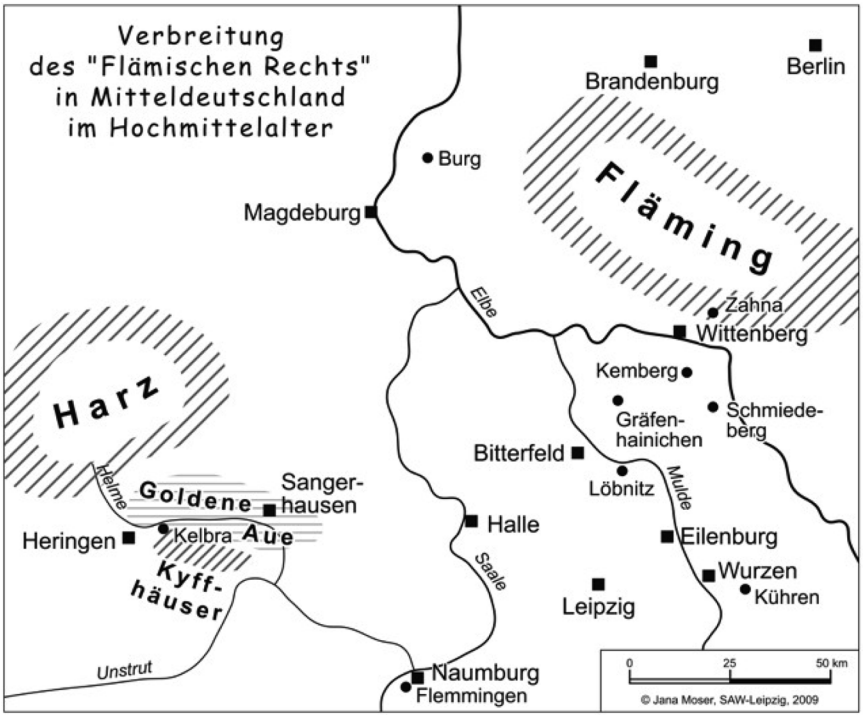


that the lord of the village (*Dorfherr*) can give fields, with the right of inheritance, to the peasants for rent.[17] But he cannot give special 'vests' to them; the village commune is also not allowed to give special 'vests' (privileges) to itself, because this would limit the judge's rights. It seems as if *Eike von Repgow* has recorded a concept here from which he knew that it was not in accordance with the reality in his home.[18] Already the picture which is located below the Heidelberger manuscript illustrates the characteristic content of such documents (fol. 26v/5): The village headman is sitting in front of a church holding the court assembly, where the village's special rights have definitely been applied. One of the three neighbours (*Dorfgenossen*) holds the document in hand as a symbol for the documented village law between himself and the village headman. Leftmost, there is another male person, who shows his refusal by folding his arms. The accompanying text[19] explains that no outsider is obliged to follow the

17 Neschwara (2008).
18 Hoppe/Stock (2002).
19 "Kein vz wendic man en is phlichtic in deme dorfe czv antwertene nach irme sunderlicheme dorfe rechte me wen nach gemeineme lantrechte, he en clage da uf erbe ader uf gut ader vmme schult" (Koschorreck [1989], pp. 221/223).

special village law. Instead, he is subjected to common territorial law. If these rules have been followed cannot be proven because sources are lacking. However, the extant settlement documents offer some reference points. Unfortunately, there are no such documents in connection with the well-known "*Fläming*". Nevertheless, one can find several Dutch and Flemish settlement areas in Central Germany, meaning Saxony, Saxony-Anhalt and Thuringia, which are very well documented. All of those areas are located in the territory of the Saxon Mirror. Because of documents and/or other evidence, they count as having Flemish influences.

Fig. 2: Flemish settlements in Central Germany. Jana Moser. Sächsische Akademie der Wissenschaften zu Leipzig.



We talk about the areas around Magdeburg, Burg (near Magdeburg) and Wittenberg and surroundings, the villages Flemmingen near Naumburg, Kühren near Leipzig and Löbnitz near Halle as well as the Golden Meadow (*Goldene Aue*) below the Kyffhäuser mountains (**fig. 2**). This is a

geographical frame which, however, cannot be complete. The legal aspects of Dutch and Flemish colonization expressed in the respective sources will be shown in this paper in the four mentioned areas. In doing so, the main focus will be on certain legal institutions. Jurisprudence defines legal institutions as precisely fixed and generally accepted legal structures like contracts, purchase or marriage. But, institutions and principles whose purpose is to serve the more or less conflict-laden legal life also count as legal institutions: courts, jurisdiction (*Gerichtsherrschaft*), judges, certain proecedural principles (*Verfahrensgrundsätze*) and so on. Legal institutions have always been used by various legal entities and legal personalities in antiquity, in the Middle Ages and in modern times to scale legal coexistence as a reaction to the past and as a guideline for the future. Those guidelines are either generally binding (absolutely) or they are only effective between two affiliates (relatively). German philology, especially represented by the scholars Karl Bischoff (1905-1983), Max Bathe (1904-1978) and Hermann Teuchert (1880-1972),[20] has repeatedly written about the legal language tradition of Flemish provenance, when it could be found in the sources. Legal language here means the language of legal life in a very broad sense. Although it is different from the common language, both of them overlap in many respects. The close connection to the already mentioned legal institutions is that they are described with terms from the legal language. Thus, in the context of the following presentation, legal institutions and legal language go hand in hand. Flemish/Dutch linguistic remnants in the area studied have been made clear in the course of the examination of a remarkable amount of sources.[21] Due to the focus on the legal language, the amount of possible words decreases tremendously.[22] Ruth Schmidt-Wiegand has pointed out that the older legal language often has a close connection to legal customs.[23] Therefore, certain customs of legal life will be explained in detail when necessary. Eventually, the results will be summarized. Now let us have a detailed look on the Flemish settlements in the area around Magdeburg, the old imperial and ecclesiastical centre in the troubled East of the Sacrum Romanum Imperium.

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20 Cf. Wenner (2004).

21 Bischoff (1954), (1966), (1967); Frings/Lerchner (1966); Karg (1933); Stellmacher (1973), (1990); Teuchert (1944).

22 "Maten", "Tie", "dikmester", "wetebuch", "schulte" (Bischoff [1954], pp. 16, 19, 23, 26, 30 seqq.); "vierschar" (Bischoff [1967], pp. 180 seqq.), "dik" (Bischoff [1972], p. 359).

23 Schmidt-Wiegand (1990), p. 345.

II. Area around Magdeburg

The vivid settlement in the area around Burg near Magdeburg, east of the river Elbe, has mainly been motivated by Archbishop Wichmann. Wichmann can be regarded as a promoter of colonization in general.[24] Already the earliest preserved document,[25] which shows Wichmann as archbishop[26] for new settlers, belongs to that context. We refer to the often quoted document from 1159 by which Wichmann transferred certain rights for new settlers to a man with the name *Heribertus* in the village Pechoe (= *Pechau*)[27]. The document's words have seemingly reinforced a contract between Wichmann and Heribert. The contribution was made…

> *cum omnibus ad eam pertinentibus agris, pratis, silvis et stagnis ad excolendum et fructificandum.*

It is remarkable that the new inhabitants of the already existing village were supposed to live according to a special law. Wichmann has granted…

> *iusticiam, quam ius Burgense vocant, in omnibus suis [sic! H. L.] et negociis.*

The reason for granting the *ius Burgense*, meaning the law of the small town Burg near Magdeburg (located between Magdeburg and Berlin), to the settlers is not definitely known. It is possible that it fit local conditions and enabled an adjustment of the actual and legal conditions of the new settlement to the environs with Burg as its centre.[28] Moreover, the document says that the locator (*Lokator*) – that means the operator of settling – received six hides as a heritable fief for his work.[29] The village church has been furnished with one hide. In addition, Wichmann has assured the new settlers that there will be no further transfer (*verleihen)* of the village which has probably meant a certain degree of legal security. Moreover, the settlers were allowed to possess free property on the basis of the right of inheritance for a tax (*Erbzinsrecht*). The document included the huge advantage

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24 Springer (1992), pp. 12 seqq.
25 Israël/Möllenberg (1937), no. 299.
26 There is a document by Wichmann as bishop of Naumburg for settlers near Naumburg from 1152 (Posse [1889], no. 240 = Rosenfeld [1925], no. 210).
27 12 km south-east from Magdeburg (Römer [1987a]).
28 Schwineköper (1987b).
29 Henning (1984).

that the settlers were to be freed of a rent named "*burgwere*" for the span of ten years. Already, the example of Pechau has shown that the located peasants as well as their locator were excluded from the general judiciary of the surrounding area:

> *Similiter statui, ut neque comes neque advocatus aliquis quidquam iuris ibi habeat…*

Consequently, the administration of justice has been transferred to the locator who was supposed to judge the colonists' disputes, the jurisdiction over the other villagers remaining in the hands of the archbishop. This is shown by the distribution of the money which had to be paid to the representatives of the jurisdiction: the locator received one third, whereas the 'lord of the court' got two thirds.[30]

The relatively autonomous administration of justice of the new settlers had considerable advantages. They included the waiver from the duty to appear in court (*Dingpflicht*) in relation to the court of the prince (*Landesherr*) through avoidance of absenteeism. The events around Pechau partly correspond with the earlier mentioned rules of the Saxon Mirror. It may not be a village "from wild roots", because it already existed. Yet, the prince (Archbishop Wichmann) has handed a document to a locator (Heribert) by which a privilege for the new settlers is laid down through transmission of the right of Burg within the boundaries of the village. Furthermore, the document contains special regulations about the organization and structure of courts, which include a relatively autonomous jurisdiction for Heribert (to whom the document does not give a special title) and his fellows. The document already envisages the foundation of further villages for which similar conditions could be expected. It applies to the settling of colonists on the deserted march *Poppendorf*[31] by Werner of Paderborn and a certain Gottfried. Another document, which was also issued by Wichmann in 1164,[32] mainly concerns the judiciary, besides the usual declarations. It has expressly been the right of the mentioned Werner to judge the colonists. No other secular legal power was supposed to have access to the settlers' community. In a more specific document from 1166[33], Wichmann

30 Lück (1997a), pp. 159-160.
31 In the east of Magdeburg.
32 Israël/Möllenberg (1937), no. 310.
33 Israël/Möllenberg (1937), no. 321.

confirms leaving the village Cracau[34] near Magdeburg in 1158 to the locators Burchard and Symon. Its residents should get

> *in omnibus causis ac negociis sive plantis suis iusticiam et consuetudinem seu plebiscita Hollandiensium.*

Furthermore, they should pay "iure Hollandiensium" 12 pence per year and the tithe for each hide.

In contrast to the example of Pechau, the connection to the settlers' origin is implied expressis verbis. Besides the fact that Cracau is not a village "from wild roots" ("*aus wilder Wurzel*") either, the document's content resembles the general regulations of the Saxon Mirror. A further document of location (*Lokationsurkunde*), which Wichmann has issued for settlers in (Groß-)Wusterwitz in 1159, also refers to the area around Burg.[35] It determines that a certain Heinrich and the other "Flamingi" should live as settlers in (Groß-)Wusterwitz[36] according to the law of Schartau[37], a little town near Burg (today a part of the city Burg):

> *ut per omnia et in omnibus eam habeant iusticiam, que* [sic! H. L.] *Scartoensis appellatur*

The locator Heinrich does not get a special official title in the document either. But the issue, the year, the structure and the closeness of Schartau to Burg as well as the designation of a law with its name show a connection to the document of Pechau. Close connections to Burg have already been established in the Pechau document, which refers to the *ius Burgense* and the (Groß-) Wusterwitz document which mentions the geographical origin of the Schartau law. Now, we will focus on the conditions in Burg itself**.**

Unfortunately, a charter of foundation for Burg is not be preserved, although there is interesting documentary evidence which hints at an early settlement of Burg by immigrants from Flanders and Brabant.[38] A document by Archbishop Wichmann 1179 addressed to merchants of Burg names among the witnesses four *cives de Borch*: *Wilhelmus Flaminger*,

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34 Today a part of Magdeburg.
35 Israël/Möllenberg (1937), no. 300.
36 Ca. 12 km in the south-west of Brandenburg/Havel. Cf. Römer (1987b).
37 Ca. 5 km west of Burg. Cf. Schlesinger (1960/1961), pp. 278-279.
38 Israël/Möllenberg (1937), no. 362; Schwineköper (1987b), p. 60.

Giselbrecht de Thiest[39], *Lambrecht de Louene*[40] and *Reinerus de Brosle*[41]. Admittedly, the scarce sources only allow speculation about the validity of a special law characterized by Flemish influences.

However, with the help of an important source, the speculation can be proven for the area around Burg, whose foundation occured due to the legal changes during the colonization. We refer to the Burg Land Law (*Burger Landrecht*) from the late 13th or, more likely, early 14th century.[42] As with any other law book, one can assume that legal customs described in the Burg Land Law had already been practiced long before they were written down.[43] It has to be kept in mind that the new settlers in Pechau (1159) should live according to the *ius Burgense* and those in (Groß-)Wusterwitz (1159) according to the *iustitia Scartoensis*. The words of the Burg Land Law are delivered in a single manuscript in quarto in the municipal archive of Burg which contains the Burg Land Law.[44] It is no new fact that the Burg Land Law contains dictates of justice which differ from those in the dominating Saxon Mirror.[45] The best known is the right of 'halving' in case of inheritance (in German the so called *Halbteilungsrecht*) – one half to the widow, the other half to children – which is largely accepted as an indicator for Flemish legal influence.[46] It is clearly enshrined in the Burg Land Law.[47] Apart from that, a verdict of 1539 by the Madgeburg bench of aldormen, the ultimate authority regarding the interpretation and application of Saxon law[48], clarifies that *Halbteilungsrecht* is a Flemish custom.[49] There are several more indications from the 16th century,[50] as, possibly, the rules on administration of justice serve as further evidence.[51] According to the Burg Land Law, the central court was the court of the archiepiscopal advocate or governor (*Landvogt*), because he held the court assemblies in

39 Diest in Southern Brabant.
40 Leuven.
41 Bruxelles.
42 Zimmer (2003), (2008).
43 Kannowski (2008).
44 Fol. 65v-70v. Cf. Oppitz (1990), no. 334.
45 Buchda (1940), p. 378.
46 Schröder/Künßberg (1932), p. 812.
47 "Kumpt eyn knecht unde eyn maget tu samen, dat gud is half unde half; stervet dy knecht ane erve, dat gut is half der frowen unde half der frund" (fol. 65v in the attachment Zimmer [2003]).
48 Cf. Meuten (2000).
49 Kamptz (1826), pp. 313-314; Bischoff (1967), pp. 182-183.
50 Bischoff (1967), pp. 182-183.
51 Zimmer (2003), pp. 115 seqq.

front of the city. It was a princely archiepiscopal land court with higher jurisdiction.

It had to be announced by the judge three days in advance. The court possibly has been responsible for all neighbours who have been living according to Burg Land Law. They had to fulfil the duty of participation in the sessions of the territorial court. In case they did not do so, they lost three shillings to the court, unless they could name a legally recognized reason for their absence.[52] Next to the advocate, the court consisted of three aldormen (judgment finders / *Schöffen*) and the spokesman (*Fürsprecher, Vorsprecher*).[53] The judge commanded the aldormen to take a seat on the bench three times. If one of them did not follow that order, he had to pay a court fine (*Gewette*) to the judge. When an aldorman could not give the required verdict, the judge was allowed to follow the archbishop as the lord of the court (*Gerichtsherr*). This reminds us of the relatively autonomous judiciary in the settlers' communities. To get a verdict elsewhere should be an exception. The advocate's task was to talk on behalf of the parties in court. The appeal procedure (*Urteilsschelte*)[54] is extensively explained, but it will not be taken into consideration here.

A lot of rules correspond to those of the Saxon Mirror and those of Magdeburg municipal law. But there is a difference: there are variants between the court of the advocate outside the city gates and the regulation about getting the verdict in the so called *heren kameren* in Magdeburg. The reasons and the classification of those differences are unclear.[55] The words "*heren kameren*" could mean a central princely court at the seat (chamber) of the archbishop in Magdeburg.

Apart from that, the judiciary described in the Burg Land Law does hardly show any differences from that of the surrounding areas. The same is true for the penal and criminal procedural parts of the Burg Land Law.

For the judiciary, it means that the Burg Land Law is not reminiscent of a special Flemish law of the settlers. The results of the linguistic analysis of the Burg Land Law by Karl Bischoff are also slim.[56] While he could detect

52 Schmidt-Wiegand (2008).
53 Oestmann (2008).
54 Kaufmann (1998).
55 Court sessions in front of the walls and behind the walls were usual in Halle too. Cf. Lück (1997b), p. 70.
56 Bischoff (1972), pp. 364, 366-367, 369-370.

traces of a common language of Dutch provenance, there were no legal terms (except for "*scultetus*" / *Schulte / Schultheiß*)[57].

III. Area around Wittenberg (Southern Fläming)

Another typical area of Flemish settlement is the Fläming[58] which has been introduced at the beginning. Its southern periphery around Wittenberg[59] will be our next focus. Because location documents are lacking[60] we have to depend on other sources. Apart from the report by Helmold of Bosau which says that there have been settlers of Dutch origin below the Wittenberg river bend of the Elbe,[61] several names of fields, rivers, villages and towns allude to influences of Flemish or Dutch provenance.[62] A prominent example for that is the name of the little town Kemberg near Wittenberg.[63]

Noteworthy records which are similar to the Burg Land Law do not exist. But while reconstructing the judiciary within the area of the old Wittenberg Land court, one can still detect aftermaths of Flemish settlement in the 16th century, at least concerning the distinction of the spatial responsibilities of the office holders. So, it is far from pointless to take a look at the Wittenberg Land court in the early 16th century.[64] In the Electoral Saxon department of Wittenberg, there have been five districts of territorial courts around 1500. The river Elbe was the natural border between the "Maedow" ("Aue") (or the "Kemberg district" /"Kemberger Pflege") and the "Fläming" (or the "Wittenberg district" / "Wittenberger Pflege") as well as the "Zahnaer Pflege". The "Aue" comprises two smaller, i.e. subordinated, Land court districts. Both of them have been located in Kemberg.[65] It met once a year after 'Johanni' (24th of June). The court has also been referred to as "German court" / "Dewitzsche Gericht". It was responsible for fifteen villages and abandoned (deserted) villages. The judge of the village Merk-

57 Bischoff (1972), p. 370.
58 Cf. Geisthardt (1995).
59 Cf. Vercruysse (2002).
60 Beck (2000), p. 65.
61 "Sed et australe litus Albiae ipso tempore ceperunt incolere Hollandenses [sic! H. L.] advena" (Stoob [1990], p. 312).
62 Bily (1996), p. 11; Beck (2000), pp. 66 seqq.; Zschieschang (2003), passim.
63 Kemberg (Kamerijk, Cambrai): Bily (1996), pp. 209-210. Further similar examples are Euper (Ypern): Bily (1996), p. 163; Uthausen (Uithusen): Bily (1996), p. 379.
64 Lück (1997a), pp. 162 seqq.
65 Cf. Blaschke (1987a).

witz[66] acted as a chairman under the name of *Landschulze* for which he was freed from plow duties three days a year. He was bound to his function by an oath. The judges of the fifteen villages and abandoned villages probably filled the bench of that court as village headmen, but this is not expressly stated in the Wittenberg land register of 1513.[67]

Only in 1550, clear evidence that the owner of the hide belonging to the court in the deserted village Abtsdorf[68] had to sit on the territorial court can be found.[69] The same might be true for the other villages with hides belonging to the courts.

Also the Land court named "Slavic court" / "Wendische Gericht" was in session once a year in Kemberg. Its chair was the judge in Parnitz[70] as *Landschulze*. His jurisdiction included the villages and abandoned villages. The judges of those villages might also have been jurymen in court. It is no misconception that the division into a German and a Slavic court traces back to the German and Flemish settlement of that area. The names of the eleven villages belonging to the "Wendische Gericht", of which eight had already been abandoned in 1513, are altogether of Slavic origin.

The three Land courts of the Electoral Saxon department Wittenberg east of the Elbe had the same constitution as the Western ones (at least around 1500). Here, the judges of Bernsdorf[71], Iserbegka[72] and Waltersdorf[73] acted as *Landschulzen*. They were responsible for twelve, thirteen and eighteen villages and abandoned villages. Nothing is said about the time or place of the courts in the land registers (*Amtserbbücher*). The only known fact is that the court which included the eighteen villages of the so called "big Flemish district" ("*großflämische Pflege*") met in Zahna[74]. The other two had their seat in Wittenberg, maybe in the new town (Neustadt). This had surely previously been the case as well. The court's jurisdiction

66 Today a part of the village Schnellin in the south-east of Kemberg.
67 Sächsisches Hauptstaatsarchiv Dresden, Loc. 38129, XLVII, Wittenberg 1 (Amtserbbuch Wittenberg 1513).
68 Today a part of the village Euper near Wittenberg.
69 Landeshauptarchiv Sachsen-Anhalt Magdeburg (LHASA), Rep. D, Amt Wittenberg 2 (Amtserbbuch Wittenberg 1550), Vol. I, fol. 2r.
70 Abandoned village near Gommlo; southern Kemberg.
71 Abandoned village in the south-west of the village Streetz (?).
72 Today a part of the town Elster at Elbe-River.
73 Abandoned village near the town Dommitzsch at Elbe-River.
74 Cf. Blaschke (1987d).

included the so-called "small Fläming" ("Kleinen Fläming"). The connection to the old castle districts (*Burgwarde*) Wittenberg, Kemberg and Zahna is obvious. Next to the *Landschulze* from Waltersdorf, a second *Landschulze* from Schmögelsdorf[75] worked with the Land court in Zahna. His competences are unclear. In the land register of 1550, it is stated that the court assemblies are held twice a year, so it is possible that the *Landschulze* alternately presided.

The inhabitants of the villages named had to appear in the Land court to state their legal matters. This procedure was called "to charge" in the land registers. Electoral vassals were excluded, because their place of jurisdiction was in their lord's court (*Hofgericht*). The fact that five vassals/feoffees (*Belehnte*) went to the Land court of the *Landschulze* of Iserbegka on a regular basis is explicitly stated as an exception in 1513 which goes back to old customs. Next to the *Landschulze* and the ealdormen, a bailiff[76] and a servant of the department (*Landknecht*) belonged to the land courts. The electoral department Wittenberg had a servant of the department "in the meadow" (= "*in der Aue*") and another one "on the Fläming" ("*auf dem Fläming*"). The first one was responsible for the villages left to the Elbe, the latter for the villages right to the Elbe. For that purpose, two servants of the department were obliged to have a horse prepared for which they received two oat bushels a week. In detail, they had to deliver the summons to the court, carry out sentences in the form of garnishments and announce court sessions in the village. Another task was the collection of rents from the persons in the department subjected to the…: For their services, they received money from several judges as well as from peasants. The servant of the department "on the Fläming" was also the bailiff of the Wittenberg electoral court.[77]

The office of the judge could be staffed by the department in four places: in Kemberg, Schmiedeberg[78], Zahna and Neustadt Wittenberg. Those "set-judges" ("*Setzrichter*") received one-third of the collected fines and the abatement of certain rents. The land register of Wittenberg of 1513 knows "Flemish hides"[79]. Otherwise, there are no substantive statements made. In

[75] Today a part of the village Marzahna.
[76] Cf. Lück (2008b).
[77] Lück (1997a), pp. 110 seqq.
[78] Cf. Blaschke (1987b).
[79] Cf. Higounet (1990), pp. 261 seqq.

the adjacent Seyda[80], the *Halbteilungsrecht* is documented in an "Inheritance- and land register" ("*Erb- und Amtsbuch* …") from 1508.[81] That is why the same situation, even if not area-covering, can be expected for the districts of territorial courts around Wittenberg. Clear evidence from the early modern times can be found in a file in the city archive of the little town Kemberg. In the municipal statutes, there is a text with the heading "Statuta derer Städte Kemberg, Schmiedeberg and Gräfenhaynichen". Under number 2 it says[82]:

> "Because it has been usual for a long time in these towns, that without foundations, contracts, donations or other legal translations among married persons in the case of death of one of them the surviving part receives the half of the inheritance."
>
> *"Weil es auch von altersher alhier bräuchlich gewesen, dass wo vorher keine sonderliche Ehestiftung, Verträge, Donationes oder einige andere Vermachung zwischen Eheleuthen aufgerichtet und vorhanden sind da derer einer mit Thode abgangen, dem überbleibenden der halbe Theil an der verlassenen Erbschafft und Güthern zuständig gewesen…".*

The described judiciary hardly differs from the one in other departments of Electoral Saxony (Kursachsen).[83] The only linguistic peculiarity is the "(Land-)Schulze", which can be traced back to Dutch origin.[84] But the connection is not clear, since the *scultetus/Schultheiß/Schulze* has been a spatially and temporally common legal institution with different contents.[85]

IV. Flemmingen, Kühren, Löbnitz

The known colonist places Flemmingen, south-west of Naumburg, Kühren, southeast of Leipzig, and Löbnitz,[86] northeast of Halle, justify a collective description. Together they belong to the margrave of Meißen,

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80 Cf. Blaschke (1987c).
81 Bischoff (1954), p. 7; that means LHASA, Amt Seyda LII 144 (Amtserbbuch Seyda 1508-1790) or LII 145 (Amtserbbuch Seyda 1508-1573).
82 Stadtarchiv Kemberg, 3902, fol. 2v.
83 Lück (1997a), pp. 156 seqq.
84 Bischoff (1967), pp. 44, 196-197, 289; Schulze (2008).
85 Erler/Neidert (1990); Schmidt-Wiegand/Lück (2004); Heidelberger Akademie der Wissenschaften (2013).
86 Ca. 10 km south-east of Bitterfeld, at the southern bank of the Mulde river.

although clergymen (Geistliche) were the issuers of the defining documents like in the area of Magdeburg-Burg.[87]

1. Flemmingen

Already in 1140, Bishop Udo I of Naumburg (1125-1148) listed the possessions of the Cistercian monastery Pforte. They include villages "ad terminos Hollandensium"[88]. Some years later (1152), Wichmann, as bishop of Naumburg (1149-1152), granted certain prerogatives to the population of the area already called "Hollanth" in a document granted by his predecessor Udo I[89]: Among the villages might already have been the village *Tribun*, which was called "Flemmingen".[90] The village headman is labeled as "sculthetus". When Bishop Engelhard of Naumburg (1206-1242) confirmed the acquisition of the village Tribun (= Flemmingen), once again the hereditary right (Erbrecht) "iure Hollandensium" (sic! H.L.) is explicitly referred to.[91] The document of 1152 stated that the bishop was supposed to hold the court assemblies himself three times a year ("colloqium"). In reality, he probably had entrusted an advocate with that task. The corporate court of the settlers chaired by the *Schulze* might have been responsible for legal matters which did not come under the higher jurisdiction. Apart from that, the provost of the monastery of Pforte held its ecclesiastical court (*Sendgericht*).

2. Kühren

Kühren[92] near Leipzig has been settled by "ex Flandrensi provincia adventantes". Bishop Gerung of Meißen (1152-1170) issued the document of settlement on November 22nd 1154.[93] The head of village had the same name as the one in Flemmingen. The document first calls him "magister incolarum" (master of inhabitants / village headman), but it subsequently

87 Cf. Schlesinger (1975b).
88 Boehme (1893), no. 3.
89 Rosenfeld (1925), no. 210.
90 Schieckel (1987).
91 Schulze (2000), no. 1.
92 Cf. Wolf (1990); Higounet (1990), pp. 111-112.
93 Posse (1889), no. 254; new edition by Wittig (2008). About diplomatic aspects Ludwig (2008).

clarifies that he is going to be called "sculthetus" (…). He owns two tax-free hides, depending on his office. Again, the deputy of the bishop (advocatus) is supposed to hold the court assemblies in the village assisted by the *Schulze* three times a year. One-third of the legal issues went to the *Schulze*, the remaining two-thirds were charged by the bishop in his function as lord of justice.[94]

3. Löbnitz

We finally arrive in Löbnitz,[95] which belonged to the area of the castle (*Bürgward*) of Eilenburg. The document[96] issued in 1185 by Bishop Martin of Meißen (1170-1190) divides the (new) villagers into *forenses* and *coloni*. The first were marketers who were supposed to live according to the law of the city Halle, situated at the Saale-River. From their yards they had to give the local normal tax (6 pence).[97] The latter *coloni* were peasants subject to the Law of Burg near Magdeburg.

Forensibus itaque quam Hallenses, colonis quam illi de Burch habent…

Therefore, the document for Löbnitz might as well count as an attempt at founding a city, which, in retrospect, can be regarded as having failed. Several aspects of court sessions and justice are described in detail in the document. Both parties should not go to the court in the presence of the advocate more than three times a year. They were supposed to deal with and decide about all litigation. Several breaches of law have been excluded, because they belonged in the court of the margrave and were punished by a royal ban.[98] The hide was freed from the burden of military service or financial contributions to those services. Only the tithe should be given from the fields to the cathedral of Meißen. The document addresses the aforementioned *forenses* and *coloni*. It does not mention a single person who could be called locator.

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94 Schlesinger (1953/1961), pp. 122-123.
95 Cf. Neuß (1987).
96 Posse (1889), no. 512.
97 Schlesinger (1983), p. 543.
98 "De maioribus autem excessibus, sicut de latrocinio, de furto, de sanguine effuso, de rapina et de alia his simili violentia sub regio banno respondere cogantur." Cf. Lück (1997a), p. 35; Schlesinger (1953/1961), p. 108.

We talk about privileges which have been characteristic for new settlements of peasants in the area of colonization here as well. A specific aspect of Flemish settlement cannot be detected.

It is possible that there were more villages in the territory of the margraves of Meißen than the ones discussed here. They might have been influenced by Flemish settlement as law as well,[99] but hardly any evidence can be found.[100]

V. Golden Meadow (Goldene Aue)

The last object of interest is the Golden Meadow (*Goldene Aue)*[101] located at the Kyffhäuser's feet. Here, in the cultivated reed of the Helme-River, Flemish customs obviously continued to have an effect for a long time.[102] The initiative for actions of cultivation, supposedly, came from the emperors Konrad III (1138-1152) and Frederic I Barbarossa (1152-1190).[103] Privileges of location, which the other colonies had, cannot be found for the Golden Meadow.[104] In comparison, several documents from the 12th century contain details about the cultivation and the related property situation.[105] Additional information about the measure of hide in documents related to the monastery Walkenried[106] shows a close connection to Flemish settlement.[107]

A royal document by King Otto IV (1198-1212) from December 24th 1209[108] states that Frederic I Barbarossa left 7 hides in the drained reedy marsh to friar Jordan for his active participation in the process of cultivation. Another document by Otto IV from November 20th 1208[109] talks about "octo mansos Hollandenses" (sic! H.L.) in the reed (*Ried*) next to the Rothenburg-castle[110]. The corresponding confirmation by Archbishop

99 Markgraf (1908); Müller (1937/1998).
100 Bünz (2008b), pp. 137 seqq.
101 Cf. August/Bathe (1959-1961); Neuß et al. (1987); Higounet (1990), p. 46; Naumann (1916), pp. 13 seqq.; Rosenkranz (1964), pp. 164 seqq.; Sebicht (1888); Schrader (1879).
102 Naumann (1916), p. 14; Michelsen (1853).
103 Neuß et al. (1987), p. 141; Brachmann (1994).
104 Naumann (1916), p. 14; Michelsen (1853), pp. 144 seqq.
105 Dolle (2002); no. 12, 14, 15, 33.
106 Cf. Petke (1997).
107 Große (1992), pp. 34 seqq.
108 Dolle (2002), no. 74.
109 Dolle (2002), no. 66.
110 Cf. Patze (1989).

Siegfried II of Mainz (1200-1230) lists hides "qui Hollandenses mansi iuxta vulgarem consuetudinem appellantur"[111]. On September 3rd 1266, Count Burchard of Mansfeld gave a Flemish hide ("unum mansum Flamingicum") between the church of Langenried[112] and the so called "reed yard" (Riedhof)[113] to the cloister of Walkenried.

Another document by Burgrave Burchard II of Schraplau (1274-1303) from August 28th 1282 also mentions "quatuor mansorum Flandrensis mensure" in the reed (*Ried*) near Kelbra.[114]

Knowledge about the administration of justice in that area mainly comes from sources of the 16th century. The later Electoral Saxon department Sangerhausen obviously received its legal profile by the settlement of Flemish colonists in the Helmeried[115] in the late 12th century. The lower level of the judiciary was deeply influenced by the founding of villages by the Flemish.[116] In 1370 the district of Sangerhausen[117] entered into the possession of the Wettiners, the later rulers of Saxony. The area around (Ober-)Röblingen with Martinsrieth[118], Edersleben[119], Riethnordhausen[120], (Ober-)Röblingen and Niederröblingen[121] constituted some kind of subordinated department of Sangerhausen. Although it was subordinated to a tax-collector (*Schösser*) or advocate, it belonged to the Land court Sangerhausen in matters of penal and civil law.

Concerning the reprimand (matters), "charges", the villages of the Flemish formed a legal community in 1547 which can be proven until the 19th century. The land register of 1547 states that the "High Flemish court" was held once a year at the deserted church in Lorenzrieth between (Ober-)Röblingen and Edersleben.[122] Later, it was relocated to a place in front of the village tavern in (Ober-)Röblingen, which is obviously the location of today's desk-like "Peasant's Stone" ("*Bauernstein*").[123]

111 Dolle (2002), no. 67.
112 Near Görsbach; ca. 4 km north-east of Heringen.
113 Dolle (2002), no. 435.
114 Dolle (2002), no. 461.
115 Higounet (1990), p. 46.
116 Cf. Lück (1997a), pp. 221 seqq.
117 Cf. Lück (2007); Timm (1987).
118 Ca. 6 km south-west of Sangerhausen, at the northern bank of the Helme River.
119 Ca. 8 km south of Sangerhausen.
120 Ca. 8 km south-west of Sangerhausen.
121 Ca. 7 km south of Sangerhausen.
122 LHASA, A I 5 (Amtserbbuch Sangerhausen 1547), fol. 237.
123 Fieber/Schmitt (1988); Fieber/Lück/Schmitt (2009), p. 54.

Anybody who possessed field in Lorenzrieth had to appear in court. In the middle of the 16th century the court acted in the name of the duke of Saxony as the lord of court. Initially, the *Schultheiß* and later the communities (Ober-)Röblingen and Edersleben were obliged to give food and drinks to the members of the court. In the hearings, the judge of the princely department inquired the aldormen about the privileges of the prince. This was followed by the charges ("*rügen*"), meaning the legal disputes in the fields. A similar court assembly was held twice a year in Martinsrieth "on the lane in front of the tavern" ("uff der Gasse vor der Schenke"). It was probably chaired by the land judge (*Landrichter*) of (Ober-)Röblingen. As assessors, two "Schopffen im Rieth" and the "Riethschopff von Riethnordhausen" are mentioned. This court acted as "High Flemish Court" ("*Hohes Flämisches Gericht*") in the name of the duke of Saxony as well. The judge asked the aldormen about the verdict, which means the legal situation in the reed. Consequently, the oldest aldorman 'went behind' to the neighbours ("*Hintergang*"), inquired every single peasant ("*Landmann*") and reported the collected answers as the result of the consultation to the judge. The advocate and the judge of (Ober-)Röblingen received a meal and horse fodder from the *Schultheiß*. Another peculiarity of the legal life in the "Helmeried" seemingly was the "Flemish church going" ("*flämischer Kirchgang*"), which probably constituted a symbolic act of a married couple to display its special property regime.[124] Similar conditions were true for the court assembly held once a year in Weidenhorst (abandoned village near Martinsrieth). For it, the *Schultheiß* in Martinsrieth had a subordinated *scultetus* ("*undergesatzten Schultteys*").

The rights and duties of the *Schulze* might have been those of the department of Sangerhausen. The tasks of the *Schulze* were explicitly stated. Apart from the duty to give food and drinks, he applied himself to rear a horse for feudal service and a cow and a hog for the community. As benefit, he received two-thirds of the court's fines while the remaining two-thirds went to the prince as Lord of the court, meaning to the department. Furthermore, in case of a change in ownership which was bound to certain customs, he could charge fees. He owned a special yard (*Schulzengut*) of which four tax-free and interest-free pieces in the "*Ried*" were part of. Together with aldormen he had to take care of the serving of damages in

[124] Michelsen (1853), pp. 146 seqq.

the fields. Obviously, the *Schulze* must have belonged to the old-established farmers. In connection to the lack of the elderly, it was pointed out that the village did not have a *Schulze* in 1436. Instead, a so called *Heimbürge*[125] was mentioned.[126] The background of this constellation is not known. The described judiciary shows huge differences in contrast to the areas east of the Golden Meadow. Most likely, those differences date back to the Flemish settlement and the connected legal customs. With respect to the legal language, *scultetus/Schulze* is, once again, the only word which may remind of the Flemish.

VI. End

Flemish remnants in the legal institutions could only be detected for a small extent in the four areas of investigation. Most likely, the *Halbteilungsrecht* in the area Magdeburg/Burg can be qualified as a Flemish remnant, but the judiciary does hardly differ from that of the surroundings. Around Wittenberg, the legal influence of Flemish settlements in the early 16th century can only be detected regarding the delimitation of competences within the single districts of the Land court Wittenberg and its bailiff. Linguistically, only the *scultetus/Schultheiß/Schulze* indicates Flemish influences. The situation in the Golden Meadow differs from the findings by the rivers Mulde and Elbe. Mannerisms in the exercise of legal customs, which do not originate in Saxon law, have survived well into early modern times.

Moreover, the label "High Flemish Court" is indicative of the former legal community of the settlers and their legal circle. There are no traces concerning legal language, even though the sources in form of articles of charge, village ordinances and legal customs of Flemish villages and abandoned villages have not been completely analyzed. The label "Flemish law" ("*flämisches Recht*") can only describe a legal mixture consisting of transplanted legal elements, locally founding rules and new statutory law.[127] The hint at the provenance of law only makes sense in the context of a different law. Therefore, it means a complex of legal customs and statutory rules, which is generally characteristic for new settlements in the

[125] Lück (2012b); Wiemann (1962); Schildt (1996), pp. 91 seqq.
[126] LHASA, A I 5 (Amtserbbuch Sangerhausen 1547), fol. 236-237.
[127] Schlesinger (1953/1961), p. 76.

context of colonization. It has been shown that the listed rules of the judiciary do not count as Flemish peculiarities. The rules have been existing in villages which were not settled by the Flemish as well. The events that led to those privileges may be comparable to those which have promoted the adoption of the "ius teutonicum", "ius Saxonicum" or "ius Maideburgense" in Eastern Central Europe.[128] The otherness and the appeal for the recipients in relation to the existing law are in the foreground once again. The actual origin seems to be secondary, although certain legal elements of the area of origin have proven viable. Further analyses have to prove or disprove the assumptions. Especially, the linguistic scholars Bischoff and Teuchert have pointed out the difficulties of finding words of Dutch or Flemish origin in Central Germany. If one looks for words from the legal language, the likelihood of identifying Dutch or Flemish linguistic influences in the Saxon legal area further decreases.

Only the *Schulte/Schulze* might fall into this category. It seems appropriate to gather all village ordinances, village charges and written legal customs in Central Germany from the early modern times and to analyze them concerning legal history and language history in order to be able to get further knowledge. This has not happened until today although plenty of relevant sources exist since the 15th century.

Bibliography

[1] August, Oskar /Bathe, Max (1959-1961) *Niederländische (Flämische) Einflüsse in Siedlungen und Flurnamen (Erläuterungen zu Schlüter, Otto/August, Oskar [Ed.], Atlas des Saale- und mittleren Elbegebietes,* Teil 1-3, Karte 26*)*, pp. 94-102.

[2] Beck, Lorenz Friedrich (2000) *Herrschaft und Territorium der Herzöge von Sachsen-Wittenberg (1212-1422)*, Köln et al.: Böhlau.

[3] Bily, Inge (1996) *Ortsnamenbuch des Mittelelbegebietes*, Berlin: Akademie-Verlag.

[4] Bischoff, Karl (1954) *Elbostfälische Studien*, Halle: Max Niemeyer.

[5] Bischoff, Karl (1966): *Mittelalterliche Überlieferung und Sprach- und Siedlungsgeschichte im Ostniederdeutschen*, Wiesbaden: Akademie der Wissenschaften und der Literatur (Mainz).

[6] Bischoff, Karl (1967) *Sprache und Geschichte an der mittleren Elbe und der unteren Saale*, Köln/Graz: Böhlau.

[128] Eichler/Lück (2008).

[7] Bischoff, Karl (1972) *Die Sprache des Burger Landrechts*, in: Schirmer, Karl Heinz/ Sowinski, Bernhard (Ed.), Zeiten und Formen in Sprache und Dichtung. Festschrift für Fritz Tschirch zum 70. Geburtstag, Köln/Wien: Böhlau, pp. 357-375.

[8] Blaschke, Karlheinz (1987a) *Kemberg*, in: Schwineköper (1987a), pp. 237-238.

[9] Blaschke, Karlheinz (1987b) *Schmiedeberg, Bad*, in: Schwineköper (1987a), p. 417.

[10] Blaschke, Karlheinz (1987c) *Seyda*, in: Schwineköper (1987a), p. 43.

[11] Blaschke, Karlheinz (1987d) *Zahna*, in: Schwineköper (1987a), pp. 518-519.

[12] Boehme, Paul (Ed.) (1893) *Urkundenbuch des Klosters Pforta*, Teil 1, Halle: O. Hendel.

[13] Brachmann, Hansjürgen (1994) *Archäologische Forschungen zum stauferzeitlichen Landesausbau in Sachsen*, in: Engel, Evamaria/Töpfer, Bernhard (Ed.), Kaiser Friedrich Barbarossa. Landesausbau – Aspekte seiner Politik-Wirkung, Weimar: Böhlaus Nachf., pp. 31-50.

[14] Buchda, Gerhard (1940) Rezension zu: *Das Burger Landrecht, Text und Übersetzung nebst Faksimile-Wiedergabe nach dem Kodex des Stadtarchivs Burg b. Magdeburg*, hg. und mit einleitenden Bemerkungen versehen von Fritz Markmann und Paul Krause, Stuttgart/Berlin …, 1938, in: Zeitschrift der Savigny-Stiftung für Rechtsgeschichte, Germanistische Abteilung 60 (1940), pp. 377-380.

[15] Bünz, Enno (Ed.) (2008a) *Ostsiedlung und Landesausbau in Sachsen. Die Kührener Urkunde von 1154 und ihr historisches Umfeld*, Leipzig: Universitätsverlag.

[16] Bünz, Enno (2008b) *Die Rolle der Niederländer in der Ostsiedlung*, in: Bünz 2008, pp. 95-142.

[17] Dobozy, Maria (1999) *The Saxon Mirror. A Sachsenspiegel of the Fourteenth Century.* Translated by Maria Dobozy, Philadelphia: University of Pennsylvania Press.

[18] Dolle, Josef (2002) *Urkundenbuch des Klosters Walkenried*, Bd. 1: Von den Anfängen bis 1300, nach Vorarbeiten von Walter Baumann, Hannover: Hahnsche Buchhandlung.

[19] Eckhardt, Karl August (Ed.) (1973), *Sachsenspiegel Landrecht* (MGH. Fontes iuris germanici antiqui, Nova series 1, 1.), 3rd Ed., Hannover: Hahnsche Buchhandlung.

[20] Eichler, Ernst / Lück, Heiner (Ed.) (2008) *Rechts- und Sprachtransfer in Mittel- und Osteuropa. Sachsenspiegel und Magdeburger Recht*, Berlin: De Gruyter.

[21] Erler, Adalbert/Neidert, M. (1990) *Schultheiß, Schulze*, in: HRG 4 (1990), 1519-1521.

[22] Fieber, Wernfried/Lück, Heiner/Schmitt, Reinhard (2009) *Bauernsteine in Sachsen-Anhalt.* "…ahnn den Stein, so uf den Anger stehet…". Ein Inventar, Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt.

[23] Fieber, Wernfried/ Schmitt, Reinhard (1988) *Die Wüstung Lorenzrieth und der sog. Schenkstein von Oberröblingen*, in: Jahresschrift der Bodendenkmalpflege des Kreises Sangerhausen 1988, Heft 1, pp. 5-11.

[24] Frings, Theodor/Lerchner, Gotthard (1966) *Niederländisch und Niederdeutsch. Aufbau und Gliederung des Niederdeutschen*, Berlin: Akademie-Verlag.

[25] Geisthardt, Fritz (1995) *Der Fläming*, in: Heinrich (1995), pp. 174-175.

[26] Große, Rudolf (1992) *Soziolinguistische Bemerkungen zu den niederländischen Sprachspuren im Thüringischen und Nordobersächsischen*, in: Hipp, Helga (Ed.), Niederlandistik und Germanistik. Tangenten und Schnittpunkte. Festschrift für Gerhard Worgt zum 65. Geburtstag, Frankfurt am Main et al.: Peter Lang, pp. 31-42.

[27] Heidelberger Akademie der Wissenschaften (Ed.) (2013) *Schultheiß*, in: dies., Deutsches Rechtswörterbuch. Wörterbuch der älteren deutschen Rechtssprache, Bd. XII, Heft 9/10, Weimar: Böhlaus Nachf., 1416-1428.

[28] Heinrich, Gerd (Ed.) (1995) *Handbuch der historischen Stätten Deutschlands,* Bd. 10, Berlin und Brandenburg. Mit Neumark und Grenzmark Posen-Westpreußen, 3rd Ed., Stuttgart: Alfred Kröner.

[29] Heirbaut, Dirk / Lück, Heiner (2008), *Flämisches Recht*, ^{2}HRG 1 (2008), 1590-1592.

[30] Henning, F.-W. (1984) *Locator*, in: HRG 3 (1984), 22-24.

[31] Higounet, Charles (1990) *Die deutsche Ostsiedlung im Mittelalter*, Frankfurt am Main: dtv

[32] Hoppe, Günter/Stock, Michael (2002) *Die slawisch-deutsche Nachbarschaft während der frühdeutschen Herrschaftsbildung in den Gauen Serimunt und Colodice*, in: Mitteilungen des Vereins für anhaltische Landeskunde 11 (2002), pp. 39-85.

[33] HRG 1 (1971) – 5 (1998): Erler, Adalbert / Kaufmann, Ekkehard (Ed.), *Handwörterbuch zur deutschen Rechtsgeschichte*, Berlin: Erich Schmidt.

[34] ^{2}HRG 1 (2008) – 2 (2012): Cordes, Albrecht et al. (Ed.), *Handwörterbuch zur deutschen Rechtsgeschichte*, 2nd Ed., Berlin: Erich Schmidt.

[35] Israël, Friedrich/Möllenberg, Walter (Ed.) (1937) *Urkundenbuch des Erzstifts Magdeburg*, Teil 1: 937-1192, Magdeburg: Selbstverlag der Landesgeschichtlichen Forschungsstelle.

[36] Kamptz, Karl Albert von (Ed.) (1826) *Die Provinzial- und statutarischen Rechte in der Preußischen Monarchie, Erster Teil: Die Provinzen Brandenburg, Ost- und Westpreußen, Sachsen und Schlesien*, 1826.

[37] Kannowski, Bernd (2008) *Aufzeichnung des Rechts*, in: ^{2}HRG 1 (2008), 347-355.

[38] Karg, Fritz (1933) *Flämische Sprachspuren in der Halle-Leipziger Bucht*, Halle: Max Niemeyer.

[39] Kaufmann, Ekkehard (1998) *Urteilsfindung-Urteilsschelte*, in: HRG 5 (1998), 619-622.

[40] Kellenbenz, Hermann/ Philipp, G. (1978) *Hufe*, in: HRG 2 (1978), 248-251.

[41] Koschorreck, Walter (Ed.) (1989) *Der Sachsenspiegel: Die Heidelberger Bilderhandschrift Cod. Pal. Germ. 164. Kommentar und Übersetzung*. Neu eingeleitet von Wilfried Werner, Frankfurt am Main: Insel.

[42] Ludwig, Thomas (2008) *Die Urkunde Bischof Gerungs von Meißen vom 22. November 1154. Zur Diplomatik der Kühreners Urkunde*, in: Bünz (2008), pp. 261-272.

[43] Lück, Heiner (1997a) *Die kursächsische Gerichtsverfassung 1423-1550*, Köln et al.: Böhlau.

[44] Lück, Heiner (1997b) *Der Roland und das Burggrafengericht zu Halle. Ein Beitrag zur Erforschung der Gerichtsverfassung im Erzstift Magdeburg*, in: Donnert, Erich

(Ed.), Europa in der Frühen Neuzeit, Festschrift für Günter Mühlpfordt, Bd. 1: Vormoderne, Köln et. al.: Böhlau, pp. 61-81.

[45] Lück, Heiner (2007) *Civitas-oppidum-Stadt? Quellen zur Stadtwerdung Sangerhausens im Spiegel neuerer verfassungs- und rechtsgeschichtlicher Forschungen*, in: Mitteilungen des Vereins für Geschichte von Sangerhausen und Umgebung e. V., 13. Heft (2004), pp. 13-33.

[46] Lück, Heiner (2008a) *Bauermeister*, in: ^{2}HRG 1 (2008), 465-466.

[47] Lück, Heiner (2008b) *Fronbote*, in: ^{2}HRG 1 (2008), 1856-1859.

[48] Lück, Heiner (2010) '*Flämisches Recht' in Mitteldeutschland*, TRG LXXVIII (2010), pp 39-61.

[49] Lück, Heiner (2012a) *Gerichtsverfassung*, in: ^{2}HRG 2 (2012), 192-219.

[50] Lück, Heiner (2012b) *Heimbürge*, in: ^{2}HRG 2 (2012), 895-897.

[51] Lück, Heiner (2013) *Über den Sachsenspiegel. Entstehung, Inhalt und Wirkung des Rechtsbuches*, 3rd Ed., Wettin: Janos Stekovics.

[52] Markgraf, Bruno (1908) *Vlämisches Recht in der Umgebung von Leipzig*, in: Neues Archiv für sächsische Geschichte 29 (1908), pp. 150-154.

[53] Meuten, Ludger (2000) *Die Erbfolgeordnung des Sachsenspiegels und des Magdeburger Rechts*. Ein Beitrag zur Geschichte des sächsisch-magdeburgischen Rechts, Frankfurt am Main et al.: Peter Lang.

[54] Michelsen, Andreas Ludwig Jakob (1853) *Flämische Rechtsgewohnheiten in der goldenen Aue*, in: Michelsen, Andreas Ludwig Jakob (Ed.): Rechtsdenkmale aus Thüringen, 1. Lieferung, 1853, pp. 139-178.

[55] Müller, Max (1937) *Landschaftsbild und Siedlungsgeschichte des Ostteils der Leipziger Tieflandsbucht* (Dresden: Limpert) (new Ed. in Heydick, Lutz/Schirmer Uwe [Ed.] [1998] Zur Siedlungsgeschichte des Leipziger Raumes. Eine Sammlung wissenschaftlicher Arbeiten aus den Jahren 1914 bis 1937, Beucha: Sax-Verlag, pp. 75-168).

[56] Munzel, Dietlinde (1990) *Rechtsbücher*, in: HRG 4 (1990), 277-282.

[57] Naumann, Louis (1916) *Die flämischen Siedlungen in der Provinz Sachsen*, Halle: O. Hendel.

[58] Neschwara, Christian (2008) *Erbzins*, in: ^{2}HRG 1 (2008), 1392-1393.

[59] Neuß, Erich (1987) *Löbnitz,* in: Schwineköper (1987a), p. 285.

[60] Neuß, Erich et al. (1987) *Goldene Aue*, in: Schwineköper (1987a), pp. 140-141.

[61] Oestmann, Peter (2008) *Fürsprecher*, in: ^{2}HRG 1 (2008), 1883-1887.

[62] Oppitz, Ulrich Dieter (1990) *Deutsche Rechtsbücher des Mittelalters*, Bd. 2: Beschreibung der Handschriften, Köln/Wien: Böhlau.

[63] Partenheimer, Lutz (2003) *Albrecht der Bär. Gründer der Mark Brandenburg und des Fürstentums Anhalt*, 2nd Ed., Köln et al.: Böhlau.

[64] Patze, Hans (Ed.) (1989a) in Verbindung mit Peter Aufgebauer, *Handbuch der historischen Stätten Deutschlands*, Bd. 9: Thüringen, 2nd Ed., Stuttgart: Alfred Kröner.

[65] Patze, Hans (1989b) *Rothenburg*, in: Patze (1989a), p. 359.

[66] Petke, Wolfgang (1997) *Walkenried*, in: Henry Bautier et al. (Ed.), Lexikon des Mittelalters VIII (1997), 1976.

[67] Posse, Otto (Ed.) (1889) *Urkunden der Markgrafen von Meißen und Landgrafen von Thüringen 1100-1195*, Leipzig: Giesecke & Devrient.

[68] Römer, Christof (1987a) *Pechau*, in: Schwineköper (1987a), pp. 363-364.

[69] Römer, Christof (1987b) *Großwusterwitz*, in: Schwineköper (1987a), p. 163.

[70] Rosenfeld, Felix (Ed.) (1925) *Urkundenbuch des Hochstifts Naumburg*, Teil 1 (967-1207), Magdeburg: Selbstverlag der Historischen Kommission.

[71] Rosenkranz, Heinz (1964) *Der thüringische Sprachraum*. Untersuchungen zur dialektgeographischen Struktur und zur Sprachgeschichte Thüringens, Halle: Max Niemeyer.

[72] Schieckel, Harald (1987) *Flemmingen*, in: Schwineköper (1987a), pp. 122-123.

[73] Schildt, Bernd (1996): *Bauer – Gemeinde – Nachbarschaft*. Verfassung und Recht der Landgemeinde Thüringens in der frühen Neuzeit, Weimar: Böhlaus Nachf.

[74] Schlesinger, Walter (1961) *Mitteldeutsche Beiträge zur deutschen Verfassungsgeschichte des Mittelalters*, Göttingen: Vandenhoeck & Ruprecht.

[75] Schlesinger, Walter (1953) *Zur Gerichtsverfassung des Markengebiets östlich der Saale im Zeitalter der deutschen Ostsiedlung*, in: Jahrbuch für die Geschichte Mittel- und Ostdeutschlands 2 (1953), pp. 1-94 (new Ed. in: Schlesinger 1961, pp. 48-132).

[76] Schlesinger, Walter (1960) *Forum, villa fori, ius fori. Einige Bemerkungen zu Marktsiedlungsurkunden des 12. Jahrhunderts in Mitteldeutschland*, in: Geschichte und Landeskunde. Forschungen und Darstellungen. Franz Steinbach zum 65. Geburtstag gewidmet von seinen Freunden und Schülern, Bonn 1960, S. 408-440 (neu Ed. in: Schlesinger 1961, pp. 275-305).

[77] Schlesinger, Walter (Ed.) (1975a) *Die deutsche Ostsiedlung des Mittelalters als Problem der europäischen Geschichte*, Sigmaringen: Jan Thorbecke.

[78] Schlesinger, Walter (1975b) *Flemmingen und Kühren. Zur Siedlungsform niederländischer Siedlungen des 12. Jahrhunderts im mitteldeutschen Osten*, in: Schlesinger (1975a), pp. 264-309.

[79] Schlesinger, Walter (1983) *Kirchengeschichte Sachsens im Mittelalter,* Vol. II: Das Zeitalter der deutschen Ostsiedlung (1100-1300), 2nd Ed., Köln/Wien: Böhlau.

[80] Schlesinger, Walter (Ed.) (1990) *Handbuch der historischen Stätten Deutschlands*, Bd. 8: Sachsen, 2nd Ed., Stuttgart: Alfred Kröner.

[81] Schmidt-Wiegand, Ruth (1990) *Rechtssprache*, in: HRG 4 (1990), 344-360.

[82] Schmidt-Wiegand, Ruth (2008) *Echte Not,* in: 2HRG 1 (2008), 1177-1179.

[83] Schmidt-Wiegand, Ruth/Lück, Heiner (2004) *Schultheiß*, in: Dieter Geuenich et al. (Ed.), Reallexikon der Germanischen Altertumskunde, 2nd Ed., XXVII, 2004, pp. 370-373.

[84] Schrader, H. (1879) *Das flämische Gericht zu Lorenzrieth*, in: Zeitschrift des Harz-Vereins 12 (1879), pp. 646-656.

[85] Schröder, Richard/Künßberg, Eberhard Frhr. von (1932) *Lehrbuch der deutschen Rechtsgeschichte*, 7th Ed., Berlin/Leipzig: Walter de Gruyter & Co.

[86] Schulze, Hans K. (1971) *Erbschulze*, in: HRG 1, 977-980.

[87] Schulze, Hans K. (1984) *Meier*, in: HRG 3 (1984), 439-442.

[88] Schulze, Hans K. (2008) *Erbschulze*, in: ^{2}HRG 1 (2008), 1384-1387.

[89] Schulze, Hans K. (Ed.) (2000) *Urkundenbuch des Hochstifts Naumburg*, Teil 2 (1207-1304). Auf der Grundlage der Vorarbeiten von Felix Rosenfeld und Walter Möllenberg bearb. von Hans Patze u. Josef Dolle, Köln et al.: Böhlau.

[90] Schwineköper, Berent (Ed.) (1987a), Handbuch der historischen Stätten Deutschlands, Bd. 11: Provinz Sachsen/Anhalt, 2nd Ed., Stuttgart: Alfred Kröner.

[91] Schwineköper, Berent (1987b) *Burg*, in: Schwineköper (1987a), pp. 59-61.

[92] Schwineköper, Berent (1987c) *Fläming,* in: Schwineköper (1987a), pp. 119-121.

[93] Sebicht, Richard (1888) *Die Cistercienser und die niederländischen Kolonisten in der goldnen Aue* (Im XII. Jahrhundert), in: Zeitschrift des Harz-Vereins 21 (1888), pp. 1-74.

[94] Springer, Matthias (1992) *Erzbischof Wichmann von Magdeburg, ein geistlicher Fürst der Stauferzeit*, in: Puhle, Matthias (Ed.): Erzbischof Wichmann (1152-1192) und Magdeburg im hohen Mittelalter, Stadt-Erzbistum-Reich, Ausstellungskatalog, Magdeburg: Kulturhistorisches Museum, pp. 2-19.

[95] Stellmacher, Dieter (1973) *Untersuchungen zur Dialektgeographie des Mitteldeutsch-Niederdeutschen Interferenzraumes östlich der Mittleren Elbe*, Köln/ Wien: Böhlau.

[96] Stellmacher, Dieter (1990) *Niederdeutsche Sprache. Eine Einführung*, Berlin: Weidler.

[97] Stellmacher, Dieter (Ed.) (2004), *Sprachkontakte. Niederländisch, deutsch und slawisch östlich von Elbe und Saale*, Frankfurt am Main et al.: Peter Lang.

[98] Stoob, Heinz (Ed.) (1990), *Helmold von Bosau, Slawenchronik*, Ausgewählte Quellen zur deutschen Geschichte des Mittelalters. Freiherr vom Stein-Gedächtnisausgabe, XIX, 5th Ed., Darmstadt: Wissenschaftliche Buchgesellschaft.

[99] Teuchert, Hermann (1944) *Die Sprachreste der niederländischen Siedlungen des 12. Jahrhunderts,* Neumünster.

[100] Timm, Albrecht (1987) *Sangerhausen*, in: Schwineköper (1987a), pp. 409-410.

[101] Vercruysse, Jos (2002) *"Was haben die Sachsen und die Flamen gemeinsam…?"* Wittenberg von außen gesehen, in: "Recht lehren ist nicht die geringste Wohltat", Wittenberg als Bildungszentrum 1502-2002, Lernen und Leben auf Luthers Grund und Boden, Wittenberg, pp. 9-32.

[102] Wenner, Ulrich (2004) *Hermann Teuchert, Karl Bischoff, Max Bathe: Auf der Suche nach niederländischen Sprachspuren im Mittelelbegebiet*, in: Stellmacher (2004), pp. 101-131.

[103] Wiemann, Harm (1962) *Der Heimbürge in Sachsen und Thüringen*, Köln/Graz: Böhlau.

[104] Winter, Johanna Maria van (1953) *Vlaams en Hollands recht bij de kolonisatie van Duitsland in de 12e en 13e eeuw,* TRG 21 (1953), pp. 205-224.

[105] Wittig, Thomas (2008) *Edition der Kührener Urkunde von 1154*, in: Bünz (2008a), pp. 485-489.

[106] Wolf, Herbert (1990) *Kühren*, in: Schlesinger (1990), p. 175.

[107] Zimmer, Keno (2003) *Das Burger Landrecht. Ein spätmittelalterliches Rechtsbuch aus dem Kernland des Sachsenspiegels*, Halle: Mitteldeutscher Verlag.

[108] Zimmer, Keno (2008) *Burger Landrecht*, in: ^{2}HRG 1 (2008), 747-748.

[109] Zschieschang, Christian (2003) *"Das land tuget gar nichts"*. Slaven und Deutsche zwischen Elbe und Dübener Heide aus namenkundlicher Sicht, Leipzig.

Laudatio of N.H. Lameire

R. Vanholder

Norbert H Lameire was born in 1940, at the beginning of the second world war. His parents were simple working class people, but made every effort to allow Norbert to study, as he was a brilliant pupil. In 1958, he finished high school at the Royal Atheneum in Deinze, province of East Flanders, Belgium, and started his university studies at the medical faculty of nearby Ghent. He obtained the diploma of M.D. in 1965 and continued his education by specializing in internal medicine. He was qualified as an internist in 1970 and obtained his Ph.D. at the same university in 1975. He became a staff member at the then quite new nephrology section of the department of internal medicine under the chairmanship of Prof S Ringoir. He became associate professor in 1989 and full professor with tenure in 1991, and succeeded S Ringoir as head of the nephrology section in 1996, which he remained until his appointment as emeritus in 2005. He received a honorary doctorate from the university of Kaunas, in Lithuania in 2001.

Within the medical faculty of Ghent University and the Ghent University Hospital, he occupied several official functions such as: secretary-treasurer of the association of alumni, coordinator of the student training commission and secretary of the medical faculty, coordinator of the Erasmus program for trans-European student exchange, contractor of a Tempus program in collaboration with Kaunas, Lithuania, secretary of the medical advisory board of the hospital, and chairman of the department of internal medicine (twice).

Many of his activities had a strong international background, with stays during the early years of his career in Utrecht, the Netherlands, Butare, Ruanda and finally, for a research training with the famous Jay Stein, in

San Antonio, Texas, USA. During the later years of his career, he developed intense collaborations with other nephrology sections abroad, the most important ones being Kaunas, Lithuania (as already mentioned), Sousse, Tunisia, Heidelberg, Germany (together with which our unit organized for years a Dialysis Academy which later on was mimicked at several other locations), and finally Oxford, UK (together with which a summer course in nephrology was launched that is still existing).

Apart from being a brilliant teacher and clinician, he also was scientifically extremely active, resulting up till now in a total of more than 500 publications and close to 13,000 citations. His main scientific expertise was in the areas of acute kidney injury (AKI) and peritoneal dialysis (PD) although also many other areas attracted his interest, especially, from the clinical point of view socio-economic aspects of nephrology and integrated care, and from the basic science side, renal physiology in general and more specifically kidney hemodynamics. His scientific work emanated among other things in 2 papers in the New England Journal of Medicine, 5 in Lancet, 1 in JAMA, 24 in the Journal of the American Society of Nephrology (the highest ranking journal in nephrology), 4 in Circulation Research, 3 in Circulation and 1 in European Heart Journal. Although his publishing activity tended to diminish a bit during the recent years, some of his most important texts were generated only lately, especially a comprehensive and extensive review on acute kidney injury in last year's Lancet.

He also received several awards and scholarships: the Specia award as a student, a fellowship sponsored by the Belgian-Dutch cultural agreement, a NATO fellowship, the Schamelhout-Koettlitz award of the Belgian medical academy, a honorary award from the national kidney foundation (USA) and finally, a merit award for his entire career by the European Renal Association – European Dialysis and Transplant Association (ERA-EDTA), the European association of nephrologists.

He occupied several official functions in national and international medical and scientific societies and scientific journals: council member of the Dutch society of nephrology (1980-1984), council member of the French speaking société de néphrologie (1989-1994), president of the Belgian society of internal medicine (1993-1995), chairman of the commission of the international society of nephrology (ISN) on acute renal failure (1992-1997), coordinator of the renal disaster relief task force of ISN (RDRTF/

ISN) (1995-2005), council member of EURO-PD (1996-2007), deputy editor in chief of Nephrology Dialysis and Transplantation (NDT) (1999-2005), editor in chief of NDT (2005-2011), editor in chief of NDTPlus/ Chronic Kidney Journal (CKJ) (2008-2011), editor in chief of Acta Clinica Belgica (1997-), council member of ISN (1999-2005), member of the steering committee of the dialysis outcomes practice pattern study (DOPPS) (2001-2007), founding co-chair of kidney diseases improving global outcomes (KDIGO) (2001-2007) and coordinator of ISN-GO (2005-2013).

More recently, he very efficienctly takes care of the scientific and political local lobbying in favour of nephrology at the European Community institutions in Brussels. He first became member and now is chair of the European Kidney Health Alliance (EKHA) which is a consortium of nephrogical societies (not only physicians but also nurses, foundations and patients) to propagate the interests of nephrology and kidney patients at the EU (2011-). He also represents EKHA within the European Chronic Disease Alliance (ECDA) which is a group of several consortia involved in various chronic diseases, and also represents ERA-EDTA in the Biomed Alliance which is another consortium of societies, this one on basic research.

In what follows, I will highlight somewhat more in depth the most important elements among these activities.

EURO-PD is a group of interested nephrologists who organize congresses throughout Europe with as purpose the propagation of PD. These congresses occur every other year. N Lameire was a founding member. In 1996, he hosted and organized the EURO-PD congress in Ghent. End of 2013, the actual president of EURO-PD (N Topley) signed an agreement of collaboration between EURO-PD and ERA-EDTA.

N Lameire was editor in chief of NDT, the core journal of ERA-EDTA, for a period of 6 years. He also took the initiative for and became the first editor in chief of the second journal of ERA-EDTA, NDTPlus, that subsequently would be renamed into CKJ. After having finished the regular term of 6 years, he was honored by receiving the title of editor in chief emeritus in 2011. In 2012, his picture was displayed on the cover page of NDT.

DOPPS is a multinational and multicontinental comparative database on clinical outcomes in dialysis patients, whereby therapeutic attitudes and results are compared in between countries. For 7 years N Lameire coordinated the activities for the Dutch speaking part of Belgium. DOPPS generally produces 10 to 15 publications per year on all sorts of topics relevant to the dialysis patient population and the nephrological community.

KDIGO is a global guidance body that generates therapeutic recommendations in a worldwide perspective. Next to chairing this initiative together with Garabed Eknoyan for seven years, he also after the end of his activities as overall chair, was the chairman of a specific comprehensive guideline on AKI.

ISN-GO is the continuous medical education (CME) program of ISN with special focus on emerging countries. In this function, N Lameire over a period of almost 10 years organized an impressive number of CMEs throughout the world and was a well savored speaker in many of those. As a consequence, he is known all over the world. For these efforts, he was honored last year by the ISN.

As a consequence, it goes without saying that the whole career of N Lameire was structured around humanitarian and social issues. According to an interview he gave in Prague in 2011, his inspiration was to a large extent influenced by his relatively modest societal background, resulting in the fact that circumstances he had known during his youth largely inspired his later professional and scientific attitudes, with specific attention for those socially and economically deprived. Typical examples of his humanitarian spirit were his involvement already during his internal medicine training period for several months in the tropical hospital at the university of Butare in Ruanda, which at that time was a truly emerging country, and later on his involvement in ISN-GO. In 2011, he gave at the ERA-EDTA meeting in Prague a brilliant plenary lecture on "Nephrology in an unjust world" for a packed audience. Also the historical review emanating from his Sarton lecture given on February 13th 2014, the contents of which are summarized in the text accompanying this career overview, are testimony to this spirit. Above all, however, he will be remembered as the person who made the RDRTF/ISN to what it is nowadays. Taking this task force over from Kim Solez during the second year of its existence, he managed together with médecins sans frontières (MSF) to organize this initiative to

a group of volunteers who are ready to intervene in any disaster around the world where somehow kidney patients are affected. Also this part of his work is amply depicted in the text of his hand that follows. Under his coordination, the RDRTF deployed several major interventions, amongst others in the aftermath of the Marmara earthquake in Turkey in 1999, and the Bam earthquake in Iran in 2003 but also in post-conflict zones like Kosovo and the former Yugoslavian republic of Macedonia.

I am sure that this resume is incomplete and that I missed some major events and activities, for which I apologize. Even if some details are missing, what is left in this text is impressive enough to convince everybody how multifaceted and driven this man is.

Wars, disasters and kidneys

Norbert Lameire, MD, PhD
Emeritus prof of Medicine

Although the term "nephrology" was introduced only in 1960, at the occasion of the first World Congress of Nephrology in Evian (France), kidney diseases and, more in particular, acute renal failure (ARF), currently named acute kidney injury (AKI), must have afflicted humans from times immemorial, because of wars, trauma, and infections. As elegantly written by Gary Eknoyan [1], AKI, as with other diseases, predates medicine and its historical roots are buried in the misty beginnings of priestly medicine, which emerged as illnesses to be separated from other kinds of suffering [1].

For all the destruction and chaos it wreaks, war also spurs advances in most medical domains and medical services have been associated with the military since the days of Ancient Greece. This relationship declined in the Middle Ages, but after a radical reorganisation of medicine during the 1700s the links between the two grew stronger with each passing year.

There is much debate about how much influence war and medicine have had on each other, but in many cases war moves medical practices and innovation forward, or refocuses research into specific conditions. For obvious reasons, this happens most frequently in acute trauma medicine. Historically, trauma surgery, emergency care and infectious disease treatments leap the furthest ahead.

Some criticists however, including British sociologist Roger Cooter, have made the argument that, "for the most part, war has accelerated research into old medical problems of military importance, the bulk of which are highly specific to that context and of little value outside it." During most

modern wars, Cooter says, civilians' health needs have taken a back seat to the medical needs of the military [2].

Already Hippokrates (460-370 BC) is quoted as saying that "he who would become a surgeon should join an army and follow it'" and second-century Greek physician Galen (AD 129 – c.200/c.216**),** court physician to Marcus Aurelius in Rome honed his skills not only in the sanctuary of Aesclepius, god of healing, but also as physician to the gladiators of Pergamon. He performed bold operations and gained an understanding of the human anatomy that was unsurpassed well into the second millennium.

Blood loss has always been the biggest killer in war. A big turning point came, in 1537, when a French barber called Ambroise Paré (1510-1590**)** was sent as a surgeon to the Siege of Turin. He was so horrified by what he saw, that he came up with an incredibly simple alternative, the blood vessel ligature. He would identify bleeding arteries, clamp them, and then tie the ends with silk threads. Prevention of blood loss through the use of tourniquets and ligatures, as well as amputation to prevent death by gangrene, was used as early as Roman and Arab times but the skills had been lost and it took time for Paré's work to change people's attitudes. A century later surgeons were still using boiling oil and cauterising for bleeding wounds.

The idea of using specialised transport to evacuate the wounded from the battlefield came 200 years ago by Dominique Jean Larrey (1766-1842), surgeon-in-chief to Napoleon's armies who noticed that the French artillery were able to move cannons at high speed around the battlefield with horse-drawn carriages. He wondered if similar vehicles could be used to move casualties. At that time many soldiers were left to die where they fell and it could take 24 hours or more to get a wounded man to a field hospital. Larrey created what he called, "flying ambulances". These were horse-drawn carts which could carry the wounded in some comfort and at high speed to the waiting surgeons. The Duke of Wellington was so impressed he ordered his men not to fire at them.

Larrey also improved the mobility of the field hospitals and organised a system of triage, under which the wounded were treated according to their need for treatment and not because they were of noble birth.

When recorded medicine began in antiquity, it was the abnormal symptoms and external signs with which patients presented that formed the

framework of the diagnostic taxonomy of what was then considered a disease.

Related to diseases of the kidney, dominant among those presenting symptoms were pain and changes in urine excretion and this often translated into the pain of urolithiasis and either increased or suppressed urine excretion [3]. Over time, increased urine output (polyuria) was termed diabetes in the 2nd century BC and emerged as a diagnostic entity by the 2nd century [4]. By contrast, that of suppressed urine output (oliguria) went unnamed and linked to the obstruction of urolithiasis that usually presented with pain. Nevertheless, by the time medicine matured and for the centuries that followed, suppressed urine output also came to be considered an ominous prognostic sign in several other diseases [1;5].

In the 17th century the term 'ischuria', indicating either the suppression or retention of urine, was introduced. And, following the establishment of anatomical dissection, which allowed the early description of diseased organs, Morgagni (1682-1772), the acknowledged father of pathological anatomy, first proposed a classification of ischuria into four categories: *ischuria vesicalis, ischuria ureterica, ischuria urethralis* and *ischuria renalis* [6]. A fascinating case of acute renal ischuria was for example described by George Fife in 1840 [7].

As pointed out by Eknoyan [8], the "kidney infection" of Galen, the "ischuria renalis" of Morgagni, and the subsequent use of "nephritis" (a term introduced in the 16th century to mean "inflammation of the kidneys") are the inclusive but wastebasket terms, often used interchangeably, that provided the framework within which diseases of the kidney in general, and those of ARF and AKI in particular, were grouped, described, and studied well into the 19th century.

William Heberden (1710-1801) in his *Commentaries on the History and Cure of Diseases* (1802) introduced a chapter on "Ischuria," as "a total suppression of urine has lasted seven days, and yet the patient has recovered. It has been fatal as early as the fourth day. But in general those patients, who could not be cured, have sunk under the malady on the sixth or seventh day" [9].

Richard Bright (1789-1858) described his eponymous disease of albuminuric end-stage kidneys in 1827, which was soon followed by its classi-

fication into acute and chronic forms of Bright's disease [1]. By the turn of the 20th century, acute Bright's disease became the taxonomic classification under which acute renal failure (ARF) was generally classified and discussed. In the late editions of his textbook *Principles and Practice of Medicine*, which appeared in the early years of this century, Osler stated that acute Bright's disease could be produced by various poisons, infections, burns, traumas, major surgery and pregnancy [10]. Francis Delafield (1841-1915) in an 1888 report titled "Acute Bright's Disease" wherein he provides what can be considered an accurate description of the microscopic pathology of ARF, classified it as "parenchymatous degeneration of the kidneys" [11].

During World War 1,German authors observed acute renal failure in soldiers who had been buried under heavy masses of earth when trench walls collapsed [12;13]. As only tubular lesions were seen on postmortem examination, the anuria was thought to be due to circulatory disturbances of the kidney ("vasomotorische Nephrose") or to tubular obstruction caused by myoglobin casts.

Terms as renal inadequacy, vasomotor nephosisis, lower nephron nephrosis, post traumatic shock kidney all emerged in the literature during the pre and post first world war period. An increasing number of traumatic shock cases occurred as a result of work-related accidents in the new industrial setting of the time, especially those of life-threatening car and train accidents. Because more operative procedures were being performed, postsurgical shock emerged as a clinical subject of investigation. In addition, changes of kidney function began to be noted and reported in cases of severe diarrhoea, transfusion reactions, and toxin exposure (for details see [8]. Whereas all described in variable detail some of the clinical, biochemical, and structural features of the posttraumatic shock kidney described during World War I, they did so in articles published in various specialty journals, each under different names that were not appreciated as a single disease until the years that followed the Second World War [1].

Trench nephritis

As we consider the 100-year anniversary of World War 1, one should be mindful of the assaults that the soldiers faced from the diseases that pros-

pered in the trenches of this war. A neglected area of research is the group of diseases that bear the name of the trenches, namely trench fever, trench nephritis and trench foot [14-16]. Trench fever was a short-duration relapsing fever spread by lice; trench foot involved pain and swelling of the feet due to exposure to cold and damp, which could lead to gangrene. Trench nephritis occurred secondary to an unknown cause but there are arguments to believe that at least many cases of trench nephritis were caused by Hanta virus disease (see below). These trench diseases collectively led to about half a million casualties in the British and Allied forces.

This relatively "new" kidney disease appeared early 1915 in British troops in Flanders and was quickly called "trench nephritis" or "war nephritis" in the British reports (which formed the majority) [17-19]. Towards the end of June 1915, a total of 1062 cases was counted with a steady monthly increase afterwards. The "nephritis" occurred in the soldiers after some months at the front, by which time the war had stagnated, and troops lived and died in a long line of cold, muddy, pestilent trenches which extended right from Switzerland to the English channel 500 miles to the North. For many veterans who are asked to recall their memories of life in the trenches the overriding feature that lingered in the mind was the problem – and horror – of trench rats. Rats – brown and black – thrived literally in their millions among trenches in most Fronts of the war, be it Eastern, Italian, Gallipoli – but primarily the Western Front. Trench conditions were ideal for rats. Aside from feeding from rotting food rats would invade dugouts in search of food and shelter. Most soldiers who served on the Western Front would later recall how rats grew in boldness, stealing food that had been lain down for just a few moments. Rats would also crawl across the face of sleeping men.

The majority of the patients suffering from the "trench nephritis" were in active duty in the trenches at the moment of their illness although some rare cases were also observed in the rear zone or in the base campements. Trench nephritis remained a serious sanitary problem for the British Expeditionary Force throughout the war, with thousands of soldiers to be sent back for convalescence, and leading to a bed occupancy of 25% in the internal medicine wards of the base hospitals at the end of the war. In the German Austrian troops, a similar outbreak was noted since the spring of 1915 and was called "*Feldnephritis*" or *"Kriegnephritis*" [20].

The disease spread to French and even Canadian troops located South of Flanders as well, demonstrating many features of an infectious disease, being common in Summer and rare in Winter: on occasion, hospital orderlies and others who had never been at the front also could succumb.

A febrile prodrome of sudden onset was followed by pulmonary symptoms in a majority, and "nephritis" sometimes with anuria occurred in about 20% of cases [21]. Blood pressure might be high but without eye fundal changes; the urine contained various casts and modest proteinuria. The condition was so common that specially designated "nephritis wards" were set up in the British army field hospitals of northern France to investigate and treat the hundreds of cases, and the Army became seriously worried about its impact on the fighting ability of the troops – it is worth remembering that less than one quarter of fatalities in soldiers were from battle wounds.

When the US troops joined the war in 1917, they were not spared and on a total of 370000 Americans, in Europe, 2002 (0.54%) cases of acute "war nephritis" were noted (Dr Jan Clement-personal communication).

Looking back [22;23] it appeared that a similar condition had been seen during the American Civil war and probably the Franco-Prussian war, but not in the Crimean or Boer war – nor the Sino-Japanese war in Manchuria only a few years previously. During World War II, as many as 16000 cases of a rodent-borne leptospirosis-like disease were noted during the 1942 German campaign in Finnish Lapland [24;25]. Because the snow melted, great numbers of lemmings and field mice invaded the German bunkers. Examinations in Munich and Berlin of these rodents, air-lifted from the war theater, offered no clue. Confronted with some distinctive clinical symptoms (e.g., acute myopia and localised oedema) and with repeatedly negative findings for leptospirosis in the patients, a new field-like fever disease ("Kriegsnephritis") was suspected [24].

Extensive investigations on both sides of the front during and after World war 1 yielded no clear aetiology, but a viral cause (a filter-passer) was already suspected early [15;21] (Dr Jan Clement-personal communication).

Although a combination of several conditions could have been responsible for these epidemies (acute tubular necrosis, acute interstitial nephritis,

glomeronephritides) there is more and more, be it indirect and retrospect evidence, that Hantaan virus infection and Hanta virus nephropathy could have been a major cause (see below).

Korean Haemorrhagic Fever

In the Spring of 1951 the military doctors of the United Nations (UN) troops in Korea were confronted with a "new" and frightening disease consisting of fever, haemorrhages, shock and renal failure. Many other diseases, including leptospirosis could easily be excluded and since an infection, hitherto unknown to Western medicine, was suspected, the American Army Medical Services created a Haemorrhagic Fever Centre in South Korea to treat the affected troops under the best conditions and to start a very extensive research programme. In all the UN forces, more than 3000 cases occurred of what later was called Korean Haemorrhagic Fever (KHF). A mortality of approximately 10%, even reaching 15% in some localised clusters was observed. Despite the intensive research, KHF was the most important – but unresolved – nephrological problem of the Korean War. It was only 25 years later that the causative virus could be isolated from the lungs of the Korean striped field mouse, *Apodemus Agrarius Coreae*, a rodent very common in the region [26]. The virus was named after the Hantaan River, which transsects the same endemic region where most of the cases had been noted and which runs in the Demilitarised Zone near the famous 38th parallel. Hantaan virus [26] is the cause of KHF. A milder form of the disease has been described in Scandinavia and in many other European countries and has been termed "nephropathica epidemica" and is caused by an antigenically similar virus [27-30].

Hantaviruses infect various animal species worldwide: rodents and insectivores, as well as mammals such as cats (Clement et al. 1998). The natural reservoir of infection appears to be in rodents such as the fieldmice in Korea, the bank vole in Scandinavia and other European regions and rats. Rodents contaminate humans who inhale aerosols of virus-containing particles excreted through lung, saliva, and urine. In Europe, hantavirus disease is mainly due to the Puumala serotype, whose animal reservoir is the red bank vole, Clethrionomys glareolus. It is endemic and, occasionally, epidemic in Scandinavia (where it was known as Nephropathia

epidemica), western Europe, the Balkans, and the western part of the Russia (where it was known as haemorrhagic nephroso nephritis).

Korean haemorrhagic fever is often severe, with haemorrhagic features and acute renal failure. The mortality is currently around 5 to 8%. The related illness, nephropathica epidemica, is milder, haemorrhagic features are unusual and the mortality is less than 1% (for recent and comprehensive review see J.Clement – Acute kidney disease and hantavirus disease-chapter OTCN in press, Oxford Textbook in Clinical Nephrology, Oxford University Press 2014). The European cases appear also to be of this less severe variety.

In view of the discussion above, it is thus highly plausible that many cases of so-called "trench nephritis" and the acute kidney disease in KHF were Hanta viral nephropathies.

The role of Norbert Goormaghtigh

Prof. Norbert Goormaghtigh was born on the 14th of February 1890 in Ostend, where he was raised and also went to school. He left his native town for Ghent where he studied medicine at the State University. He graduated as Doctor in Medicine, Surgery and Obstetrics magno cum laude in 1913. He became well-known for his studies on the structure of the adrenal gland. He started his studies on the kidney, more in particular the juxtaglomerular apparatus at the beginning of the 1930s carrying on from previous observations and in 1932 he provided evidence of its endocrine function [31;32]. His training and research were interrupted by the first World War. He was mobilised and assigned to a surgical mobile hospital. He took part in the retreat of the Belgian Army behind the river Yser, and functioned as surgeon in the Field Hospital in Hoogstade which was an English hospital, sent to Belgium by the British government in order to support the Belgian Army. In this hospital he met his future wife, Mable Lawrence, who was an English nurse belonging to the staff of the Belgian Field Hospital [32].

The discovery of the unique structural relationships between the early distal tubule of the nephron and the vascular pole of its originating glomerulus and the subsequent demonstration of the functional and clinical import

of this remarkable complex – the juxtaglomerular apparatus – is one of the principal achievements of nephrology.

Of the several investigators who made this possible, Norbert Goormaghtigh was not only one of its first observers but the only one to persevere in its investigation, to recognise and define the critical relationship of the complex he named the juxtaglomerular apparatus, and in what were clearly prescient insights to foresee correctly many of its functions that were to be documented in the ensuing decades [31]. Goormaghtigh belonged to the class of morphologists who believed that accurate structural studies provided a basis for the undertaking of functional studies. In fact, he often used in the text and title of his papers the term 'histophysiologie' (histo-physiology).

In his inaugural paper on the subject [33], Goormaghtigh described in detail the afibrillar cells of the juxtaglomerular arterioles, principally in an 8-year-old girl who had died of scarlet fever. He characterised them as afibrillar granular cells and identified them with those lining the afferent arteriole described by Ruyter. In addition, he identified a second population of smaller, also afibrillar but agranular, spindle-shaped cells in the vascular pole, and highlighted the rich enervation of the entire area. The second type of cells he described were subsequently termed lacis cells because of their interlacing processes separated by basement membrane.

In the context of this paper, it is of interest that Goormaghtigh performed some of his numerous studies on autopsy material submitted to him by pathologists of the Royal Canadian Army Medical Corps stationed in Belgium during the first World War. The victims were young enlisted men in the Canadian Army who had died 4 to 9 days after crushing injuries and after the development of marked oliguria and even anuria. In a seminal paper describing his results he added a case of "traumatic uraemia" observed by him during the war of I9I4-I8 with a remarkable clinical description of a post crush syndrome complicated by oligo-anuric ARF [34].

It is on this background in the state of the medical sciences that Goormaghtigh made his major contributions on the juxtaglomerular apparatus in the period between the two world wars, both of which to some extent influenced and shaped his personal life.

The Second World War (WWII) was equally defining in his life, when his favoured son was accused and imprisoned in Dachau in 1943. The following year, the Gestapo incarcerated him also, albeit for only a short period.

The toll of WWII on his work and productivity is reflected in the diminishing number of his publications. His subsequent administrative responsibilities as a rector (1947-1950) of the University of Gent, during a particularly difficult period in its history, further hampered and practically ended his investigative career. Following a series of progressively severe and incapacitating cardiac attacks beginning in November 1957, he died on 2 January 1960.

The beginning of chronic dialysis.

It is beyond the scope of this paper to repeat the well-known history of the development of both peritoneal and haemodialysis in the treatment of acute and chronic kidney disease. A number of websites can be consulted on this topic and some interesting books have treated in detail this fascinating story [35;36].

The development of the artificial kidney by Willem "Pim" Kollf in Kampen (the Netherlands) during the second World War and the rather slow but worldwide introduction of the first models in some selected university hospitals have been told many times. Whereas the first Kollf-Brigham artificial kidneys were successfully used in the treatment of acute renal failure patients in the Korean War (see below), chronic dialysis became only possible by the creation of a permanent vascular access by Scribner in 1960. The Scribner shunt was developed using the newly introduced material, Teflon®. With the shunt, it was no longer necessary to make new incisions each time a patient underwent dialysis.

Further improvement in chronic vascular access was realised by the surgical creation of the arteriovenous (AV) fistula by Drs Cimino and Brescia in 1966.

In 1962, Scribner started the world's first outpatient dialysis facility. Immediately the problem arose of who should be given dialysis, since demand far exceeded the capacity of the six dialysis machines at the center.

In another brilliant move, Scribner decided that the decision about who would receive dialysis and who wouldn't – a matter of life and death for the patients involved – would not be made by him. Instead, the choices would be made by an anonymous committee composed of local residents from various walks of life plus two doctors who practiced outside of the kidney field. Although his decision created controversy at the time, it was the creation of the first bioethics committee, which changed the approach to accessibility of health care in many countries.

The past 60 years has been a time of incredible advancements in the world of kidney medicine. Thanks to the efforts of Kolff and Scribner and other medical pioneers like them, people with chronic kidney disease are now able to live full and productive lives.

Prof Severin Ringoir – pioneer of nephrology in Ghent University Hospital

Dr Severin Ringoir was born in 1931 in the city of Aalst. He did his medical studies on the medical faculty in Ghent and graduated as Doctor in Medicine, Surgery and Obstetrics as the degree was named at that time in 1956. Besides his military service he started a training in internal medicine under the guidance of Prof Paul Regniers between 1957 till 1961. His choice for beginning a study of kidney diseases started already during his training in internal medicine and was prompted by the dramatic experience of observing some young patients slowly dying from chronic renal failure, despite so-called conservative therapy. Encouraged by prof Regniers, Dr Ringoir was allowed to stay for several months in already then famous renal services abroad, Paris (Hôpital Hôtel Dieu under the leadership of Prof Dérot and the young Marcel Legrain), Géneva (Dir Prof René Mach), and Houston (the renal division of Baylor College – Dir Prof Morgen). From each training period he brought back experience in peritoneal dialysis, haemodialysis, and kidney transplantation. In the meantime he was working on his PhD thesis in the Laboratory of Normal and Pathological Physiology, between 1964 and 1966.

A particular interest for acute renal failure is already present from his beginning years in nephrology and is reflected in an interesting contribution in his Mémoire pour le titre d'assistant étranger de l'Université de

Paris on "Observations in 33 cases of anuria caused by acute tubular necrosis post-abortum".

Under the stimulating leadership of Prof Ringoir and in collaboration with the department of surgery, a young team of nephrologists started acute and chronic haemodialysis, peritoneal dialysis and kidney transplantation in the first 5 years of the 1960s.

It is without exaggeration one can say that under Ringoir's guidance the Ghent school of nephrology has acquired a certain national and international reputation and has contributed to the development of a great number of Flemish centers of nephrology.

In parallel with dialysis, an active kidney transplant programme was developed in close cooperation with the department of surgery under the direction of Prof Fritz Derom.

It has been a long way between the first haemodialysis patient in Ghent in 1963, the first kidney transplant in 1968 and the first continuous ambulatory peritoneal dialysis patient in 1977 and the actual number of 3926 haemodialysis, 122 peritoneal dialysis, and 2998 kidney transplant patients by the end of 2010 present in Dutch-speaking Belgium.

The University of Ghent Renal Division and the Renal Disaster Relief Task force of the International Society of Nephrology

As mentioned above, there has always been a great interest in ARF in the Ghent nephrology division. It was then almost natural that the Ghent renal division was in the frontline when the International Society of Nephrology started the creation of a Renal Disaster Relief Task Force for renal interventions in case of disasters causing post-traumatic crush ARF.

Most cases of AKI that develop following natural disasters are a result of crush syndrome. Crush syndrome is a reperfusion injury that occurs after ischaemia of skeletal muscle caused by prolonged continuous pressure by rubble. The pressure causes destruction or disintegration of triated muscle, which is called rhabdomyolysis. This syndrome is characterised by muscle breakdown and necrosis resulting in the leakage of the intracellular muscle constituents into the circulation and extracellular fluid [37;38].

After a victim is released from the rubble, water and sodium flow into the injured region, and severe dehydration and circulatory failure develop. Furthermore, large amounts of myoglobin and potassium are released into the circulation from the injured muscle, which can result in acute tubular injury and hyperkalaemia.

The first adequate description of muscle crush syndrome appeared in the English literature in the classic monumental report on casualties of the London Blitz which started in September 1940. Bywaters and Beal [39] described four patients with extensive mechanical crushing of muscles and myoglobinuric AKI resulting in renal failure. All patients were extricated alive from under the rubble, but died a few days later. Initially, some of these casualties developed shock and haemoconcentration with gross oedema of the crushed limbs, which was strongly suggestive of extensive sequestration of extracellular fluid by the damaged muscles. Furthermore, through an elegant series of experiments, Bywaters demonstrated that myoglobinuria led to nephrotoxic effects when the urine was acidic but not when it was alkaline [40-42]. On the basis of these observations, Bywaters was the first author to suggest that management of muscle crush syndrome should consist of copious rehydration combined with infusion and ingestion of bicarbonate ions to achieve alkalinisation of urine [42]. Towards the end of World War II, London was bombed again. Bywaters later estimated that 95 of 186 patients with muscle crush syndrome in this second attack were prevented from developing myoglobinuric AKI as a result of treatment with copious rehydration and urine alkalinisation during the predialysis period [42]. These results were achieved before development of the Kolff artificial kidney, which was introduced in London in 1946, and greatly improved the management of patients with myoglobinuric AKI. Furthermore, in 1946, mannitol (an osmotic diuretic drug) was the first agent introduced for protection against ischaemic renal injury and myoglobinuric AKI in humans and in experimental models [43]. The decades that followed completely vindicated the usefulness of Bywaters' regimen. Crush syndrome was first mentioned in US literature as late as 1958 [42]. This delay probably reflects the near-absence of large-scale disasters or war within mainland USA since the civil war.

The "Bywaters' regime of vigorous fluid resuscitation was also applied by Ron et al in 1984 [44]. Following the collapse of a building in South

Lebanon, seven subjects (aged 18 to 41 years) were released from under the rubble within one to 28 hours. All seven suffered from extensive crush injuries with evidence of severe rhabdomyolysis and were treated by the induction of an alkaline solute diuresis immediately on their extrication from the debris. Historical controls with injuries of similar severity have showed a high incidence of acute renal failure and a high mortality rate, yet none of the fluid treated patients had azotaemia or renal failure. This success was attributed to the unprecedented early institution of intravenous appropriate therapy even before the complete body of the victim was extricated from under the rubble. Efforts to extricate trapped victims may be futile if the means to resuscitate and treat rescued victims are not available, as occurred following the 1988 earthquake in Armenia [45]. Many rescued victims in Armenia subsequently died of crush-related acute kidney injury (AKI) and hyperkalaemia because of poorly organised relief and inability to provide dialysis to all patients with AKI [46;47]. It was also evident that a poorly organised relief effort resulted in a chaotic influx of untrained, unsupported volunteers and materials that overloaded available distribution systems and interfered with transport of supplies, creating a 'second disaster' [45-48]. Consequently, it was clear that there was a need to organise an international response system to prevent and manage crush-induced AKI. The International Society of Nephrology founded the Renal Disaster Relief Task Force (RDRTF) in 1989, as a response to the chaotic relief efforts of the Armenian earthquake [49].

The organisation of this task force was and still is in the hands of the Ghent Renal Division. The interventions in several disasters, the most important ones being the Marmara, Bam, Kashmir, and Haiti earthquakes have been described in detail elsewhere. The programme is embedded within the broader rescue support programme deployed by Médéçins sans Frontières, (Doctors without Borders) [50-54].

Based on the cumulative and extensive experience with several of these interventions where the principles of early fluid resuscitation were applied, the task force has published recommendations for the logistical and medical management of crush syndrome victims in mass disasters [53-55].

During the London Blitz of 1940, crush syndrome was almost universally fatal, whereas by 1999 the mortality rate had been dramatically reduced to <20%. In 2003, all 16 young adults (mean age 23 ± 13 years) who were

treated with early vigorous fluid resuscitation for extensive crush syndrome following the Bingol earthquake in Turkey survived. Although myoglobinuric AKI occurred in four of these individuals, this complication was prevented altogether in the other 12 [56]. An important point to note, however, is that such aggressive treatment would have been inappropriate in elderly earthquake survivors with multisystem failure, as such individuals are vulnerable to the adverse effects of fluid overload. Since fluid administration should be started on site before a patient is transported to medical facilities, there is a critical need to educate emergency staff, co-medical staff and general physicians about the risk of crush syndrome and the importance of fluid therapy. Such knowledge would facilitate early recognition of AKI and timely referral of patients who require renal replacement therapy.

In addition, nephrologists have also a key role in the management of chronic dialysis and transplant patients, following an earthquake [57]. Major disasters destroy dialysis facilities, leaving patients without life-saving therapy in their local environment. This was a major challenge following Hurricane Katrina, Cyclone Yasi, the Kobe and Marmara earthquakes, and the recent Tohuku earthquake and tsunami, which was followed by the Fukushima nuclear power plant meltdown (for review see [50;54].In these situations, if possible, dialysis-dependent endstage renal disease patients must be transferred to other dialysis facilities, often in other cities, to continue their dialysis treatment. For example, relocation of chronic dialysis patients places significant pressures on receiving dialysis units. Following Hurricane Katrina, 700 dialysis patients from New Orleans were added to the usual 1000 in Baton Rouge, LA. This may involve a number of days without dialysis while the patients are relocated or the facilities are repaired and brought back into service. During that period, chronic dialysis patients must be contactable and, if possible, conservative care preferably provided by experienced nephrologists should be prescribed.

The same concerns apply to transplant patients who may not have access to their antirejection therapy in the disaster area.

In conclusion, the Sarton lecture 2014 provided an opportunity to summarise some aspects of the reciprocal impact of wars and disasters on medicine in general and nephrology in particular.

This summary was only possible thanks to the advice and help given to the author by prof Gary Eknoyan (Houston, Texas), an authority on the history of nephrology, emeritus prof Severin Ringoir, prof Raymond Vanholder, and Dr Jan Clement, who has contributed so much to my learning about Hanta virus disease, a still neglected area in nephrology.

Reference List

[1] Eknoyan G. Emergence of the concept of acute renal failure. Am J Nephrol 2002 Jul;22(2-3):225-30.

[2] Cooter R. War, medicine, and modernity. Stroud,UK: Sutton Pub Ltd; 1998.

[3] Eknoyan G. A history of urolithiasis. Clin Rev Bone Min Metab 2004;2:172-85.

[4] Eknoyan G, Nagy J. A history of diabetes mellitus or how a disease of the kidneys evolved into a kidney disease. Adv Chronic Kidney Dis 2005 Apr;12(2):223-9.

[5] Jeffcoate W. Why did the 5th Earl of Derby die? Lancet 2001 Jun 9;357(9271):1876-9.

[6] Abercombie J. Observations on ischuria renalis. Edinburgh MedJ 1821;10:210-22.

[7] Fife G. Dr. Fife's Case of Ischuria Renalis. Prov Med Surg J 1[13], 211-212. 1840. Ref Type: Journal (Full)

[8] Eknoyan G. Emergence of the concept of acute kidney injury. Adv Chronic Kidney Dis 2008 Jul;15(3):308-13.

[9] Heberden W. Commentaries on the History and Cure of Diseases. London: Payne; 1802.

[10] Osler W. The priniciples and practice of medicine. New York: Appelton; 1892.

[11] Delafield F. Acute Bright's disease. MedRec 33, 151-155. 1888. Ref Type: Journal (Full)

[12] Hackradt A. Uber eine akute, tödliche vasomotorische Nephrose nach Verschüttung 1917 (Doktoral Thesis).

[13] Minami S. Uber Nierenveranderungen nach Verschuttung. Arch Pathol Anat 245, 247. 1923.

[14] Atenstaedt RL. Trench foot: the medical response in the first World War 1914-18. Wilderness Environ Med 2006;17(4):282-9.

[15] Atenstaedt RL. The medical response to trench nephritis in World War One. Kidney Int 2006 Aug;70(4):635-40.

[16] Atenstaedt RL. The response to the trench diseases in World War I: a triumph of public health science. Public Health 2007 Aug;121(8):634-9.

[17] Abercrombie RG. Observations on the acute phase of five hundred cases of war nephritis. J Roy ArmMed Corps 27, 131-157. 1916.

[18] Bradford J. Nephritis in the British troops in Flanders. Q J Med 9, 125-127. 1916.

[19] Davies FC, Weldon RP. A contribution to the study of "war nephrits". Lancet 1917;2:118-20.

[20] Miller FR. Lehrbuch der Inneren Mediizin II. Jena: Fischer; 1925.

[21] Cameron SJ. The mystery of trench nephritis. Sem Dial 19, 362. 2006.
Ref Type: Journal (Full)

[22] EARLE DP. Analysis of sequential physiologic derangements in epidemic hemorrhagic fever; with a commentary on management. Am J Med 1954 May;16(5):690-709.

[23] Maher JF. Trench nephritis: a retrospective perception. Am J Kidney Dis 1986 May;7(5):355-62.

[24] Stuhlfauth K. Bericht über ein neues schlammfieberähnliches Krankheitsbild bei Deutscher Truppen in Lappland. Deutsche Med Wchschrift 439, 474-477. 1943.

[25] Arnold OH. Die sogennante Feldnephritis. Klinische Studie zur Symptomatologie, Pathogenese und Ätiologie einer akute diffuse Gefässerkrankung infektioser Genese. Leipzig: Thieme Verlag; 1943.

[26] Lee HW, Lee PW, Johnson KM. Isolation of the etiologic agent of Korean Hemorrhagic fever. J Infect Dis 1978 Mar;137(3):298-308.

[27] Clement J, Heyman P, McKenna P, Colson P, vsic-Zupanc T. The hantaviruses of Europe: from the bedside to the bench. Emerg Infect Dis 1997 Apr;3(2):205-11.

[28] Clement J, Maes P, Van Ranst M. Acute kidney injury in emerging, non-tropical infections. Acta Clin Belg 2007 Nov;62(6):387-95.

[29] Lee HW, Lee PW, Lahdevirta J, Brummer-Korventkontio M. Aetiological relation between Korean haemorrhagic fever and nephropathia epidemica. Lancet 1979 Jan 27;1(8109):186-7.

[30] Svedmyr A, Lee HW, Berglund A, Hoorn B, Nystrom K, Gajdusek DC. Epidemic nephropathy in Scandinavia is related to Korean haemorrhagic fever. Lancet 1979 Jan;1(8107):100.

[31] Eknoyan G, Rubens R, Lameire N. The juxtaglomerular apparatus of Norbert Goormaghtigh – a critical appraisal. Nephrol Dial Transplant 2009 Dec;24(12):3876-81.

[32] Roels H. Norbert Goormaghtigh and his contribution to the histophysiology of the kidney. J Nephrol 2003 Nov;16(6):965-9.

[33] Goormaghtigh N. Les segments neuro-myo-artériels juxtaglomerulaires du rein. Arch Biol 43, 575-591. 1932.

[34] Goormaghtigh N. The Renal Arteriolar Changes in the Anuric Crush Syndrome. Am J Pathol 1947 Jul;23(4):513-29.

[35] Cameron JS. History of the treatment of renal failure by dialysis. Oxford: Oxford University Press; 2002.

[36] Ing TS, Rahman MA, Kjellstrand CM. Dialysis, History, Development, and Promise. 1st ed. New Jersey,USA: World Scientific; 2012.

[37] Vanholder R, Sever MS, Erek E, Lameire N. Rhabdomyolysis. J Am Soc Nephrol 2000 Aug;11(8):1553-61.

[38] Warren JD, Blumbergs PC, Thompson PD. Rhabdomyolysis: a review. Muscle Nerve 2002 Mar;25(3):332-47.

[39] Bywaters EGL, Beall D. Crush injuries with impairment of renal function. Brit Med J 1941;1:140-7.

[40] Bywaters EG, Delory GE, Rimington C, Smiles J. Myohaemoglobin in the urine of air raid casualties with crushing injury. Biochem J 1941 Nov;35(10-11):1164-8.

[41] Bywaters EG, STEAD JK. The production of renal failure following injection of solution containing myohaemoglobin. Q J Exp Physiol 33, 53-70. 1944.

[42] Bywaters EG. 50 years on: the crush syndrome. BMJ 1990 Dec 22;301(6766):1412-5.

[43] Better OS, Rubinstein I, Winaver JM, Knochel JP. Mannitol therapy revisited (1940-1997). Kidney Int 1997 Oct;52(4):886-94.

[44] Ron D, Taitelman U, Michaelson M, Bar-Joseph G, Bursztein S, Better OS. Prevention of acute renal failure in traumatic rhabdomyolysis. Arch Intern Med 1984 Feb;144(2):277-80.

[45] Noji EK, Armenian HK, Oganessian A. Issues of rescue and medical care following the 1988 Armenian earthquake. Int J Epidemiol 1993 Dec;22(6):1070-6.

[46] Collins AJ. Kidney dialysis treatment for victims of the Armenian earthquake. N Engl J Med 1989 May 11;320(19):1291-2.

[47] Eknoyan G. Acute renal failure in the Armenian earthquake. Ren Fail 1992;14(3):241-4.

[48] Armenian HK, Melkonian AK, Hovanesian AP. Long term mortality and morbidity related to degree of damage following the 1998 earthquake in Armenia. Am J Epidemiol 1998 Dec 1;148(11):1077-84.

[49] Solez K, Bihari D, Collins AJ, Eknoyan G, Eliahou H, Fedorov VD, et al. International dialysis aid in earthquakes and other disasters. Kidney Int 1993 Sep;44(3):479-83.

[50] Gibney N, Sever MS, Vanholder R. Disaster nephrology: crush injury and beyond: review. Kidney Int (in press). 2014.

[51] Lameire N, Vanholder R, Clement J, Hoste E, Van Waeleghem JP, Larno L, et al. The organization of the European Renal Disaster Relief Task Force. Ren Fail 1997 Sep;19(5):665-71.

[52] Lameire N, Mehta R, Vanholder R, Sever M. The organization and interventions of the ISN Renal Disaster Relief Task Force. Adv Ren Replace Ther 2003 Apr;10(2):93-9.

[53] Sever MS, Vanholder R, Lameire N. Management of crush-related injuries after disasters. N Engl J Med 2006 Mar 9;354(10):1052-63.

[54] Vanholder R, Sever MS. Crush recommendations: a step forward in disaster nephrology. Nephrol Dial Transplant 2012 Apr;27(4):1277-81.

[55] Sever MS, Vanholder R. Management of Crush Victims in Mass Disasters: Highlights from Recently Published Recommendations. Clin J Am Soc Nephrol 2012 Sep 27.

[56] Gunal AI, Celiker H, Dogukan A, Ozalp G, Kirciman E, Simsekli H, et al. Early and vigorous fluid resuscitation prevents acute renal failure in the crush victims of catastrophic earthquakes. J Am Soc Nephrol 2004 Jul;15(7):1862-7.

[57] Fukagawa M. Nephrology in earthquakes: sharing experiences and information. Clin J Am Soc Nephrol 2007 Jul;2(4):803-8.

Laudatio Erik Aerts

Hilde de Rooster

I am privileged to introduce to you Professor Erik Aerts from the Department of History of the University of Leuven. He was nominated by the Faculty of Veterinary Medicine of Ghent University to receive the Sarton Medal 2013-2014. For those who wonder why veterinarians are interested in historians: Professor Aerts studied the cat throughout history!

Professor Erik Aerts was born in Belgium in 1954. He studied history and philosophy at the Universities of Antwerp and Leuven. Before entering Leuven University he worked as a Senior Archivist in the Belgian State Archives where he ended his career as Director of the Antwerp State Archives. From 1989 he combined his job with an Assistant Professorship at the Flemish Business School Brussels and from 1999 with a part-time Assistant Professorship at the Department of History of Leuven University. In 2004 he became full-time Professor at KU Leuven.

He was and is involved in many professional and scientific organizations, resulting in council memberships and functions at KU Leuven such as Chairman of the research group Early Modern History (2005-2011); Chairman of the Lamberts-Van Assche Foundation (2009-); Member of the steering team of the interuniversity master after master in Archival Science (2009-); Member of the Bureau of the Permanent Teaching Commission (2009-); Chair of the Department of History (2012-); Member (as representative of the senior academic staff) of the Board of the Faculty of Arts (2012-); Member of the Faculty of Arts Selection Committee (2012-); Member of the Faculty of Arts Promotion Committee (2012-); Member of the Faculty of Arts Assessment Committee for senior academic staff.

It became clear to me that history is an extremely broad topic. And so are the research areas covered by Professor Erik Aerts, including economic development, craft guilds, consumption, currency, banking, finance, financial institutions, but also witchcraft, medicine and religious values and norms, all topics on which he published extensively in a dozen languages. Although undoubtedly very interesting, the relationship between religion and economics or other monetary and fiscal issues would not have attracted the attention of the veterinary society, however. One should also realize Professor Erik Aerts has an extensive list of publications about Belgian beer! Yet many veterinarians will rather like to taste beer than to read about it… But then, there was also the study of the cat throughout history, published by Professor Erik Aerts. And now, the nomination of Professor Erik Aerts for the Sarton Medal by the Faculty of Veterinary Medicine became trivial!!!

Professor Erik Aerts will certainly get the full attention of the audience while talking about the cat, we veterinarians think to know so well. But do we know anything about her role and status throughout history? No, we don't but we will… after listening to Professor Erik Aerts who will present: The various facets of felis catus and man in the Low Countries during the Middle Ages and New Age.

The Multiple Cat

Aspects of the Medieval and Early Modern Relationship between Man and Cat in the Low Countries

Erik Aerts

Introduction

The likelihood that the reader has no affinity with the subject of this paper is small.[1] Indeed, the cat is immensely popular in Belgium and the Netherlands today, even more than the dog.

Estimates for 2010 suggest that there were 3.6 million domestic cats living in the Netherlands, with slightly more than a third of families having at least one cat in their household. In 2008, Belgium had an estimated 2 million domestic cats, with one in four households having a cat. Data for the neighbouring countries show the same pattern. According to the *Chambre syndicale des fabricants d'aliments pour des animaux familiers* France had 10.7 million cats in 2008, which implies that 26 percent of French households were home to a cat. The best and most recent figures are available for the United Kingdom with 8.5 million cats in 2013. One in five British families are the proud patron of a cat. These figures show clearly that the cat has adapted itself from a wild, solitary hunter to a charming family companion.

[1] I would like to thank Tom De Roo, Luc Devriese, Brecht Dewilde, Nina Lamal, Johan Poukens, Eddy Put, Johan Van Heesch, Leen Van Molle, Raymond Van Uytven and Johan Verberckmoes for comments and suggestions on earlier versions of this article.

But what about the relationship between man and cat in the past? To what extent can the historian reveal important explanatory variables that may shed light on this relationship? The ensuing pages aim at a first exploration of the field; they follow a careful but seemingly erratic, though focused, path – just as a cat explores new territory. That territory is large, but with an emphasis on the Low Countries from the early Middle Ages to the end of the Early Modern Period. As such the article seeks to contribute to a rapidly growing and predominantly Anglo-Saxon historiography of domestic animals.[2] I shall argue that the relationship between man and cat was multilayered or even kaleidoscopic showing five different and often conflicting aspects. Some of these aspects had a chronological sequence, others partially overlapped in time. As early as the end of the First World War, the great cultural historian Johan Huizinga observed how the human mind is eager to find "new thoughts and new forms of life" in the past, how scholars are preoccupied with "the coming to birth of new things". What is often ignored is how old, rigid and compelling forms fester, proliferate and become combined with novelty and innovation.[3]

Intellectuals observe. The functional cat

Much of medieval science is a dialogue with the "book of books". The Bible itself does not mention the cat, not even when listing clean or unclean animals,[4] although there is a rather obscure passage on flying cats in the Book of Baruch.[5] It was only during the Early Modern Period that cats, like dogs and other familiar animals, were regularly added in Bible translations and comments to bring the content of the Bible more into line with people's everyday experiences.[6] One of the oldest descriptions of the cat in Western Europe is to be found in the etymological encyclopaedia in twenty volumes

2 De Roo T. Mens en hond in de Antwerpse gebodboeken, eind 15de tot eind 18de eeuw: een casestudie naar mens-dier relaties in een stedelijke omgeving. Volkskunde. Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 2007; 108: 347.

3 Huizinga J. Herfsttij der Middeleeuwen. Groningen: H.D. Tjeenk Willink; 1975 p. xix.

4 Leviticus XI, 1-8 and Deuteronomium XIV, 4-8.

5 Kampling R. Vom Streicheln und Nutzen der Katze. Die Wahrnehmung der Katze bei christlichen Autoren von der Spätantike bis zum 12. Hahrhundert. In: Kampling R, editor. Eine seltsame Gefährtin. Katzen, Religion, Theologie und Theologen. Frankfurt am Main: P. Lang; 2007 p. 95-96.

6 Nahuys GJ, Van Nuys Klinkenberg J. De Bijbel, door beknopte uitbreidingen en opheldernde aenmerkingen verklaerd. Amsterdam: Johannes Allart; 1781. vol 3 p. 92-93.

by the 7th-century Spanish bishop Isidore of Seville. Isidore praises the *musio*

> "who is so called because it is a foe of mice. Common people call it *catus* because it catches mice. Others say, because it sees (*catat*). For it has such sharp sight that it overcomes the darkness of the night by the brightness of its eyes. Hence from the Greek "to burn" comes *catus* which means keen".[7]

Later authors of encyclopaedic compendia such as the French Dominican friar Vincent de Beauvais in his *Speculum naturale* (before 1245), his Brabant colleague Thomas van Cantimpré in his *Liber de natura rerum* (1235-1250)[8] or Jacob van Maerlant from the neighbourhood of Bruges, in his *Der Naturen Bloeme* (1270), have amply plagiarised or paraphrased this text.[9] For them, too, the *musio* with its shining carbuncle eyes is capable of catching mice in even the deepest darkness. Its precious fur is a trophy for dealers in hides and skins. Even the great philosophers and theologians of the 13th century, such as Albertus Magnus (*De animalibus* from 1254-1257) and Thomas Aquinas (*Quaestiones disputatae de malo* from 1269-1272), copied the fragment.[10] Albertus also gave a detailed description of the cat that would remain a standard and a guideline in the ensuing centuries. The domestic cat exists in various colours, likes to play with its reflection, loves to be stroked by man and is very hygienic. The famous *doctor universalis* draws his inspiration from his fellow Dominican Thomas van Cantimpré, but he demonstrates his much praised talent for

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7 In *liber XII de animalibus*, Paragraph 2 concerning *de bestiis*, verses 38 and 39: "*Musio appellatus, quod muribus infestus sit. Hunc vulgus cattum a captura vocant. Alii dicunt, quod cattat, id est videt. Nam tanto acute cernit ut fulgore luminis noctis tenebras superet. Unde a Graeco venit catus, id est ingeniosus, ἀπὸ τοῦ καίεσθαι*". http://penelope.uchicago.edu/Thayer/L/Roman/Texts/Isidore/12*.html#3 (accessed March 2014). The information on this site is based on Lindsay WM, editor. Isidori Hispalensis Episcopi Etymologiarum sive Originum. Oxford: Oxford University Press; 1911. 2 vol. The English translation comes from Brehaut E. An Encyclopedist of the Dark Ages: Isidore of Seville. New York: Columbia University; 1912 p. 226, but I added the last sentence. See also Van Bentum W. Een kat in het nauw. Tiecelijn, 2004; 17: 68 and Bobis L. Une histoire du chat. Paris: Seuil; 2006 p. 97 (Points. Histoire; vol 356).

8 Boese H, editor. Thomas Cantimpratensis Liber de Natura Rerum. Editio princeps secundum codices manuscriptos. Berlin, 1973. vol 1 p. 151-152, art. LXXVI.

9 Verwijs E, editor. Jacob van Maerlant's Naturen bloeme. 1st ed. Groningen: J.B. Wolters; 1878; reprint Arnhem; 1980 p. 126 (Bibliotheek van Middelnederlandsche letterkunde); Jongen L. Over Viervoeters. Jacob van Maerlant. Amersfoort-Bruges: Bekking & Blitz; 2011 p. 77-78.

10 Guldentops G, Steel C. Critical Study: The Leonine Edition of 'De spiritualibus creaturis'. Recherches de théologie et philosophie médiévales. Forschungen zur Theologie und Philosophie des Mittelalters, 2001; 68: 199; Bilke L. Was heiβt hier Katze? Untersuchungen zum Namen der Katze. In: Kampling R, editor. Eine seltsame Gefährtin. Katzen, Religion, Theologie und Theologen. Frankfurt am Main: P. Lang; 2007 p. 87-88.

observation when he describes how the cat first washes its nose with its paws and afterwards licks the entire body.[11]

None of this is very spectacular. Europe's intellectual, mainly ecclesiastical, elite gave a rather sober description of the cat, focusing on the functional characteristics that also in the Low Countries were much appreciated in the day-to-day relationship with the animal. Most authors largely copied each other. Critical reflection based on personal observation was the exception rather than the rule.[12] True to an established tradition, preference was given to animals that were useful to men. *Utilitas* (usefulness, utility) prevailed.[13] At the same time, as we shall see, a number of these intellectuals had found a welcome companion in the cat during the long hours spent writing, by day or by night, in the scriptoria. All the conditions were in place to begin the development of a fairly osmotic relationship. But then something terrible occurred. The Devil took possession of the cat.

"*Musio appellatus*": three walking cats (Bodleian Library Oxford, middle 13th century).

[11] Jammy P, editor. Beati Alberti Magni De Animalibus lib. XXVI. Lyon; 1651. vol 6 p. 603.

[12] Bobis L. Contribution à l'histoire du chat dans l'Occident médiéval. Etude critique des sources [unpublished PhD thesis]. Paris, Ecole Nationale des Chartes; 1990, 3 vol. In the next pages I shall quote the summary, published with the same title in Ecole Nationale des Chartes. Positions des thèses soutenues par les élèves de la promotion de 1990 pour obtenir le diplôme d'archiviste paléographe. Paris; 1990 p. 17-28.

[13] Epstein SA. The Medieval Discovery of Nature. Cambridge: Cambridge University Press; 2012 p. 101; Tatarkiewicz W. History of Aesthetics. Paris-The Hague: Mouton; 1970 p. 199.

Devil and witch. The demonological cat

The popular theory that the cat was treated horribly in the Middle Ages is not entirely correct. It was only from the late 12th century that the cat became increasingly associated with evil.[14] This association was the result of the gradual development of a systematic demonology. A growing number of learned men believed that Satan and his accomplices were actually present on earth to affect the life of mortals. For demonologists, woman was the creature par excellence employed by the devil to destroy mankind. Women who previously had only been accused of magical practices were now considered to be handmaidens of the Devil and therefore had to be punished as heretics. Along with the increasing misogyny, hatred for the cat grew. People not only started to personalise the Devil and his companions, but also to bestialise them and to depict them as animals.[15] The cat proved to be a preferred representation in this process. Describing Satanic rituals with some heretic sects, Walter Map, in his *De Nugis Curialium* ("Trifles of courtiers"), which was written between 1181 and 1193, presented the devil as "a black cat of wondrous size" descending at night by a rope which hangs in the midst of their sanctuaries.[16] Somewhat later, the oldest images appear showing witches in the shape of a cat running off with the male genitalia.[17] Many famous and less famous authors (including Alain de Lille, Gervais de Tilbury, Guillaume d'Auvergne) from the 13th century considered the black cat to be one of the forms that could be adopted by a witch or the Devil.[18] With the papal bull *Vox in rama* (1233), which was in reality much more of a decretal letter to a few German bishops and a heresy hunter, pope Gregory IX put the cat in a demonological context. The highest Church authority confirmed how so-called Luciferians worshiped a black cat at their meetings, which was as

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14 Everaert C. Dierenopvattingen en -voorstellingen in de stand van de kennis in de 13de eeuw [unpublished master thesis]. Leuven, KU Leuven, history department; 2003-2004,

15 Metzler I. Heretical Cats: Animal Symbolism in Religious Discourse. *Medium Aevum Quotidianum*. 2009; 59: 16-32; Van Uytven R. De papegaai van de paus. Mens en dier in de Middeleeuwen. Leuven-Zwolle: Davidsfonds; 2003 p. 75, 152.

16 "*descenditque per funem appensum in medio mire magnitudinis murelegus niger"* (James MR, editor. *Walter Map. De Nugis Curialium*. Oxford: Clarendon Press; 1914 p. 57).

17 Vervoort R. De zaak van de gestolen fallussen. Millennium. Tijdschrift voor Middeleeuwse Studies. 2008; 22 (1): 46.

18 Menard Ph. La tête maléfique dans la littérature médiévale, étude d'une croyance magique. In: Davies PV, Kennedy AJ, editors. Rewards and Punishments in the Arthurian Romances and Lyric. Poetry of Mediaeval France, Woolbridge: D.S. Brewer, 1987; p 91; Bobis L. Contribution à l'histoire du chat, p. 199-201; Van Bentum W. Een kat in het nauw, p. 71.

big as an average dog and with an erect tail, and how they kissed the creature on its anus ("*descendit retrorsum ad modum canis mediocris gattus niger retorta cauda*").[19]

After the publication of this bull, there was a rapid increase in the number of texts and images that show how both Devil and witch could easily transform themselves into a cat to menace mankind. It now became commonly accepted that cats were worshiped as the Devil on the Sabbath, that they orchestrated horrible orgies, castrated men, stole and hid their genitals, and even killed young children in their cradles at night. Several heretic sects such as the Waldensians, Manicheans, Albigensians and Cathars (these were also etymologically associated with cats) all worshiped a black cat as the Devil.[20] Even as late as in 1726, a polemic work by the Middelburg preacher Jacobus Leydekker still mentions

> "how the old Waldensians kissed the backside of a cat, which is the form in which Lucifer appeared to them. That is why they are called Cathari after the cat".[21]

The black cat was the principal victim. In the late Middle Ages the old colour symbolism was already strongly eroded, causing different and often conflicting interpretations of the same colours. Black was linked to firmness, eminence, solemnity, mourning but also festivity. Yet negative feelings prevailed with the grim absence of colour. To many people, black was the tint of death and the Devil, of putrefaction and corruption, of ugliness and heresy.[22] In 1727 the French writer, poet and court historian François-

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19 Hergemöller B-U. Vox in Rama: Die Dämonisierung des schwarzen Katers. In: Kampling R, editor. Eine seltsame Gefährtin. Katzen, Religion, Theologie und Theologen. Frankfurt am Main: P. Lang; 2007 p.149-176; Kors AC, Peters E, editors. Witchcraft in Europe, 400-1700. A Documentary study. 2nd ed. Philadelphia: University of Pennsylvania Press; 2001 p. 114-116; Maddaloni C. La bolla di Gregorio IX e l'olocausto del gatto nero. In: IV Congresso Italiano di Storia della Medicina Veterinaria Grugliasco (Torino), Italia, 8-11 Settembre 2004. Turin; 2004 p. 383-390.

20 Serpell JA. The domestication and history of the cat. In: Turner DC, Bateson P, editors. The domestic cat. The biology of its behaviour. Cambridge: Cambridge University Press; 1988 p. 155; Thomsett MC. Heresy in the Roman Catholic Church: A History. Jefferson (NC): McFarland; 2011 p. 82.

21 "*de oude Waldenzen kusten het agterste gedeelte van een kat, in welker gedaante, men zegt, dat Lucifer hun verscheen, daarom zynze van de Kat Cathari genaamt*" (Leydekker J. De hervormde kerk andermaal verdedigt in 't gemeen tegen het pausdom. Middelbourg: M. Schryver; 1726, not paginated, 'Aanspraak').

22 Van Uytven R. Rood-wit-zwart: kleurensymboliek en kleursignalen in de Middeleeuwen. Tijdschrift voor Geschiedenis. 1984; 87: 449, 453, 462, 469.

Augustin Paradis de Moncrif observed "*Il est vrai que la couleur noire nuit beaucoup aux Chats dans les esprits vulgaires*".[23]

It would be wrong to believe that the intellectual elite brutally imposed an unworldly cultural model on the common people.[24] In popular superstition, too, it was uncritically accepted that the cat had magical properties. In particular, the connotation with female sexuality – which still survives – was widely known.[25] It is even tempting to assume that this sexual connotation inspired a number of demonological constructions among a misogynistic clergy. The choice of other animals for the representation of the Devil points in that direction: the rooster and the male goat were also known for their unbridled lust and passion for procreation. Theologians subtly intertwined doctrines of the learned demonology with elements of the magical world and imaginative superstition of the common people. A continuous and fertile interaction between learned theories and popular convictions therefore seems a better concept to explain the development of the image of the diabolical cat.

The demonological literature of the Middle Ages resulted in the notorious *Malleus maleficarum*. This "Hammer of Witches" (1486), wich appeared in a great number of editions and reprints, contains an odd story of a labourer from a town in the diocese of Strasbourg. When the man was chopping wood in the forest, he was suddenly attacked by a huge cat. He managed to chase the animal but a second and even larger cat appeared. When he tried to chase off this cat as well, he was attacked by a third one. Only with great difficulty was he able to escape the attack by biting, in turn, one of the animals in the head, another in the legs and the third in the back. An hour after his return to town he was arrested by the sergeants of the magistrate as a criminal and brought before the bailiff who had him imme-

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23 Grappe G, editor. F. A. Paradis de Moncrif, Histoire des chats (1727). Edition ornéee d'un portrait-frontispice avec une Introduction. Paris; Chez Sansot; 1909 p. 89.

24 Gielis M. Magie in het oude hertogdom Brabant. Een onderzoek naar de heksenwaan en de waan der historici. In: Mostert M, Demyttenaere A, editors. De betovering van het middeleeuwse christendom. Studies over ritueel en magie in de middeleeuwen. Hilversum: Verloren; 1995 p. 265; Marnef G. Between religion and magic: an analysis of witchcraft trials in the Spanish Netherlands, seventeenth century. In: Schäfer P, Kippenberg HG, editors. Envisioning magic. A Princeton seminar and symposium. Leiden-New York-Cologne: Brill; 1997 p. 235-236, 249; Wiesner-Hanks ME. Christianity and Sexuality in the Early Modern World. Regulating Desire, Reforming Practice. London-New York: Routledge; 2000 p. 264.

25 Darnton R. The Great Cat Massacre and Other Episodes in French Cultural History. 2nd ed. New York: Basic Books; 2009 p. 95.

diately imprisoned in the dungeon for prisoners awaiting a death sentence. For three days the poor man protested his innocence before he was heard by the bailiff and learned about the charges against him. According to the accusation, three days earlier in the wood he had assaulted three respectable women of his town, causing them to remain in bed with serious injuries. Fortunately for the accused, the magistrate finally believed his version of events. Wisely, the city fathers decided that the Devil was at work here ("*intelligentes opus Daemonis fuisse*").[26] The great French scholar Jean Bodin uncritically copied this story in his *Démonomanie des sorcières*, one of the most influential demonological works of the 16th and 17th centuries.[27]

Obviously, in a society where literacy was the privilege of an elite, not everybody had access to the *Malleus*, a difficult and dense scholastic treatise in Latin. The demonological thought process as exposed in the *Malleus* left little or no traces in the Low Countries. The authority of the *Malleus* was modest, its influence minimal. Different authors have noted that the witch-hunt by ecclesiastical and civil authorities was mainly directed against magical practices that were widely disseminated among the people.[28] It is possible that the *Malleus*, and particularly elements of its learned demonology, had some indirect influence. All kinds of more popular versions, even in the form of comics, brought parts of the horrific content to the common man and the normal court procedures or the daily course of justice. In this way a number of prejudices and stereotypes were reinforced or legitimised. However, also with respect to the cat, one should not overestimate the importance of the *Malleus* in the Low Countries. Although cats as an incarnation of the Devil show up in numerous witch

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26 The story is in *pars II*, *quaestio I*, *cap. IX*. I used the edition by N. Bassaeus (Basse): Sprenger J, Institoris H. Malleus maleficarum: De Lamiis Et Strigibvs, Et Sagis, Aliisqve Magis & Daemoniacis. Frankfurt: Basse; 1588 p 308-309.

27 Bodin J. De la Démonomanie des sorcières. Paris: Chez Jacques du Puys; 1581 p 97-98.

28 De Waardt H, De Blécourt W. De regels van het recht. Aantekeningen over de rol van het Gelderse hof bij de procesvoering inzake toverij, 1543-1620. Bijdragen en Mededelingen Vereniging Gelre. 1989; 80: 28; Gijswijt-Hofstra M. Toverij in Zeeland, een status quaestionis. In: De Blécourt W, Gijswijt-Hofstra M, editors. Kwade mensen. Toverij in Nederland. Amsterdam: P.J. Meertens Instituut; 1986 p. 107-151; Gielis M. Magie in het oude hertogdom Brabant, p. 263-313; Vanhemelryck F. De criminaliteit in de ammanie van Brussel van de late middeleeuwen tot het einde van het Ancien Régime (1404-1789). Brussels; 1981 p. 84, 86 (Verhandelingen van de Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België. Klasse der Letteren; vol 43, 97); Vanhemelryck F, Heksenprocessen in de Nederlanden. Leuven: Davidsfonds; 1982 p. 30.

trials,[29] there are no indications of specific cat trials and cat executions. Like people, animals were criminally liable for the acts they were accused of, but cats are notoriously absent from animal lawsuits.[30] The picture of the diabolic cat started to fade when serious cracks appeared in the demonological construct. In 1691 the preacher and theologian Balthasar Bekker denounced the superstition that people could transform themselves into cats.[31] Half a century earlier Abraham Palingh, a linen merchant and a town surgeon in Haarlem, had started an intellectual campaign against Bodin and others intellectuals who believed that cats were witches in disguise.[32] Reminders of the belief survived in legends, tales and proverbs where ghost animals like the black cat continued to be associated with witchcraft and misfortune.[33] According to a local newspaper, the *Gazette van Gent*, the sudden appearance of a cat at the old cemetery of Gent, near the Rabot and the Bruges Gate, in 1895 was enough to cause blind panic in the neighbourhood.[34]

Artistic inventiveness. The imaginery cat

In the previous sections we learned that the functional and rather objective aspect of the oldest ecclesiastical descriptions had smoothly passed into a

[29] Monballyu J. Met de duivel op stap in Kortrijk. Heksenprocessen in 1598-1606 als symptoom van een harde tijd. De Leiegouw. 2012; 54: 65, 68, 89.

[30] Brants J. Over dierenprocessen. Dietsche Warande en Belfort. 1975; 120 (9): 703-706; Evans EP. The Criminal Prosecution and Capital Punishment of Animals. 7th ed. Clark (NJ): The Lawbook Exchange; 2006 (1st ed. 1906); Maes LT. Vijf eeuwen stedelijk strafrecht. Bijdrage tot de rechts- en cultuurgeschiedenis der Nederlanden. Antwerp-The Hague: De Sikkel; 1947 p. 479; Monballyu J. Van vuylle fayten ieghens de nature. Bestialiteitsprocessen in het graafschap Vlaanderen op het einde van de 16de eeuw en het begin van de 17de eeuw. Biekorf. 2000; 100: 160-161; Vanhemelryck F. De criminaliteit in de ammanie, p. 339-340; Verschaffel T. Het varken (sus scrofa). Over misdadige dieren en hun verdiende loon. De Brabantse Folklore en Geschiedenis. 1994; 282: 109-120.

[31] Bekker B. De betoverde weereld, zynde een grondig ondersoek van 't gemeen gevoelen aangaande de geesten (…). Amsterdam: Daniel van den Dalen; 1691. vol 3 p. 12.

[32] Palingh A. 't Afgerukt mom-aansight der tooverye (…). 2nd ed. Amsterdam: Andries van Damme; 1725 p. 154, 167.

[33] Cumps C. Resultaten van het sagenonderzoek in het Nederlandse taalgebied. Volkskunde. Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 1972; 73: 34, 26, 41 and 59; Daniëls D. Resultaten van het sagenonderzoek in het Nederlandse taalgebied. Volkskunde. 1972; 73: 140; Viaene-Devynck A-M. Resultaten van het sagenonderzoek in het Nederlandse taalgebied. Volkskunde. 1972: 73, 316; Harrebomée PJ. Spreekwoordenboek der Nederlandsche taal of Verzameling van Nederlandsche spreekwoorden en spreekwoordelijke uitdrukkingen van vroegeren en lateren tijd. Utrecht: Kemink en zoon; 1870. vol 3 p. 247

[34] Gazette van Gent, 5-7 September 1895.

very negative image propagated by the Church. Artists, however, soon questioned the dominant image of the damned cat. They endowed cats with a number of features, both positive and negative, which in the eyes of the modern reader are sometimes hilarious, but very often leave him in great perplexity. An artist never creates something out of nothing. "The concrete representation of his images will always reveal features of the real world around him".[35] Surviving prejudices, popular impressions, the reading of *auctoritates* and to a much lesser extent personal observations fuelled the image of the imaginary cat with human characteristics. This personification, emphasising the vices, was the basis of the extreme negative attitudes towards the cat, but the generally accepted anthropomorphism focusing on the virtues also enabled a more positive approach.

The earliest literary testimonies are still indebted to the functional descriptions of ecclesiastical authors. The English abbot Aldhelm of Malmesbury (640-709), bishop of Sherborne, praises the cat in a riddle in verse as a faithful guardian and tireless hunter.[36] The shining eyes in the darkness are mentioned repeatedly. Numerous authors pay attention to the efficient way in which cats catch mice. But soon exempla (a kind of moral anecdotes) began appearing in which the cat was attributed with a number of moralising features that still stigmatise the animal to this day. As stated earlier, writers did not hesitate to use far-reaching anthropomorphisation.[37] Egbert of Liège (972-1032), for example, in his proverbs calls the domestic cat a haughty creature full of guile und cunning "that very well knows whose beard it may lick".[38] It is a statement that was to be frequently plagiarised, including in a 15th-century Dutch proverb, "*de catte weet wel wat baert dat*

[35] Van Uytven R. Cloth in Medieval Literature of Western Europe. In: Harte NB, Ponting K, editors. Cloth and Clothing in Medieval Europe. Essays in Memory of Professor E.M. Carus-Wilson. London: Heinemann Educational Books; 1983: p. 152 (Pasold Studies in Textile History; vol 2); Van Uytven R. L'ange Gabriel et le perroquet, selon Boccace. In: Vanneste A, De Wilde P, Kindt S, Vlemings J, editors. Memoire en temps advenir. Hommage à Theo Venckeleer. Leuven-Paris-Dudley (MA): Peeters; 2003 p. 189.

[36] Kampling R. Vom Streicheln und Nutzen der Katze, p. 107.

[37] Bobis L. Chasser le naturel… L'utilisation exemplaire du chat dans la littérature médiévale. In: Berlioz J, Polo de Beaulieu M-A, editors. L'animal exemplaire au Moyen Age. V^e^-XV^e^ siècle. Rennes: Presses universitaires; 1999 p. 227-232, 236-237.

[38] "*ad cuius veniat scit cattus lingere barbam*" (Voigt E. Egberts von Lüttich. Fecunda Ratis. Zum ersten Mal herausgegeben auf ihre Quellen zurückgeführt und erklärt. Halle: Max Niemeyer Verlag; 1889 p. 4; Seiler F. Deutsche Sprichwörterkunde. München: Beck Verlag; 1922. vol 4 p. 86).

sij lackt".[39] In her animal fables (*Ysopet*) from the end of the 12th century, Marie de France, the oldest known poetess in France, suspected cats of having a dose of cunning, but also pointed to their intelligence, realism and humility.[40] Somewhat earlier William IX, duke of Aquitaine and not without merits as an Occitan troubadour, had gone a step further by speaking of "*lo gat mal et felon*", the malicious and treacherous cat. But his judgement was understandable since a ginger cat with great whiskers had scratched him when two seducing ladies had put his alleged deafness to the test.[41]

Aristotle himself linked the cat to shameless lust and unbridled female sexual appetite[42]. Many medieval authors followed him on that path.[43] This was also the case for the German vagrant Freidank at the start of the 13th century. The dangerous – since "*Katzen*" (cats) rhymes with "*kratzen*" (scratch) – catcher likes the company of young mice ("*junger miuse*"). It is also said that "*Eine Metze und eine Katze leben nach gleichem Satze*", in other words, a slut and a cat are one of a kind.[44] The functional mouse-catcher from the early Middle Ages now acquires an erotic significance. "*Sonder mauwen muijsen*" (catching mice without mewing) in later centuries referred to a secret and forbidden sexual relationship.[45] Thomas van Cantimpré went in the same direction. Around the middle of the 13th century he called the cat an unclean and unpleasant animal with fierce mating habits. It is interesting that he added a new element to the common negative representation. The preaching friar from Sint-Pieters-Leeuw (near

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39 De Bruyn E. The Cat and the Mouse (or Rat) on the Left Panel of Bosch's Garden of Delights Triptych: an Iconological Approach. In: Jaarboek Koninklijk Museum voor Schone Kunsten. Antwerp; 1991 p. 40. The proverb was also known to the Anglo-Norman Marie de France: "*Bien seit chaz ki barbe il lecche*" (Bloch RH. The Anonymous Marie de France. Chicago: The University of Chicago Press; 2003 p. 153-154; Wright T. The Domestication of Animals in the Middle Ages. The Intellectual Observer, 1865: 6: 325).

40 Bloch RH. The Anonymous Marie de France, p. 125, 144, 154, 179, 194, 196; See also Amer S. Ésope au féminin: Marie de France et la politique de l'interculturalité. Amsterdam- Atlanta (GA): Editions Rodobi; 1999 p. 160-151, 166.

41 De Witt Snodgrass W. The ladies with the cat. In: Robert Kehew R, editor. Lark in the morning. The verses of the troubadours. A bilingual edition. Chicago: The University of Chicago Press; 2005 p. 32 and 33.

42 Dixon LS. Perilous chastity: women and illness in pre-Enlightenment art and medicine. New York: Cornell University Press; 1995 p. 70-71.

43 Bobis L. Chasser le naturel, p. 234-235.

44 Grimm W. Freidank. 2nd ed. Göttingen: Verlag der Dieterichschen Buchhandlung; 1860 p. 88-89; Simrock K. Freidanks Bescheidenheit. Ein Laienbrevier. Stuttgart: Gotta'schen Buchhandlung; 1867 p. 122

45 De Bruyn E. The Cat and the Mouse, p. 34-37.

Brussels) did not fail to notice that a cat spent 70 percent of its time sleeping. Henceforth "immoderate laziness" (*nimia pigritia*) was another sin ascribed to the poor cat.[46] The most famous anthropomorphic cat from the Low Countries illustrates the transition to a negative image. Despite his small stature (he is called a small animal, "*een cleene dier*"), Tybeert, the unfortunate tomcat in the animal epic *Van den vos Reynaerde* (1200-1260?), is wise, experienced and cunning. But because he prefers a tasty mouse meal to salvation for his soul, he is severely punished for his gluttony.[47] It is clear: the cat was anything but popular in the late Middle Ages and on the eve of a new era it could expect little sympathy.[48] Even the talent for catching mice, so often praised in earlier centuries, was now interpreted as false and deceptive.[49] As the painter, poet and the artist biographer Karel van Mander put it in 1604: like unjust judges cats in the house were often more detrimental than mice ("*dickwils in huys schadigher als de Muysen*").[50]

A faithful and watchful, agile and wise, but much more a vain, arrogant, cunning, lazy, false and especially voluptuous creature: the literary reputation of the cat at the start of the Early Modern Period was not enviable. The new era remembered from the previous one above all the erotic connotations. Both in the plays and in the poetry of the rhetoricians, the mewing kitten ("*catken*") or the purring puss ("*minneken*") refers to a sexually aroused woman. This was also the case in more moralising works. For example, Abraham a Sancta Clara (1642-1709) mentioned the "rubbing and stroking" of the cat ("*stryken en streelen*"), an amorous creature that "licks and strokes" ("*likt en streelt*").[51] In the emblemata literature of the

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46 Boese H, editor. Thomas Cantimpratensis Liber de Natura Rerum. Editio princeps secundum codices manuscriptos. Berlin, 1973. vol 1 p. 151, art. LXXVI

47 Lulofs F, editor. Van den vos Reynaerde. Kritische editie met woordverklaring, commentaar en tekstkritische aantekeningen en een inleiding. Hilversum: Verloren; 2001 p. 106-107 (Middelnederlandse tekstedities; vol 9); Hellinga W. Het laatste woord is aan Firapeel. In: Van Dijk H, Wackers P, editors. Pade crom ende menichfoude. Het Reynaert onderzoek in de tweede helft van de twintigste eeuw. Hilversum: Verloren; 1999 p. 47-48; Van Bentum W. Een kat in het nauw, p. 71-74.

48 Rassart-Eeckhout E. Le chat, animal de compagnie à la fin du Moyen Âge? L'éclairage de la langue imagée. In: Bodson L, editor, L'animal de compagnie: ses rôles et leurs motivations au regard de l'histoire. Journée d'étude Université de Liège, 23 mars 1996. Liège: Université de Liège; 1997 p. 95-118 (Colloques d'histoire des connaissances zoologiques; vol 8).

49 See the many examples quoted by De Bruyn E. The Cat and the Mouse, p. 44-46.

50 Van Mander C. Het Schilder-boeck (facsimile van de eerste uitgave).Utrecht: Davaco Publishers; 1969, f° 130r.

51 Van Sancta Clara A. De gekheyt der wereldt, wysselyk beschreven en kluchtig vertoondt (…). Amsterdam: G. Tielenburg; 1721 p. 126, 460; Van Sancta Clara A. Judas den aarts-schelm (…), Amsterdam: J. Wolters en J. Pauli; 1716 p. 402.

Low Countries the cat is usually the symbol of carnal desire and coquetry.[52] In 1646 the Jesuit and poet Adrian Poirters advised parents to watch carefully over their daughters, "since "it has been noticed more than once that creeping cats stole the meat from the cooking pot" ("*'t is meer als eens gesien dat de sluypende kattekens het vleesch uyt den pot stolen*"). His wise advice was by no means original[53] and the subject was often depicted (for example by Nicolaes Maes, *De Luistervink* (The Eavesdropper) in 1657). However, the Early Modern Period added a positive feature to the existing cat symbolism, a quality that was only sporadically recognised in the Middle Ages[54]: the cat as an independent creature *par excellence* and symbol of freedom. According to an invented tradition, the representation would stem from pre-Christian and pagan German elements. This symbolism peaked during the French Revolution and was also introduced in the Low Countries.[55] Also new was the appearance of the cat in the wars of religion and in religious polemics. Catholics were associated by their opponents with "cat lickers" ("*catte lecken*"). Clergy who according to their enemies had retired in the Land of Cockaigne of a monastery or abbey were labeled as "monastery cats".[56] This is not surprising. Since the late Middle Ages urban citizens were also known as "town cats". Bredero used the concept of "urban cats" ("*stee-katten*") when referring to townspeople.[57]

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52 Porteman K. Inleiding tot de Nederlandse emblemataliteratuur. Groningen: Wolters-Noordhoff; 1977 p. 46, 101 (Nieuwe literaire verkenningen).

53 For example in one of the proverbs by Johan de Brune in 1636 ("*De luymend' Katten zijn niet bot, zij halen 't vleysjen uyt de pot*" or "The creeping or lurking cats are not stupid, they get the meat out of the pot"). See De Jongh E. Tot lering en vermaak. Betekenissen van Hollandse genrevoorstellingen uit de zeventiende eeuw. Amsterdam: Rijksmuseum; 1976 p. 149.

54 Bobis L. Chasser le naturel, p. 231-232.

55 Boesmans A. Huisdieren. Volkskunde Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 1984; 85: 154; Leith J. Ephemera: civic education through images. In: Darnton R, Roch D, editors. Revolution in print. The press in France, 1775-1800. Berkeley-Los Angeles-London: University of California Press; 1989 p. 273; Segal S. Jan Davidsz de Heem en zijn kring. The Hague: Sdu; 1991 p. 217; Viroli M. La théorie de la société bien ordonnée chez Jean-Jacques Rousseau. Berlin-New York: De Gruyter; 1988 p. 122.

56 Bässler A. Sprichwortbilt und Sprichwortschwank. Zum Illustrativen und Narrativen Potential von Metaphern in der deutschsprachigen Literatur um 1500. Berlin: De Gruyter; 2003 p. 103

57 Veenstra F. editor, G.A. Bredero's Griane met fragmenten uit het volksboek van Palmerijn. Culembourg: Tjeenk Willink; 1973 p. 184; Rogge J. Ehrverletzungen und Entehrungen in politischen Konflikten in spätmittelalterlichen Städten. In: Schreiner K, Schwerhoff G, editors. Verletzte Ehre. Ehrkonflikte in Gesellschaften des Mittelalters und der frühen Neuzeit. Cologne: Böhlau Verlag; 1995 p. 120, note 45 (Norm und Struktur: Studien zum sozialen Wandel in Mittelalter und früher Neuzeit; vol 5).

Iconographic sources portrayed the characteristics that were ascribed to the cat in literary texts. Illustrated *bestiaria* or compendia describing various animals and fantastic creatures were a popular genre in the Middle Ages. The portrayal of the cat in these bestiaries from the 12th and 13th centuries is mainly functional. The *musio* (or sometimes *murilegus*) appears in various positions: watching or chasing mice, playing with a mouse, holding or eating a mouse, taking an interest in birds, licking the paws or just sleeping.[58] As is the case with textual documentation, but perhaps with a small time lag, the visual representation changed in the 14th century. From the late Middle Ages until well into the 17th century, the image of a cat symbolised negative features such as coquetry, laziness, falsehood, greed and above all lust.[59] It is hardly surprising in this misogynistic period that the depiction of a cat actually stands for the sexually overactive and adulterous woman.[60] In the company of cuddling or flirting couples, often a dirty old man with a young lass, the cat is never far away.[61] Erotic prints explicitly link the kitten to female sexuality. Very popular in the Low Countries in the late 16th and early 17th century was an engraving with a kitten that points with its paw to the genitals of a woman, warming up a kettle at the open fire, while she has her skirt raised and her legs spread. Sometimes the scene was also engraved on a coin. The accompanying legend "A hearth of your own is worth gold" is full of ambiguity.[62] But apart from the erotic association, the cat is also used as an unfavourable allegory in representations of religious themes such as the Garden of Even, Christ before Pilate and The Last Supper. In some paintings a monkey, another animal with a negative symbolism, looks after a cat and both run

58 See a number of images in "The Medieval Bestiary" http://bestiary.ca/beasts/beastgallery213.htm# (accessed March 2014).

59 Adriaensen P. Iconografie van de honingbij in de Lage Landen. Bijenkunst en bijensymboliek in het straatbeeld en toegankelijke gebouwen. Amsterdam-Apeldoorn: Maklu; 1998 p. 193; De Bruyn E. Het Madrileense Tafelblad: een iconografische benadering. Jaarboek Koninklijk Museum voor Schone Kunsten. Antwerp: Koninklijk Museum voor Schone Kunsten; 1991 p. 19

60 De Bruyn E. The Cat and the Mouse, p. 26. Most of the examples in the next notes are borrowed from iconographical sources. Using the handy search form of the "Koninklijk Instituut voor het Kunstpatrimonium" (KIK)- "l'Institut Institut royal du Patrimone Artistique" (IRPA), I searched the database of this institute: http://balat.kikirpa.be/search_photo.php (accessed January 2014). When possible, and particularly in the case of an anonymous work, I also quote the "object number" of the picture in the KIK-IRPA databank.

61 See for example the painting by David II Teniers, Old Man and Young Woman (1635) [KIK-IRPA 0000184] or The Amorous Couple in an Inn by Jan Miense Molenaer (1640-1650).

62 Royal Library Albert I Brussels, Cabinet des Médailles, médailler D.

away from a yapping dog.[63] For David Teniers the Younger the cat is only honest when there is some cheese in the store cupboard.[64] Kitchen scenes by Flemish and Dutch masters such as Frans Snyders and Willem van Mieris invariably contain a skittish cat begging for food or simply stealing it. Still-lifes with their prominent and very realistic display of food show the crafty cat that approaches almost invisibly and creeps closer to the victuals.[65] Dozing cats are invariably present at drinking parties or carousing and feasting companies.[66] However, in these cases, and contrary to what is believed by some art historians, the main objective of the artist may have been a realistic and accurate reflection of reality: cats largely had access to barrooms and living rooms.

The other characteristics ascribed to the cat in literature are reflected in the visual art of the time. Against the background of the conflicts between Catholics and Protestants, Catholics everywhere in Europe were represented as cats. As the highest leaders of the Catholics, popes appeared with cats on their shoulders or on their laps.[67] The linguistic association with "cats lick" ("*catte lecken*") was supported by a number of folk prints. These show the cat as a false creature that at the same time licks the face and scratches the neck and shoulders.[68] In some cases this negative symbolism

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63 See the painting by Derick Baegert, Christ before Pilate (ca 1500). Left wing of the passion triptych (*Passionsaltar*) in the Saint Lawrence Church in Cologne [KIK-IRPA 20020710].

64 Bruegel. Une dynastie de peintres. Brussels: Europalia; 1980 p. 274, 275, n° 13 (Europalia 80 Belgium).

65 See for example the paintings by Frans Snyders in the first half of the 17th century, such as The Fish Stall, The Fish Shop, The Pantry, The Cook in the Larder, Hunting Still Life, Still Life with Fruit, Dead Game, Vegetables, a Live Monkey, Squirrel and Cat, Still Life with Oysters and Fish, and many others. Other painting includes Alexander Adriaenssen, Still Life with Fish (first half 17th ecntury); Joachim Beuckelaer, The Kitchen (second half 16th century) [KIK-IRPA 50005219]; Willem van Mieris, A Woman and a Fish Peddler (1713).

66 See for examples paintings by Adriaen Brouwer, The Musician (first half 17th century) [KIK-IRPA 158673]; Jacob Jordaens, The King Drinks (ca 1638) [KIK-IRPA 40005449], As the Old Sing, so Pipe the Young (1640-1650) [KIK-IRPA 40000542]; Jan Miense Molenaer, Men drinking in an Tavern (middle of the 17th century) [KIK-IRPA 20025734]; Cornelis Hermansz Saftleven, Peasants Smoking and Drinking (17th century); William van Herp, Tavern Interior with Card Players (1660), Allegory of the Five Senses (1660); Justus van Huysum, Tavern Scene with Slaughtered Pig (second half 17th century) [KIK-IRPA 20029072]; Adriaen van Ostade, Feasting Peasants in a Tavern (1673).

67 Ketters en papen onder Filips II. Het godsdienstig leven in de tweede helft van de 16de eeuw. 2nd ed. Utrecht: Rijksmuseum Het Catharijneconvent; 1986 p. 174; Bauwens A et al. editors. Opstand en verval. Aspecten van het dagelijkse leven in het Brugse tijdens de laatste decennia van de 16de eeuw. Bruges: J. Herrebout; 1987.

68 De Meyer M. Volksprenten in de Nederlanden 1400-1900. Amsterdam: Scheltema en Holkema; 1970 p. 107, image n° 97.

Willem Van Herp, Tavern Interior with Card Players (c. 1660).

could become very personal. For example, Thomas Murner (1475-1537), the well-known Franciscan and humanist, was not only portrayed in texts as a silly tomcat ("Murr-nar"), but was also depicted with the head of a cat.[69]

Outside the world of high art, the cat was used in heraldic portrayals, particularly in the decoration on the helmet and in the coats of arms or blazons. In the whole of Europe, from Italy and the Papal State to Scandinavia, and from the British Isles to the east of the Habsburg Empire, the nobility proudly wore the cat on their shields and banners. In the small states of the Holy Roman Empire, especially, the cat proved to be a popular heraldic item. Usually the cat was depicted in rampant pose (*le chat rampant* or *effarouché*), much less with a hunchback (*le chat hérissonné*) or sitting (*le chat assis*).[70] Often the picture was limited to the head of the cat, but in some cases details were added such as a mouse between the teeth or a cat peering into a mouse hole. In some families the

[69] Thurau M. Ein Katholischer Kater. Zur Polemik Thomas Murners. In Kampling R, editor. Eine seltsame Gefährtin. Katzen, Religion, Theologie und Theologen. Frankfurt am Main: P. Lang; 2007 p. 177-206.

[70] Rietstap JB. Handboek der wapenkunde. Gouda: G.B. Van Goor; 1857 p. 178.

heraldic choice of the cat was obvious because the animal was already a part of the name. This was the case for families with names as 'Gatti', 'Le Chat', 'Katt', 'Katzbeek', 'Katzenstein', 'Katzeler', 'von der Katze' or in the Low Countried 'Boschat', 'Caters', 'Cats', 'Kets', 'Kattendijk(e)', 'Katwijk', etc. Families with the name 'Muijs' (Mouse) of 'Muyser' (Mouser) apparently also liked to be associated with the great enemy of the vermin that had inspired their naming.[71] Where the family name does not offer an explanation, the owner or bearer of the blazon referred to some characteristics of the animal he could appreciate;[72] independence and freedom are explicitly mentioned.[73] Most of the images were in sable (black), followed by silver (white) or gold (yellow), which proves that the idea of the demonological cat was far away. The owners were proud of their arms and even extended its symbolism into the afterlife. An example is provided by the funeral coats of arms and epitaphs of the aristocratic family de Caters in 's-Gravenwezel near Antwerp. These objects show two standing tomcats, fearlessly gazing at the observer and holding a shield with three other cats.[74] Cats are also found on helmets. In 1600 Leonard Micault, lord of Buizingen, had a silver cat on his helmet, holding a black mouse in its mouth.[75] Of course the cat was also present in the naming of ordinary people. Abandoned children who were found in a place that was associated with a cat were called "*katteken*" (little cat) for the rest of their lives.[76]

The imaginary cat led its own life in toponymy, in the names of squares, fields, forests, lands, meadows, brooks and pools. Although the toponym "cat" and its Germanic variants is responsible for huge problems of inter-

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71 Based on a large sample in Rietstap JB. Armorial général, contenant la description des armoiries des familles nobles et patriciennes de l'Europe, précédé d'un dictionnaire des termes du blason. Gouda: G.B. Van Goor; 1861, passim.

72 Hublou S. Van trouwe paarden, ongewenste otters en verwende valken. De heren van Beersel en de hertogen van Brabant in hun houding tegenover dieren (ca. 1405-1580). De Brabantse Folklore en Geschiedenis. 1991; 270: 125.

73 De Vulson M. La science héroïque, traitant de la noblesse, de l'origine des armes, de leurs blasons (…). Paris: S. Cramoisy; 1644 p. 286.

74 Obiits & rouwgebruiken bij de adel. Rouwborden in de Sint-Catharinakerk te 's-Gravenwezel. The Hague: Heemkring De Drie Rozen; 2002 p. 36, 44, 45; Duerloo L, Janssens P. Wapenboek van de Belgische adel. Brussels: Crédit communal; 1992. vol 4, ill. 2709-2710, n° 543; De Ryckman de Betz F. Armorial général de la noblesse belge. Liège: H. Dessain; 1957 p. 119.

75 Bal AMM. Geschiedenis van Huizingen. De Brabantse Folklore, 1960; 147: 218.

76 De Man L. Vondelingen en hun naamgeving. Leuven: Instituut voor Naamkunde; 1956 p. 12 (Anthroponymica Onomastica neerlandica; vol 7) quotes an example for Leuven "*inventus in platea felium*" (1786).

pretation among experts in various countries,[77] it is obvious that the cat left its traces in names of streets, houses and breweries, on sign-boards of inns and shops. Almost every town or village had its "*kattestraat*" (cat street) or "*kattesteeg*" (cat alley).[78] It also had a number of houses, often breweries,[79] with the name "*de Kat*" (the Cat), "*de grote Kat*" (the Great Cat), "*de kleine Kat*" (the Small Cat), "*de wilde Kat*" (the Wild Cat), and other variations, a practice used to pay tribute to the animal that managed to keep notorious

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77 Karsten G. Noordhollandse plaatsnamen. Amsterdam: Jacob van Campen; 1951 p. 58; Rentenaar R. Groeten van elders. Plaatsnamen en familienamen als spiegel van onze cultuur. Naarden: Strengholt; 1990 p. 29-30. The Dutch toponym "kat" (cat) may also be linked to a quay or wharf, a narrow opening, a small alley, a narrow waterway or seaway (compare the "Kattegat" between Denmark and Sweden). A cat meant something small or trivial, a nothing or nonentity, very often with a pejorative connotation and with a certain disdain. In the eastern part of Flemish Brabant the toponym often has this significance (Kempeneers P. Oost-Brabantse plaatsnamen. 8. Waanrode. Leuven: Instituut voor Naamkunde; 1998 p. 18; Kempeneers P. Tiense plaatsnamen. Tienen: P. Kempeneers; 1987. vol 2 p. 281; Kempeneers P. Toponymie van Attenrode-Wever. Een geschiedkundige en toponymische studie. Handelingen van de Koninklijke Commissie voor Toponymie & Dialectologie. 2007; 79: 288; Kempeneers P. Toponymie van Landen. Leuven: Instituut voor Naamkunde; 2000 p. 156 (Nomina Geographica Flandrica. Studiën en Monografieën uitgegeven door het Instituut voor Naamkunde te Leuven. Monografieën; vol 17)). But a totally different significance was possible as well, the term "*kat*" (cat) or "*kater*" (male cat) referring to military terminology related to siege and fortification. A (male) cat could indeed mean either an engine or a weapon of war (a siege cat), a wooden shed mounted on wheels with a roof covered in animal hides, sometimes even a defensive wall (Rogers CJ, editor. The Oxford Encyclopedia of Medieval Warfare and Military Technology. Oxford: Oxford University Press; 2010 p. 138, 326, 370. See also Bilderdijk W. Geschiedenis des vaderlands. Amsterdam: P. Meyer Warnars; 1833. vol 3 p. 232; Van Rooswyck N. Korte historische aantekeningen, wegens het voorgevallene in de spaansche belegering der stad Haarlem in de jaaren 1572 en 1573 (…). Haarlem: Marshoorn en Van Assendelft; 1739 p. 46; Merkes JGW. Het beleg van Maastricht in 1579: Met geschied- en Krygskundige aanteekeningen. Arnhem: W.J. Thieme; 1827 p. 92, 94). In Ostend, the "*Groote Kat*" (big cat) was a square at the seaside, situated somewhat higher than the surrounding area, where artillery was deployed (De Saint Genois J. Het kasteel van Wildenborg of de Spaansche muitelingen bij het beleg van Ostende (1604). The Hague: De Gebroeders Belinfante; 1846. vol 1, p. 33-34, 160, 170). At Leuven, the "*cattestraete*" owed its name to an earth wall but in the French period (after 1794) the name was translated by mistake as "*rue des chats*" (Glabeke K. Wat leert de straat? Leuvense straatnamen toegelicht. Leuven: Peeters; 2011 p. 119, note 1). But even these alternative meanings eventually refer to the animal: a street barely wide enough for a cat to pass by, siege engines that evoke the features or the physical appearance of the cat., etc. It is therefore safe to conclude that the cat itself was an important source of inspiration for the formation of these microtoponyms. Yet there is also a hypothesis that in a number of cases the toponym "cat" does not refer to the animal, but to mud or mire: Devos M. Valse katten in het Meetjesland. In: Vriendenboek Luc Stockman. Eeklo: Van Hoestenberghe; 1998 p. 107-109; Devos D. Betekenis en motivering van enkele diernamen in de toponymie. Naamkunde. 2002; 34: 218-220. Her thesis is supported by Vannieuwenhuyze B. Katten en wolven, modder en mensen. Twee diernamen in middeleeuws Brussel. In: De Caluwé J, Van Keymeulen K, editors. Voor Magda. Artikelen voor Magda Devos bij haar afscheid van de Universiteit Gent. Gent: Academia Press; 2010 p. 765-766.

78 Amter E. Leuvensche straatnamen. Mededeelingen uitgeg. door de Vlaamse Toponymische Vereeniging te Leuven. 1932; 8 (2): 33.

79 Other companies sometimes also received that name. Amsterdam for example, in the middle of the 18th century, had some soap factories named "*de Kat*" (Elias JE. De vroedschap van Amsterdam 1578-1795. Reprint. Amsterdam: N. Israel; 1963. vol 1 p. 492).

household pests like mice and rats out of the grain stocks. Like many other animals, the cat was very popular on sign-boards of inns, pubs, taverns, shops and market stalls. Both the male and the female variant could be found in all kinds of colours (multi-coloured, red, black, gilded), poses and situations (caught, dancing, hunting, sneezing, preaching, fishing, catching or playing with mice).[80] A variant on "*le trio de Malice*" (the Trio of Evil) in Troyes and other places in France also existed in the Low Countries. These were "*de drie valsche dieren*" (the three false animals), the trio being a cat, a woman and a monkey.[81] In contrast to many other animals the heraldic cat was absent from seals and municipal coats of arms. A probable explanation is that Belgium has no municipalities (villages, towns) that refer to the cat directly in their name. Although the situation is different in the Netherlands, places such as Katwijk or other communities (Kathoek, Katham, Kattendijke, Katwoude) did not bear a cat in their coat of arms. Katwoude does use a stamp that shows a cat resting on a tree branch.[82]

The warmth indoors. The home cat

Medieval and early modern people liked to surround themselves with animals. Some were used for food production or as suppliers of raw materials, others were employed in transport and communication, were brought into action in war and on the battlefield, offered warmth and protection, assisted with hunting or in the labour process, served as a sacrifice and payment. As suggested in the first section, all these examples indicate that usefulness dominated the daily relationship between people and animals. This is hardly surprising in a harsh and still primitive society. Yet a limited number of animals were able to transcend the pragmatic aspects. They populated man's imagination, stimulated his artistic urge, marked his identity, status and need for distinction, they shaped his desire for the unusual and the amazing. An even more select group of animals served as home

[80] Van Lennep J, Ter Gouw J. De uithangteekens in verband met geschiedenis en volksleven beschouwd. Amsterdam: Gebroeders Kraay; 1868. vol 2 p. 332, 345-346.

[81] De Potter F. Het boek der vermaarde uithangborden. Gent: F. La Fontaine; 1861 p. 22; Rutgeerts A. Vlaamsche uithangborden en gevelsteenen. Brussels: De Burcht; 1843 p. 19 (Irmin reeks; vol 3); Morse EA. Stage-coach and tavern days. New York-London: Macmillan; 1901 p 160.

[82] Sierksma K. De gemeentewapens van Nederland. Antwerp-Utrecht: Het Spectrum; 1960 p. 79, 201.

entertainment and contributed to sociability. Was the cat a member of this distinguished club?

Regardless of religious prejudices or symbolic and artistic interpretations, the cat was a fact of daily life, observed by people who were unfamiliar with theological treatises and cultural ideas or who simply ignored this tradition. The first description of a domesticated cat comes from the biography of Saint Gregory the Great (590-604), a pope with a fondness for cats. His biography, written between 870 and 880 by Joannes Diaconus of the Benedictine order, has a story of a hermit who was so impressed by the sermons of Saint Gregory that he wanted to donate his cat, which was all he possessed, to the saint.[83] From the early beginnings of monastic life, monks looked on the cat as a real pet. One of the oldest images of cats can be found in the *Book of Kells*, written by Irish monks around 800. The well-known chi-rho monogram-incipit (f° 34r°) has a lovely scene with two cats and four mice.[84] There is no question here of any animosity or aggression. Two mice are even shown sitting on the back of cats as they quietly watch the scene. Was the monk dreaming of an ideal world while performing his artistic work? Some rare personal documentation, however, makes clear that cats were not only welcome to scriptoria and chanceries because of their hunting abilities. A charming Irish poem from the 9th century suggests that cats were also the ideal companion during the long hours of writing. The author, a monk, compares his white cat Pangur's hunger for mice to his own hunger for words. But he also praises the pleasant company of his quiet companion.[85]

The ideal world does not exist. Sometimes an exceptional testimony refers to the less pleasant aspects of cohabitation between man and cat and alludes

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83 Van Bentum W. Een kat in het nauw, p. 65; Bobis L. Une histoire du chat. Paris: Seuil; 2006 p. 59 (Points. Histoire; vol 356); Lewis S. Sacred Calligraphy: The Chi Rho Page in the Book of Kells. Traditio. 1980; 36: 146; Wright T. The Domestication of Animals, p. 325.

84 Lamm RC. The Humanities in Western Culture. A Search for Human Values. 4th ed. Boston: Brown & Benchmark; 1996 p. 228; Lucie-Smith E. Art and Civilization. New York: Harry S. Abrahams; 1993 p. 120; Lewis S. Sacred Calligraphy, p. 146-147 and fig. 6. The book is preserved in Trinity College Library Dublin.

85 Gooden M. The Poet's Cat. An anthology. New Hampshire: Ayer Publishing; 1946 p. 23; Kousbroek R. Pangur Bán: een anoniem Iers gedicht. The Hague: Statenhofpers; 2004; Murphy G, editor. Early Irish Lyrics Eight to Twelfth Century. Oxford: Four Courts Press; 1956 p. 2-3; O'Rourke Murphy M, MacKillop J, editors. Irish Literature. A Reader: New York: Syracuse University Press; 1987 p. 22-23. Gallagher M. Flann O'Brien, Myles na Gopaleen et les autres: Masques et humeurs de Brian O' Nolan, Fou-littéraire irlandais. Villeneuve d'Accq: Presses universitaires du Septentrion; 1998 p. 160, note 19.

to tensions and conflicts. In 1418 a Brother of the Common Life, possibly a monk from Cologne, wrote about what he found one morning in the town of Deventer when returning to his writing table. His words still reflect his bewilderment[86]:

> "Nothing is missing here, but one night a cat urinated on this. Cursed be the miserable cat that peed on this book during the night in Deventer and because of that cat, all the other cats as well. And one must be careful not to leave open books at night where cats can get to them".[87]

A large part of the folio in the manuscript is left empty. In the centre of a light brown stain the scribe has drawn an admonishing finger pointed to the figure of a cat, although it looks more like a donkey. The incident illustrates that cats had access to houses and even to the work and living areas. A number of penitential books from the 7th and 8th centuries also leave no doubt that the domestic cat found its way into barns, basements and attics, but was also able to enter the rooms and chambers of the household.[88]

The functional reputation of the cat as a mouse exterminator was clearly appreciated in all periods because mice and rats were a real plague, both feared and hated.[89] Mice were to be found everywhere, in the kitchens of charitable institutions, in the rood lofts of churches where they chewed the organ pipes,[90] even in the private rooms of Charles of Lorraine, the popular governor of the Austrian Netherlands.[91] The ubiquity of mice explains why some institutions "employed" cats as mouse hunters. This was the case, for example, with the Gent Berg van Barmhartigheid (*Mons Pietatis, Mont-de-*

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86 The document is preserved in the Historisches Archiv der Stadt Köln and its original version reads as follows "*Hic non defectus est, sed cattus minxit desuper nocte quadam. / Confundatur pessimus cattus qui minxit super librum istum in nocte Daventrie, et consimiliter omnes alii propter illum, et cavendum valde ne permittantur libri aperti per noctem, ubi catti venire possunt*" (Vennebusch J. Die theologischen Handschriften des Stadtarchivs Köln: Die Quart-Handschriften der Gymnasialbibliothek. Cologne-Vienna: Böhlau Verlag; 1980. vol 2 p. 255-256).

87 Mertens T. Moderne Devotie en geestelijke literatuur. In: Schenkeveld-van der Dussen MA, editor. Nederlandse literatuur, een geschiedenis. 2nd ed. Amsterdam-Antwerp-Groningen: Contact-M. Nijhoff; 1998 p. 79.

88 Bobis L. Contribution à l'histoire du chat, p. 21; Bobis L. Une histoire du chat, p. 48-49.

89 Van Nieuwenhuysen P, Top S. Vlaamse volkskundige gebeden in Wallonië. Volkskunde. Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 1980; 81: 224.

90 Lier, Archives of the collegiate church of Saint Gummarus, accounts, n° 43; Breugelmans K. De sociale geschiedenis van het Lierse Sint-Elisabethgasthuis 1544-1562 [unpublished master thesis]. Leuven, KU Leuven, history department; 1983 p. 89.

91 Brussels, General State Archives, Secretariat of State and War, n° 2612, letter of 17 July 1780 and Administrative correspondance of the reformed Chambre of accounts, n^{os}. 3592-8.

Piété), an organisation established for the regulation of pawnbroking. In 1693 the Berg purchased food for its two cats.[92] Only recently have economic historians become aware of the tremendous damage caused by pests to output and capital goods, not to mention the relationship between the rat (*rattus rattus*) and the outbreak of plague.[93] Rat cages and mousetraps are mentioned in all kinds of sources, from paintings[94] and devotional pictures[95] to probate inventories[96] and street songs or poems.[97] Some statements or elucidations suggest that people also appreciated the cat for other reasons than purely functional. In a text already quoted, Thomas van Cantimpré calls the cat a lazy, lascivious and unpleasant animal, but also mentions that cats seek out warm places and like to play with humans. They also like being stroked, giving expression to their pleasure through a peculiar way of singing ("*suo modo cantandi*").[98] Undoubtedly, Cantimpré must have been watching sleeping cats. And so was Jacob van Maerlant, who describes how a cat arches its back when stroked.[99] Despite the radical theological offensive in the late Middle Ages, the cat had clearly not disappeared from people's houses at the beginning of the Early Modern Period.

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92 Charles L, Everaert G, Laleman MC, Lievois D. De Berg van Barmhartigheid in Gent. Gent: Snoeck; 2003 p. 52.

93 Hoffmann RC. Bugs, Beasts, and Business: Some Everyday and Long-Term Interactions between Biology and Economy in Preindustrial Europe. In: Cavaciocchi S, editor. Economic and Biological Interactions in Pre-Industrial Europe from the 13th to the 18th Centuries. Prato: Firenze University Press; 2010 p. 147-148 (Fondazione Istituto Internazionale di Storia Economica "F. Datini" Serie II – Atti delle "Settimane di Studi" e altri Convegni; vol 41); Davids K. Dieren en Nederlanders. Zeven eeuwen lief en leed. Utrecht: Matrijs; 1989 p. 25, 50; Jordan WC. The Great Famine: Northern Europe in the Early Fourteenth Century. Princeton NJ: Princeton University Press; 1996 p. 28.

94 Van Uytven R. De papegaai van de paus, p. 249, 250; Schadee N. Rotterdamse meesters uit de gouden eeuw. Zwolle: Waanders; 1994 p. 245. See for example the painting by Adriaen van der Werff, Two Children with a Mousetrap (1692).

95 De Meyer M. Volksprenten in de Nederlanden, p. 59, illustration 43.

96 See some samples in the town of Lier and the villages of Brussegem, Eppegem and Grimbergen, all in the former duchy of Brabant: Leuven, State Archives, Greffes scabinaux (acts of the ealdermen) district of Brussels, nos 1121, 1222, 3714, 7911 and Lier, Town Archives, Oud Archief, n°s 1837, 1867. Other examples are given by Duverger E. Antwerpse kunstinventarissen uit de zeventiende eeuw. Brussels: Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België; 1991. vol 5 p. 240 (Fontes historiae artis Neerlandicae. Bronnen voor de kunstgeschiedenis van de Nederlanden; vol 1) and Kamermans JA. Materiële cultuur in de Krimpenerwaard in de zeventiende en achttiende eeuw. Ontwikkeling en diversiteit. Hilversum: Verloren; 1999, p 94.

97 De Ridder P. "Lestmael kwam ik tot Brussel eens getreden daer ick veel aerdige dingen sagh". Twee Brusselse straatgedichten (17de-18de eeuw). In: Jansen-Sieben R, Libert M, Vanrie A, editors. Quotidiana. Huldealbum Dr. Frank Daelemans. Brussels: Archief- en Bibliotheekwezen in België; 2012 p. 175, 191, note 160.

98 Boese H, editor. Thomas Cantimpratensis Liber de Natura Rerum. Editio princeps secundum codices manuscriptos. Berlin, 1973. vol 1 p. 151, art. LXXVI.

99 Jongen L. Over Viervoeters. Jacob van Maerlant. Amersfoort-Bruges: Bekking & Blitz; 2011 p. 78.

Witch trials show that cats had daily access to the poorly secured houses.[100] Eerrijk de Put, a professor at Leuven University, court historiographer and private secretary to the Archduke, advised for reasons of hygiene in 1639 that people should take only one dog or cat as a pet.[101]

As we saw in the previous section, cats often symbolised negative characteristics both in texts and iconography. This negative image changed in the course of the 17th century. The cat had reached a stage where the conditions were favourable for some rehabilitation. Some authors praised its spirit of liberty, cleverness and sense of cleanliness.[102] The cat even became a part of a new setting, the comfortable and cosy house. At the same time the iconography also changed. In the second half of the 17th century the cat lost a great deal of its symbolic and emblematic significance. Realistic scenes in the context of everyday domesticity started to replace metaphorical and allegorical representations. Depicting animals became a specific genre, without a false bottom and without moral lessons. The "complicated vocabulary in the expression of veiled, seemingly realistic imagery" also disappeared.[103] In an increasing number of pictures and drawings the cat is shown eating, drinking, napping, playing and engaging in pranks.[104] This applies for representations of the Holy Family,[105] but also for the many indoor scenes depicting a homelike environment with a cat on a bench and a woman reading[106] or with a cat in the company of people spinning and weaving at home.[107] Other paintings show

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100 Monballyu J. Met de duivel op stap in Kortrijk. Heksenprocessen in 1598-1606 als symptoom van een harde tijd. De Leiegouw. 2012; 54: 89.

101 Dehennin H, editor. Erycius Puteanus (Honorius van den Born). Sedigh Leven, Daghelycks Broodt (1639). Gent: Koninklijke Academie voor Nederlandse Taal- en Letterkunde; 1999 p. 193, anagram n° 244 (Literaire Tekstedities en bibliografieën; vol 1).

102 De Roo T. Dierlijk gezelschap, menselijke reflectie. Gezelschapsdieren en hun culturele betekenis in de Moderne Tijd [unpublished master thesis]. Antwerp, University of Antwerp, history department; 2004-2005 p. 94, 95, 129.

103 De Meyere J. Utrechtse schilderkunst in de gouden eeuw. Honderd schilderijen uit de collectie van het Centraal Museum te Utrecht. Utrecht: Matrijs; 2006 p. 191-192; Davids K. Dieren en Nederlanders. Zeven eeuwen lief en leed. Utrecht: Matrijs; 1989 p. 34-36; Cohen S, editor. Animals as disguised symbols in Renaissance art. Leiden: Brill; 2008.

104 A good example of a cat engaged in pranking is given in the painting by Nicolaes Maes, Old Woman Praying or Prayer without End (1656-1657) [KIK-IRPA 40004932].

105 Anonymous (painting in the abbey of Tongerlo-Westerlo), Holy Family with John the Baptist and Elisabeth (17th century) [KIK-IRPA 81447]; Jacob Jordaens, The Holy Family (17th century) [KIK-IRPA 20025572]; Rembrandt Harmensz van Rijn, The Virgin and Child with Cat (1654).

106 Jacob Vrel, Interior with a Woman Sitting Reading to a Young Boy (middle of the 17th century) [KIK-IRPA 40004391].

107 Cornelis Gerritsz. Decker, A Weaver's Workshop (second half 16th century) [KIK-IRPA 20026020]; anonymous, The Weaver and his Wife (17th century) [KIK-IRPA 10129185].

an idyllic scene with a cat sitting at the feet of a mother and child[108] or on the lap of a little old woman,[109] close to the fire.[110] The cat is depicted with children playing with it,[111] teasing it,[112] stroking it[113] and hugging it.[114] In around 1670, Cornelis de Man (1621-1706), a painter from Delft, depicted a cat with a little bell around its neck that quietly watches a couple playing chess near the fireplace. Some of the other intimate interiors painted by De Man show a cat playing with a small ball.[115] The cat also becomes an essential part of a specific genre of animal painting in which it is portrayed in a very realistic manner: sleeping on a windowsill, looking through a fence or caught in the middle of cleaning and licking itself.[116]

It is more than likely that the cat has benefitted from a number of transformations in material culture. These changes were closely related to new ideas about domesticity and the home as a centre of social contact. In the course of the 17th century, a number of traditional urban associations in the Southern Netherlands, such as craft guilds, fraternities, chambers of rhetoric and shooting guilds lost a great deal of their former functions. These organisations no longer offered the same opportunities for networking or for the acquisition of status and prestige. The wealthy and respectable citizen therefore retreated into his house, which he started decorating with new, often French, consumer goods. In doing so he wanted to promote the image of a decent, civilised, respectable and reliable individual. He there-

108 Jean Baptiste Huet, Mother, Child and Kitten (middle of the 18th century) [KIK-IRPA 20025528].

109 Jacques Callot, Sitting Old Woman with Cats (copy 17th century) [KIK-IRPA 105856].

110 Lambert Lombard, Lombard and his Family (middle of the 16th century) [KIK-IRPA 10129812].

111 Jan Cossiers, Portrait of the Flamen Family (1637) [KIK-IRPA 110440]; Adriaen van Ostade, Interior with a Family (copy 2nd half of the 17th century) [KIK-IRPA 115068]; Jan Miense Molenaer, Children Playing with a Cat (middle of the 17th century); Adriaen van der Werff (1659-1722), Two Children Playing with a Cat Holding a Bird in its Jaws (1678).

112 Judith Leyster, Laughing Children With a Cat (1629) or A Boy and a Girl with a Cat and an Eel (1635); Adriaen van der Werff (1659-1722), Two Children with a Mousetrap (1692).

113 Maarten de Vos and Antoon Wierinx, The Flagellation of Christ (end of the 16th century) [KIK-IRPA 101184].

114 Cornelis Dusart, Children Playing (2nd half of the 17th century, 1689?) [KIK-IRPA 106685]; Cornelis Hermansz Saftleven, Sitting Boy with Cat on his Knees (1645).

115 Bassett LM. The paintings and career of Cornelis de Man. Art and mercantile culture in seventeenth-century Delft. Michigan: Ann Arbor; 2003 p. 59-60; Diepstraten LCM. Spel uit de kunst in de kunst: schaken en schilderkunst in de Nederlanden van Middeleeuwen tot heden: schilderijen, tekeningen, etsen, gravures en andere grafische technieken. s.l.: M. Euwe; 2001 p. 35; Bénézit E, editor. Dictionnaire critique et documentaire des peintres, sculpteurs, dessinateurs et graveurs de tous les temps et de tous les pays. 4th ed. Paris: Éditions Gründ; 1999. vol 9 p. 120.

116 Cornelis Hermansz Saftleven, Dog, Cat, Hen and Rooster (2nd half of the 17th century) [KIK-IRPA 20031601]; Dog and Cat with a Wheelbarrow (2nd half of the 17th century) [KIK-IRPA 20031590]; A Cat Peeping Through a Fence (1666); A Sleeping Cat; A Sitting Cat; A Lying Cat (all 2nd half of the 17th century).

Cornelis de Man, The Chess Players (c. 1670).

fore transformed his house into a place where he could invite fellow citizens who shared the same values. The display of carefully chosen furniture and tasteful decoration, together with the consumption of exquisite and expensive products, was intended to contribute to an atmosphere of distinction.[117] In the Golden Age of the Northern Netherlands, too, quiet and moderate domesticity became a virtue to be imitated.[118] The purring cat by the fire fitted into this picture perfectly. To many members of the middle classes, the cat was surrounded by an air of eminence, epitomised "civilised manners" and made little fuss.[119] Compared to a dog, a cat requires little

[117] Poukens J, Provoost N. Respectability, Middle-Class Material Culture, and Economic Crisis: The Case of Lier in Brabant, 1690-1770. Journal of Interdisciplinary History. 2011; 42: 159-184. See also De Vries J. The Industrious Revolution: Consumer Behavior and the Household Economy 1650 to the Present. Cambridge: Cambridge University Press; 2008 p. 22 and Smith WD. Consumption and the making of respectability, 1600-1800. New York: Routledge; 2002.

[118] Blaas PBM. De burgerlijke eeuw: over eeuwwenden, liberale burgerij en geschiedschrijving. Hilversum: Verloren; 2000 p. 40 (Publikaties van de Faculteit der Historische en Kunstwetenschappen; vol 32); Haks D. Huwelijk en gezin in Holland in de 17de en 18de eeuw: processtukken en moralisten over aspecten van het laat 17de- en 18de-eeuwse gezinsleven. Assen: Van Gorcum; 1982 p. 20. The changing attitude to animals and particularly to pets in the late 17th century was the most pronounced in England.

[119] Van Lennep J. Gedichten van den schoolmeester. Amsterdam: Gebroeders Kraay; 1863 p. 100.

care.[120] It was also very convenient that it was such a clean animal. Finally, the cat's domestic reputation may also have worked to its advantage; cats are very localised animals and are strongly attached to their home. In around 1761, the Dutch physician, biologist and publisher Martinus Houttuyn summarised this behaviour in the following terms: "They don't like to leave the house in which they have been raised. When not taken away too far, they often return to it" ("*Het Huis, daar zy in opgevoed zyn, willen zy niet gaarn verlaaten, en keeren, indien zy niet zeer ver gebragt zyn, dikwils daar heen te rug*") and "If carried away in a bag, they still return. They do not leave the houses when people move out" ("*In een sak ver weg gebracht zijnde, komen zy niettemin wederom. De huisen daarmen uit verhuist, verlaten zy niet*").[121]

Unfortunately, one of the most rewarding sources of information for the description of the material culture leaves the historian with empty hands. Cats are completely absent from the probate inventories of the Low Countries.[122] But there are indirect indications of their domestic presence. In Doesburg (Gelderland) a carpenter in 1666 had a wooden litter box in his inventory.[123] In the new domestic culture, the chimney became one of the central elements, serving as an eye-catcher that had to be decorated in a proper manner. This could be done using chimney cloth in various materials and with different patterns and designs[124], but also with all kinds of household goods and objects, including little cats made from wood, pipe

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120 Also noted by Paradis de Moncrif: Grappe G, editor. F. A. Paradis de Moncrif, Histoire des chats (1727). Edition ornéee d'un portrait-frontispice avec une Introduction. Paris: Chez Sansot; 1909 p. 102.

121 Quoted by De Roo T. Dierlijk gezelschap, menselijke reflectie. Gezelschapsdieren en hun culturele betekenis in de Moderne Tijd [unpublished master thesis]. Antwerp, University of Antwerp, history department; 2004-2005 p. 92, 95.

122 De Roo T. Dierlijk gezelschap, menselijke reflectie, p. 141-143, 147, 153; Wijsenbeek W. Delft in the eighteenth century. In: Van der Woude AM, Schuurman S. editors, Probate inventories: a new source for the historical study of wealth, material culture, and agricultural development: papers presented at the Leeuwenborch conference (Wageningen, 5-7 May 1980). Wageningen: Instituut voor Nederlandse Geschiedenis; 1980 p.164 (A.A.G. Bijdragen; vol 23); Wijsenbeek-Olthuis T. Boedelinventarissen. In: Broncommentaren. The Hague: Instituut voor Nederlandse Geschiedenis; 1995. vol 2 p. 45. Unlike cats dogs have left their traces in probate inventories in the form of dog pens, baskets, dog collars and food bowls.

123 Database of probate inventories (*Boedelbank*) of the Meertens Instituut (a research institute of the Koninklijke Nederlandse Akademie van Wetenschappen), Doesburg code 1666,1 rubrique 22 (http://www.meertens.knaw.nl/boedelbank/zoekvoorwerp.php).

124 Poukens J, Provoost N. Respectability, Middle-Class Material Culture, p. 181; Van Damme I. Verleiden en verkopen. Antwerpse kleinhandelaars en hun klanten in tijden van crisis (ca. 1648-ca. 1748). Amsterdam: Aksant; 2007 p. 197-198, table 5.3 and chart 5.3.

clay and Delft porcelain that found a place on the mantelpiece.[125] Cats now appeared on faience tiles which decorated the hearth and the walls of kitchens and other rooms.[126] They were also depicted on firebacks and hearth-plates,[127] embroidery cloths and lace patches.[128]

Despite the demonisation of the cat (see a previous section) and its unfortunate role in cruel popular entertainment (see next section), the finest specimens found their way to royal courts and the salons of the high nobility and bourgeoisie.[129] Charles of Lorraine, the governor of the Austrian Netherlands, liked to have animals not just in his palace, but also in his stables and aviaries and at his table (he was an avid hunter), but there is no mention of cats. However, he did possess several small cats made from Saxon and Chinese porcelain.[130]

The horror of the street. The tormented cat

Few will associate the idea of an appreciated and even cherished pet within the cosy, domestic warmth of the family with the Early Modern cat. Using archaeological evidence such as bone fragments, Raymond Van Uytven concluded that such privileged cats were indeed much more the exception than the rule.[131] Karel Davids also claimed that affection for cats in the Early Modern Period was rare.[132] Their point of view is shared by contemporary authors. Even as late as 1761, Martinus Houttuyn observed that few people kept cats for their pleasure or amusement.[133] Cats that were tolerated in or around the house should not necessarily expect to be treated with affection. This statement is well illustrated by the famous Farce of the

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125 For example at Maasland (1767), Maassluis (1760, 1793), Medemblik (1803) and Weesp (1789) in the database of the Meertens Instituut (see note 123).

126 Anonymous, wall tile paneling, Liege (18th century) [KIK-IRPA 10117804]; anonymous, six faience tiles with cat, Holland (18th century) [KIK-IRPA 149945].

127 Anonymous, fireback in cast iron with domestic scene, Gent (1709) [KIK-IRPA 130016].

128 Anonymous, embroidery lace (17th century) [KIK-IRPA 20051687].

129 Hengerer M. Die Katze in der Frühen Neuzeit. Stationen auf dem Weg zur Seelenverwandten des Menschen. In: Wischermann C, editor. Von Katzen und Menschen. Sozialgeschichte auf leisen Sohle. Konstanz: Universitätsverlag Konstanz; 2007 p. 59-61.

130 Catalogue des effets précieux de feu son altesse royale le duc Charles de Lorraine et de Bar, etc.etc.. Brussels: J.L. De Boubers; 1781 p. 73, 94, 99; Le XVIIIe siècle dans le palais de Charles de Lorraine. Turnhout: Brepols; 2000 p. 32.

131 Van Uytven R. De papegaai van de paus, p. 151.

132 Davids K. Dieren en Nederlanders. Zeven eeuwen lief en leed. Utrecht: Matrijs; 1989 p. 38-39, but see also p. 42 where he tempers somewhat his earlier remarks.

133 Quoted by De Roo T. Dierlijk gezelschap, menselijke reflectie, p. 94.

Catmaker (*Batement van den Katmaecker*) from the end of the 16th century.Two women want to fool their neighbour and perpetual drunkard Heijn, who is going to be a father, by telling him that his wife has just given birth. However, they take a cat and disguise it as a baby:

"Yes, should we only find a cat here
We will swaddle it in cloth
And then we will make him believe
That it is his child".

("*Jae, moegen wij slechts hier een kat vinnen.*
Dien sullen wij hier in die luijeren gaan binnen,
En dan sullen wij hem maecken vroet,
Dattet sijn kint is").

Heijn believes the story and even strokes his "sweet little prattler" ("*soete babbelaerken*"). The positive aspect to this story is that a cat is found immediately, a fact that demonstrates the animal's ready availability and proximity. The substitution with an adorable newborn, which was the theme of a popular iconography, also seems to argue in favour of the elevated status of the cat.[134] Less positive is that an innocent animal is used for a practical joke and that a cat is entrusted to a brutal drunkard. As soon as "catmaker" Heijn discovers the deception he threatens to beat both women with the poor cat.[135] A number of paintings suggest that domestic cats were quite often mistreated or even abused. The painting by Jan Steen, for example, showing children teaching a cat to dance, depicts a scene that would cause general indignation today.[136] The same applies for a number of paintings by Judith Leyster and Jan Miense Molenaer of laughing kids playing with a cat. It is clear from the frightened expression of the kitten in the boy's hand that it is not enjoying the rather wild play in the same way as the children.[137] It is also telling that, unlike dogs and horses, no names of cats have come down to us from the Ancien Regime, only indications of their colour.

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134 Kramer F. Mooi vies, knap lelijk. Grotesk realisme in rederijkerskluchten. Hilversum: Verloren; 2009 p. 202, illustration n° 17; Peacock MM. The Comedy of the Shrew: Theorizing Humor in Early Modern Netherlandisch Art. In: Classen A, editor. Laughter in the Middle Ages and Early Modern Times. Berlin-New York: De Gruyter; 2010 p. 713, fig.10.

135 Stoett FA, editor. Drie kluchten uit de zestiende eeuw. Zutphen: W.J. Thieme; 1928 p. 71, 73, 82, 83.

136 Jan Steen, The Cat's Dancing Lesson (between 1660 and 1679).

137 See also notes 111 and 112.

For the overwhelming majority of the feline population the daily reality was grim and at times even gruesome. Cats were an easy victim. In Leuven in 1740 a few brats hung up a living cat in a tree on St. James's Square and pelted it with stones.[138] In Lier, in August 1748, a group of youngsters and "simple soldiers" were shooting pigeons, ducks and cats.[139] Apart from sadistic acts such as these, which have occurred throughout time, cats more than other animals were the subject of violence on a structural level. In times of extremity, the cat suffered the same miserable fate as other animals and people. It is hardly surprising that in times of famine stray cats, as well as dogs, were killed and eaten in large numbers. During the great famine of 1316, such testimonies have survived all over Europe.[140] While these sources also report acts of cannibalism and often exaggerate the dramatic effects of the catastrophe, there is undoubtedly a lot of truth in their reports of the eating of domestic animals and even pests. Documentation with a similar tenor also exists for later periods. Gilles Li Muisis, for example, at that time the aged abbot of St. Martin's Abbey in Tournai, describes how during the English siege of Calais in September 1346, dogs and cats, and even mice and rats were consumed.[141] Another example comes from Bruges, which was besieged in the spring of 1584 by the Spaniards and where the famine was so bad that

> "neither dogs nor cats were to be found; because the citizens, driven by hunger, had caught and eaten them all".[142]

A similar situation occurred during the Spanish siege of Leiden in the summer of 1574:

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138 Goossens P. Het 'criminele' vooronderzoek als bron voor het Leuvense stadsleven van 1720 tot 1750 [unpublished master thesis]. Leuven, KU Leuven, history department 1982 p. 86.

139 Mast E, editor. Dagboek van Antonius Nollekens inhoudende de oorlogsrampen welke de stad Lier van 13 mei 1746 tot 3 meert 1749 heeft doorstaan. Lier: Taymans-Nezy; s.d., p.135.

140 Aberth J. From the Brink of the Apocalypse: confronting Famine, War, Plague, and Death in the later Middle Ages. New York: Routledge; 2001 p. 13; Gottfried RS. The Black Death. Natural and Human Disaster in Medieval Europe. London: Collier Macmillan; 1983 p. 29.

141 Li Muisis Æ. Chronicon majus Aegidii Li Muisis abbatis Sancti Martini Tornacensis. In: De Smet JJ, editor. Corpus Chronicorum Flandriae. Brussels: Commission royale d'histoire; 1841 p. 274 (Recueil des Chroniques de Flandre. Collection de chroniques belges inédites).

142 "*er noch honden noch katten meer te vinden waren; want de ingezetenen, door den honger gepraemd, hadden die al gevangen en opgeëten*" (Gailliard J, editor. Kronyk, of tydrekenkundige beschryving der stad Brugge sedert derzelver oorsprong tot op heden, naer het achtergelaten handschrift van B.-J. Gailliard. Bruges: J. Gailliard; 1849 p. 242).

"Grain stocks became exhausted, no bread could be found.
One could see how dog and cat were devoured as if they were venison".[143]

During epidemics, the most dynamic city governments ordered stray dogs and cats to be killed by the hundreds because it was assumed that they spread disease.[144] A natural or human disaster was often considered as a divine punishment. People thought they could avert or bring an end to the calamity by making a sacrifice. Often a cat was chosen. During the great flood of 1717, a cat was beaten to death in eastern Friesland. Afterwards the dead animal was thrown into the sea to fight evil with evil.[145]

In normal times, too, cats were not safe. Their screeching and fights often caused noise nuisance at night. Often they hunted small game such as pheasant, quail, partridge, squirrels, hares, rabbits and mustelids. According to all kinds of laws and regulations, even from a respectable institution such as the Council of Brabant, the ears of cats had to be clipped.[146] Such conventional "wisdom" went back to statements by Thomas van Cantimpré, Albertus Magnus and Jacob van Maerlant. They had argued that a cat with its clipped ears loses its nerve and pugnacity (*audacia*), making it easier to keep them in the home.[147] "Dog beaters" or "dog clubbers" were urban officials paid by the town authorities to kill stray or dangerous dogs with clubs and big sticks. Sporadically they also had to catch and kill cats. In some towns this unpleasant job was contracted out as a sideline to a public servant who was on the payroll of larger urban

143 "*de graanen raakten op, daar was geen brood te vinden. Men zag'er hond en kat als wildgebraad verslinden*" (Langendyk P. Willem de Eerste, prins van Oranje, stadhouder van Holland en Zeeland. Haarlem: J. Bosch; 1762 p. 111).

144 Naphy W, Spicer A. De pest. De zwarte dood in Europa. Amsterdam: Pearson Education; 2007 p. 93, 95; Hengerer MS. Stadt, Land, Katze. Zur Geschichte der Katze in der Frühneuzeit. Informationen zur modernen Stadtgeschichte. 2009; 2: 17.

145 Knottnerus O. Angst voor de zee. Veranderende culturele patronen langs de Nederlandse en Duitse waddenkust (1500-1800). In: Davids K, 't Hart M, Kleijer H, Lucassen J, editors. De Republiek tussen zee en vasteland: buitenlandse invloeden op cultuur, economie en politiek in Nederland 1580-1800. Leuven-Apeldoorn: Garant; 1995 p. 63.

146 Boesmans A. Huisdieren. Volkskunde. Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 1984; 85: 160; Hermesdorf BHD. De hond in de vaderlandsche rechtsbronnen. Publications de la Société historique et archéologique dans le Limbourg. 1949; 85: 260, 263; Van Uytven R. De papegaai van de paus, p. 151.

147 Boese H, editor. Thomas Cantimpratensis Liber de Natura Rerum. Editio princeps secundum codices manuscriptos. Berlin, 1973. vol 1 p. 151; Jammy P, editor. Beati Alberti Magni De Animalibus lib. XXVI. Lyon; 1651. vol 6 p. 603; Jongen L. Over Viervoeters. Jacob van Maerlant. Amersfoort-Bruges: Bekking & Blitz; 2011 p. 78.

administrations to carry out an even more horrifying task as the executioner.[148] Cats in the countryside were not safe either, and also had their ears cut when they caused trouble. Under the hunting regulation of June 1753, cats in the county of Flanders could even be shot.[149]

The dead animals ended up on the dunghill or were simply thrown into the water. In Antwerp in 1522 it was forbidden to drop dead cats "or other things that pollute the water" into the wells.[150] Apparently the measure was not always effective, for in 1584 "dead dogs, cats and other stinking beasts" ("*doode honden, catten ende andere stinckende beesten*") were floating in the moats of the ramparts. Usually the dead cats were skinned first. Their coats were particularly valued among the regular clergy for the simple reason that, according to the rule of Bernard of Clairvaux (1093-1153), clerics were not allowed to wear fur that was more expensive than cats' fur.[151] Of course, lay persons also appreciated warm bonnets made from cat fur. Furriers and pedlars always offered cat pelts,[152] though a furrier felt greatly insulted when called a "cat skinner",[153] because that nickname suggested that he purchased raw material of lower quality. In one of the most famous paintings by Hieronymus Bosch, The Wayfarer or The Peddler, the shabby central figure carries on his back a wicker basket or a bag with a cat skin hanging from it.[154] The Dutch poet and politician Jacob 'father" Cats (1577-1660) advised owners of beautiful cats to be on their

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148 Vanhemelryck F. Misdadigers tussen rechter en beul, 1400-1800. Antwerp-Amsterdam: De Nederlandsche Boekhandel; 1984 p. 56, 67; Vanhemelryck F. De beul van Brussel en zijn werk (XIV-XIX eeuw). Bijdragen voor de Geschiedenis der Nederlanden. 1964; 19: 199.

149 Davids K. Dieren en Nederlanders. Zeven eeuwen lief en leed. Utrecht: Matrijs; 1989 p. 28; Vyfden Placcaert-Boeck van Vlaenderen. Gent; 1763. vol 2 p. 1104, art. X.

150 De Roo T. Dierlijk gezelschap, menselijke reflectie, p. 165.

151 "*Omnia pellicia sunt generis* (...) *aut Catini* (...) *et nunquam de ullo genere majoris pretii*" as quoted by Van Bentum W. Een kat in het nauw, p. 74.

152 Dambruyne J. Corporatieve middengroepen. Aspiraties, relaties en transformaties in de 16de-eeuwse Gentse ambachtswereld. Gent: Academia Press; 2002 p. 29; Gailliard J. De ambachten en neringen van Brugge. Bruges: J. Gailliard; 1854 p. 139; Knevel P. Een kwestie van overleven. De kunst van het samenleven. In: De Nijs T, Beukers E, editors. Geschiedenis van Holland. Hilversum: Verloren; 2002. vol. 2 p. 231.

153 Rogge J. Ehrverletzungen und Entehrungen in politischen Konflikten in spätmittelalterlichen Städten. In: Schreiner K, Schwerhoff G. editors. Verletzte Ehre. Ehrkonflikte in Gesellschaften des Mittelalters und der frühen Neuzeit. Cologne: Böhlau Verlag; 1995 p. 120 (Norm und Struktur: Studien zum sozialen Wandel in Mittelalter und früher Neuzeit; vol 5).

154 De Bruyne. De vergeten beeldentaal van Jheronimus Bosch. Symboliek van de Hooiwagen-triptiek en de Rotterdamse Marskramer-tondo verklaard vanuit Middelnederlandse teksten. 's-Hertogenbosch: A. Heinen; 2001 p. 242; Van Waadenoijen J. De "geheimtaal" van Jheronimus Bosch: een interpretatie van zijn werk. Hilversum: Verloren; 2007 p. 200 (Middeleeuwse studies en bronnen; vol 103).

"*Die een schoone kat heeft en dient geen bontwercker in huys te brengen*"
(He who has a fair cat should not bring a furrier into his house)
Anonymous, possibly inspired by an emblem book by Jacob Cats.

guard for furriers.[155] Cat skins were also traded internationally and appeared in commercial transactions across northern Europe.[156] The practice of selling the skin of a cat survived the Early Modern Period. According to a local newspaper, 3,000 cats were killed and skinned in Gent during the winter of 1837-1838. Dealers in hides and skins pretended that the cat's coat had a better quality in winter.[157] Other parts of the carcass were recycled as well. In folk medicine, a drink made from beer, cumin,

155 Oudemans AC sr. Bijdrage tot een middel- en oudnederlandsch woordenboek. Arnhem: H.W. Van Marle; 1870. vol 1 p. 564; Dichterlijke werken van Jacob Cats, ridder, raadpensionaris van Holland. Amsterdam: Gebroeders Diederichs; 1828 p. 436.

156 Wijnroks E. Handel tussen Rusland en de Nederlanden, 1560-1640: een netwerkanalyse van de Antwerpse en Amsterdamse kooplieden, handelend op Rusland. Hilversum: Verloren; 2003 p. 151.

157 Collumbien H. Gentse Memoriedagen 17 april 1838. Ghendtsche Tydinghen. Tweemaandelijks tijdschrift van de Heemkundige en Historische Kring. 1999; 28 (2): 107.

mastic, betony and fat of a female cat ("*cattinensmere*") was supposed to be an excellent cure against persistent headaches.[158] In addition to the fat of the cat, also its spleen, bone marrow, meat and even faeces were common ingredients in contemporary pharmacology. Albertus Magnus had already alluded to the fact that quite a few components of the cat's body possess healing powers.[159]

Unfortunately for many cats, happy events and charivari could also mean the start of true suffering with a grim end. These types of brutal public entertainment were certainly not exclusively inspired by theological arguments or only based on the reading of the *Malleus* and other demonological treatises. As argued earlier, it was more a question of a mutual exchange of ideas, with negative perceptions among the common people feeding theological arguments and with learned or intellectual religious elements strengthening popular prejudices. Some authors have questioned whether the crowd enjoyed such gruesome spectacles; others have suggested that the people attended the executions, ritual slaughters and torturing of animals with great insensitivity or even indifference.[160] The second view seems as true as the first is incorrect. Too many horror stories have survived in which laughter and shouting drowned the screeching, caterwauling and howling of creatures in agony.[161] At weddings, cats were burned to protect the new couple from future misfortune. Although the Church opposed such pagan practices, these took place in the whole period under consideration.[162] Other festivities also meant a lot of misery for cats. During the Brussels *Ommegang* (or procession) in 1549, organised in honour of the crown prince and future king Philip II, the numerous spectators were offered a lugubrious performance. An organ had been installed on a wagon, with its pipes replaced by the tails of living cats. The tails were attached to the keyboard so that as soon as a boy, disguised as a bear,

158 De Vreese WL, editor. Middelnederlandse geneeskundige recepten & tractaten, zegeningen en tooverformules. Gent: Vlaamse Academie voor Taal- en Letterkunde; 1894. vol 1 p. 119, n° 434.

159 Bobis L. Des usages du chat dans la médecine de la fin de l'Antiquité et du Moyen Age. In: Mornet E, Morenzoni F, editors. Milieux naturels, espaces sociaux. Études offertes à Robert Delort. Paris: Publications de la Sorbonne; 1997 p. 717-728; Bobis L. Une histoire du chat, p. 85-96.

160 Maso B. Riddereer en riddermoed. Ontwikkelingen van de aanvalslust in de late middeleeuwen. Sociologische Gids. Tijdschrift voor sociologie en sociaal onderzoek. 1982; 29: 305.

161 Origo I. De koopman van Prato. Amsterdam: Contact; 1986 p. 59; Van Uytven R. De papegaai van de paus, p. 263.

162 Roodenburg H. Onder censuur: de kerkelijke tucht in de gereformeerde gemeente van Amsterdam. Hilversum: Verloren; 1990 p. 329.

started to play the organ, the cats screamed in pain.[163] In July 1582 the Prince of Orange and the Duke of Anjou were "cordially welcomed and received with a wonderful engine" in Bruges. The device showed a ship full of firework that, when lit on the Market Square in the heart of the city, caused the cats to screech until they were burned alive.[164] A commentator noted that this symbolised the fact that the *geuzen* (a name given to Calvinists and other malcontents) wanted to burn all Catholics ("*Catelycken*").[165] This is once again the old association of cats with Catholics, as mentioned earlier.[166] When commenting on atrocities against cats in the Low Countries one cannot fail to mention, of course, the well-known custom of throwing cats in the town of Ypres. According to an old tradition, since the 10th century cats have been thrown from the belfry tower of the Cloth Hall into the crowd assembled in the market square[167]. However, the oldest and more or less reliable evidence stems from the late Middle Ages. In 1817 living specimens were replaced by toy kittens made from velvet.

Conclusion

In 1983 the English cultural historian Keith Thomas observed how the anthropocentric world view and the idea of a human uniqueness in world history gradually disappeared in England in the later 17th century.[168] As a result of this evolution, human attitudes towards animals and nature in general changed. Since the publication of this ground-breaking book, a large number of *Human-animal studies* have made clear how the late medieval and early modern relationship between man and animal was characterised by a profound ambiguity. Exploitation and destruction of animals

163 Perey L. Charles de Lorraine et la cour de Bruxelles sous le règne de Marie-Thérèse. 3rd ed. Paris: Calmann-Lévy; 1903 p. 122; Du Pays A-J. Itinéraire descriptif, historique, artistique et industriel de la Belgique. Paris: Hachette; 1863 p. 45; De Maesschalck E, Van Clemen S. Beelden groot en klein.Tijdschrift van de Alumni Letteren Leuven. 2014; 4: 14.

164 Ter Gouw J. De volksvermaken. Haarlem: Erven F. Bohn; 1871 p. 352-353.

165 Leendertz P. Guillaume Weydts, chronique flamande. De Navorscher. New series, 1870; 3: 116.

166 See note 68.

167 Cauberghe JRS. Vroomheid en volksgeloof in Vlaanderen: Folkloristisch calendarium. Hasselt: Heideland; 1968 p. 68; Ver Elst A. Folkloristische tijdspiegel voor België. Brussels: I. Mertens; 1962 p. 156; Moesen A. De Kattenfeesten te Ieper. Een analyse van de Kattenstoet en het Kattenwerpen aan de hand van de theorie van Hobsbawm [unpublished master thesis]. Maastricht, University of Maastricht, department of cultural sciences 2004-2005 p. 94, 95, 129.

168 Thomas K. Man and the natural world. Changing attitudes in England 1500-1800. London: Allen Lane; 1983. Thomas devoted some fine pages to the changing attitude to cats (p. 109 sqq).

grew dramatically since the late Middle Ages due to Europe's economic and demographic expansion. More or less parallel with this evolution the need increased to treat more species of animals in a sympathetic, benevolent and even affectionate way.[169] Scholars refer to a transition from "instrumentalisation" to "sentimentalisation" or, directly related to our subject, from "cats in the fire" ("*Katzen im Feuer*") to "cats by the fire" ("*Katzen am Feuer*").[170] The cat benefited less from this process than other domestic animals such as the dog. However, when the first documents start to appear, the status of the cat in society is certainly not disturbing. For centuries many, mainly religious, intellectuals described quite objectively the characteristics of the cat which they had learn to appreciate in everyday life. This image changed in the course of the 12th century. The cat acquired a bad reputation. It was not so much Christianity itself that was responsible for this change in perception, but rather the rise of a more authoritative Church. This new and "major regulatory agency"[171] became the most extensive power network in Europe. It espoused a strict ideology which stressed human superiority and the dominance of man over creation; it also showed a growing need to identify enemies within and outside the doctrine. Ecclesiastical elites consulted the *auctoritates*, but were also inspired by popular magical practices which they covered with theological overlay.The rapid spread of a learned demonology partly justified and explained the brutal violence and ruthless cruelty of which the cat became a principal victim. In parallel with the theological image of the diabolical cat literature and iconography developed a complicated symbolism that also turned out to be negative for the cat. The statement by Alexander Pope in 1713 that "The conceit that a Cat has nine lives, has cost at least nine lives in ten of

169 Davids K. Dieren en Nederlanders. Zeven eeuwen lief en leed. Utrecht: Matrijs; 1989 p. 8, 12, 16, 64-65, 175; De Groof B, Verberckmoes J. Inleiding. Klein historisch beestenboek. Oefeningen in cultuurgeschiedenis. De Brabantse Folklore en Geschiedenis. 1994; 282: 91-92.

170 Geybels H. Dieren in de religieuze volkscultuur. Van instrumentalisering naar sentimentalisering. Volkskunde. Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 2003; 104: 289-319; Hengerer MS. Stadt, Land, Katze. Zur Geschichte der Katze in der Frühneuzeit. Informationen zur modernen Stadtgeschichte. 2009; 2: 19; Stassen E. Van bruikbaar tot dierbaar. Over de relatie mens dier. Tijdschrift voor Diergeneeskunde. 2006; 131: 578-580.

171 Mann M. The Sources of Social Power, vol. I. A History of Power from the Beginning to A.D. 1760. Cambridge: Cambridge University Press; 1986 p. 377. See Aerts E. La religione nell'economia. L'economia nella religion – Europa 1000-1800. In Ammannati F, editor. Religione e istituzioni religiose nell'economia europea (1000-1800). Religion and religious institutions in the European Economy (1000-1800). Florence: Florence University Press; 2012 p. 94; Van Zanden J.L. The Long Road to the Industrial Revolution: The European Economy in a Global Perspective, 1000-1800. Leiden-Boston: Brill; 2009 p. 35.

the whole race of them" also holds true for the Low Countries.[172] Fortunately for the cat there were some bright spots in its gloomy universe. Since the early Middle Ages, sporadic evidence has been preserved reporting an affective relationship between men and cat. In the second half of the 17th century there was a growing number of literary and iconographic testimonies illustrating a social promotion of the cat with the middle groups.

A friendlier relationship with the cat was only a small part of a societal "civilisation offensive" in which, to use the words of Norbert Elias, "*die Freude am Quälen und Töten*" (the joy of tormenting and killing) faded away.[173] Or to put it in more modern terms, part of a process of moral progress driven more by empathy and altruism.[174] The growth of this process was largely determined by the way in which people in the Early Modern period were ready to accept and to tolerate people who were "other": people with different religious beliefs, with a different skin colour, a different sexual orientation, etc.[175]. Only when man was capable of having a decent relationship with the weaker members of his own species – and especially women, children, the sick and the poor, physically or psychologically disabled persons – was he ready to enter into a new relationship with inferior life forms. Cruelty towards fellow humans shows a remarkably strong correlation with animal cruelty.[176] This evolution towards more empathy was fuelled by changes in religion and by scientific progress that undermined the most primitive expressions of superstition and prejudice. But the road to a peaceful and respectful symbiosis between man and cat was a long one. Barbaric practices had a long life, hardly surprising when one realises that until well into the 18th century criminals

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172 Thomas K. Man and the natural world, p. 110. See also Brand J, Ellis, H. Observations on popular antiquities: chiefly illustrating the origin of our vulgar customs, ceremonies and superstitions. London; 1813. vol 2 p. 396; Johnson S. The works of Alexander Pope, esq. in verse and prose. London; 1812. vol 4 p. 325.

173 Elias, N. Über den Prozess der Zivilisation: Soziogenetische und psychogenetische Untersuchungen. 6th ed. Frankfurt: Suhrkamp; 1978. vol 1 p. 268, 282 (he explictly mentions the burning of cats). For a critical reception of his ideas: Franklin A. Animals and Modern Cultures: A Sociology of Human-Animal Relations in Modernity. London: Sage Publications, 1999 p. 21-22.

174 Harris H. The Moral Landscape. How science can determine human values. New York: Free Press; 2010 p. 177. See also Baratay É. Le point de vue animal. Une autre version de l'histoire. Paris: Seuil; 2012 and Singer P. Animal liberation: a new ethics for our treatment of animals. New York: Random House; 1975.

175 Mensen en dieren in het verleden. Jaarboek voor Ecologische Geschiedenis. 2005; 7: iii-iv.

176 Cazaux G. Verband tussen geweld jegens dieren en geweld jegens mensen. In Cazaux G, editor. Mensen en andere dieren: hun onderlinge relaties meervoudig bekeken. Leuven-Apeldoorn: Garant; 2000 p. 279-296.

in the Low Countries were racked and cooked. The ritual cat slaughter in the Paris rue Saint-Séverin, immortalised by Robert Darnton, took place in 1740.[177] Orchestrated cat torturing sessions (the so-called *concerts miauliques*) could be found on weekly markets and fairs at the end of the 18th century.[178] Cat beating, or catcudgelling, was still a gruesome popular sport in the 19th century.[179] Even today, some people still compare a black cat with the Devil or his representatives.[180]

At first sight, the real revolution in our relationship with the cat only started a few decades ago when Master Felix, apart from our barns and houses, also conquered our seats, beds and hearts. Only recently has a whole industry been created for cat food, cat vitamins and supplements, cat toys and all kinds of cat accessories including beds, bowls, drinking fountains, scratchers, carriers, litter boxes and furniture. For many vets, cats have become the main clientele. Some cats are given chemotherapy or receive expensive life-prolonging treatments. A majority of domestic cats today die by euthanasia. Some of them find eternal peace in special cemeteries. But has anything fundamentally changed in our attitude to Felix? On closer examination anthropomorphisation has never ended. Indeed, we continue to attribute unquestioningly all kinds of human qualities to the cat, in the many videos on Youtube and Google Video, in commercials, but also in our daily contacts with the cat. While this may signify that we no longer stigmatise and demonise the *musio*, it also shows that we still project our emotions, frustrations and aspirations on to the eternal cat.

177 Darnton R. The Great Cat Massacre and Other Episodes in French Cultural History. 2nd ed. New York: Basic Books; 2009.

178 These sadistic shows were inspired by an iconographic genre in which cats, often in the company of a monkey, were making music together. See for example the painting and engravings by Quirin Boel (1587-1633).

179 Davids K. Dieren en Nederlanders. Zeven eeuwen lief en leed. Utrecht: Matrijs; 1989 p. 31, 45, 48; Renson R, Smulders H, Eelbode B, De Vroede E. Spelen met dieren. Volkskunde. Driemaandelijks Tijdschrift voor de Studie van het Volksleven. 1984; 85: 169; Van Lennep J, Ter Gouw J. De uithangteekens in verband met geschiedenis en volksleven beschouwd. Amsterdam: Gebroeders Kraay; 1868. vol 2 p. 344-346.

180 Penneman T. Heksenprocessen in Vlaanderen inzonderheid in het Land van Waas 1538-1692. Annalen van de Koninklijke Oudheidkundige Kring van het Land van Waas. 1976; 79: 125.

Quirin Boel, Concert of Cats (first half 17th century).

Laudatio Johan Heilbron

R. Vanderstraeten

We celebrate today work accomplished in the history and philosophy of the social sciences in general, and of sociology in particular. We celebrate the work accomplished by Professor Johan Heilbron, who is currently Director of Research at the *Centre européen de sociologie et de science politique* of the Sorbonne (Université de Paris 1) and Professor at the Erasmus University of Rotterdam. Looking at his scholarly work, one cannot but be struck by the consistency with which he has devoted both his life and his career to the sociological study of human knowledge in general, and of social-scientific knowledge in particular. Notwithstanding the variety of themes addressed in his scholarly work, there is a persistent emphasis on the social conditions of intellectual work, on pursuing intellectual history (or history of ideas) in combination with social history and sociological understanding. Besides the variety of perspectives explored in his scholarly work, there also is a permanent concern with exploring the dynamics of disciplinary traditions in the sciences (and the social sciences in particular). In my view, it is not in spite of, but exactly because of its strong interdisciplinary orientation that the scholarly work of Johan Heilbron is characterized by such a strong unity, that he has become such a distinct voice within the scientific community. His erudition is backed up by a strong reflexivity, by a strong concern with the context of the (scientific) text. In the past decades, Johan Heilbron has provided us with some of the best history of the social sciences we currently have.

In this laudatio, I cannot provide an overview of the work which Johan Heilbron produced. In my view, it also does not make much sense to simply recall the different themes or the theoretical and methodological

approaches which Johan Heilbron has pursued in the course of his very productive career. Instead, I would like to single out one particular aspect which constitutes in my view a basic leitmotif in his work. Or, to put it somewhat differently: almost all of his work is relevant for the history and sociology of science, because it consistently takes into account and/or explicitly reflects on this particular aspect, namely, the *historicity* of the scientific enterprise.

Let me briefly comment on this leitmotif. In an article entitled 'What is the history of science the history of?', the American historian of science Peter Dear discussed a few years ago the faltering and failing historicity within the field of history of science (Dear, 2005). He claimed that *current* notions of science continue to inform and misinform *historical* research about science. He asserted that most research in the history of science continues to be directed by contemporary ideas of what has to be science, and thus by normative a-historical conceptions of science.

Even in the work of the founding father of the discipline, George Sarton, one finds such normative presuppositions. His work expresses a strong preference for what has been called 'pure', 'basic' or 'fundamental' science, that is research uncontaminated by 'applied', 'practical' or 'utilitarian' considerations. For example, in the first of three *Colver lectures*, which Sarton delivered at Brown University in 1930 (thus at the start of the Great Depression in the US), he dealt at length with the distinction between pure and applied science. Let me provide a somewhat long quotation in order to illustrate his point of view (and that of many historians of science after him): 'Though many scientific discoveries have created new power and wealth …, the greatest number have no practical value whatever. For the true scientist, these are not less precious. For him [sic] the infinite treasures which science has yielded and is constantly yielding are incidental; the main purpose of science, and its main reward is the discovery of truth. How precious this discovery must be if the unlimited might and wealth which science produces is comparatively of little account, – a by-product! But so it is. No scientist worth his salt would hesitate a single moment on this point, for he knows well enough that the discovery of truth is more valuable than any treasure. It is very similar to the discovery or creation of beauty, the reward being the same

in both cases, namely that of contemplating quietly something which pleases the soul' (Sarton, 1988: 14).[1]

In a number of ways, Johan Heilbron's command of different disciplinary traditions in philosophy, history and the social sciences makes him heir to the humanist project of George Sarton. Like Sarton, he prefers to develop a long-term view on the development of science. Like Sarton, he also opts for a comparative and transnational perspective. But, an entire lifetime after Sarton, Johan Heilbron does not work 'after' Sarton in a normative, a-historical perspective. Johan Heilbron will always keep an eye out for the social and historical conditions of science. He will always draw attention to the ways in which science is conceived in particular historical settings. He will develop a sociological understanding of the knowledge production by focusing on the dynamics of the producers, the networks they form, and the broader conditions under which they do their work. In his work, he is used to focusing attention on disciplinary encounters and debates, on the formation of different scientific communities, on the genesis and transformation of specific communication networks, which allow for the rise of particular themes and theories (and not of others), on the institutionalization of motives that might legitimately be used to support the scientific enterprise, on the conditions that allow for various emphases on pure vs. applied knowledge, and so on and so further. His interest in the history of science is not one in the progress of science – but in how such an idea of science has become possible in the course of the history of science.

As Johan's family name rightly indicates, his work constitutes a source that provides cure and relief. It is a healthy source of inspiration and reflection that helps to combat many of the myopia diseases with which we are confronted both in the social sciences in general, and in much of the current writings on the history of the social sciences in particular. I am really pleased that both the staff of this Faculty (the Faculty of Political and Social Sciences), and the Sarton Committee of this University (Ghent University),

[1] For another similar point of view, see I.B. Cohen (1948). Referring to the American victory in the Second World War, Cohen claims 'that scientific research pays dividends in a very practical way (1948: 4). But the utilitarianism of science cannot be an end-product in itself; its utilitarian effects are but 'by-products of the search for fundamental truth' (1948: 7). It should be added that Cohen was a student and protégé of Sarton, who also succeeded him as the editor of the journal *Isis*. In other words, it seems difficult to overestimate the social relevance of this point of view. Both Sarton and Cohen did not just communicate personal points of view, but also those of the flagship journal in the emerging field of the history of science.

followed my suggestion to award the Sarton Medal for the academic year 2013/2014 to Professor Johan Heilbron. I am and we are proud to be able to honour one of the world's leading historians of sociology, Professor Johan Heilbron, here for his outstanding work in the history and philosophy and sociology of the social sciences.

References

[1] Cohen, I. B. (1948). *Science, Servant of Man.* Boston: Little, Brown and Company.

[2] Dear, P. (2005). What Is the History of Science the History Of? *Isis*, *96*(3), 390-406.

[3] Sarton, G. (1988). *The History of Science and the New Humanism* (with recollections and reflections by Robert K. Merton). New Brunswick: Transaction Publishers.

Auguste Comte and the Second Scientific Revolution

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I am very grateful to the selection committee of the George Sarton Medal for being here today. Aside from the personal gratification it offers, the prize will hopefully continue to stimulate scholarship in the history of the social sciences, and – however modestly – contribute to a more reflexive practice of teaching and research in our disciplines. Historical studies have a certain merit of their own, but they are most meaningful when they have some bearing on the present, when – in this case – they can help social scientists to gain a better understanding of the assumptions that underlie their work, but that are easily forgotten, and of the modes of thinking in which they are trained, but that are often taken for granted.[1]

One of the obstacles for a more reflexive practice of the social sciences is that in the course of the twentieth century the history, sociology and theory of science have parted ways. Each one has become a specialized endeavour, with its own degrees, departments and journals, and exchanges

[1] For this conception of a reflexive scientific practice, see Pierre Bourdieu, *Science de la science et reflexivité*, Paris: Raisons d'agir, 2001. Against the background of the financial crisis (2007-09) the development of economics and its changing relations to the other social sciences is a good example of contributing to a more reflexive social science practice. Since 'financial economics' played a major role in the deregulation of financial markets, a better understanding of its develpoent and functioning is of particular importance. See, for example, Franck Jovanovic, 'Finance in modern economic thought', in: K. Knorr Cetina & A. Preda (eds), *The Oxford Handbook of the Sociology of Finance*, Oxford: Oxford University Press, 2012, p. 546-566. On national trajectories of economics, see M. Fourcade, *Economies and Societies*, Princeton: Princeton University Press, 2009; on the rise of market fundamentalism, see P. Mirowski, D. Plehwe (eds), *The Road from Mont Pèlerin: The Making of the Neoliberal Thought Collective*, Harvard University Press, 2009.

across their boundaries have become more difficult. For George Sarton the study of the sciences was as a field situated at the crossroads of the natural sciences, the humanities and the social sciences. And it was the ambition of his journal *Isis* to combine philosophical, sociological and psychological perspectives on science with historical inquiry. In the current division of labour, however, properly historical questions are all too easily relegated to professional historians, social aspects of science to sociologists, epistemological issues to philosophers.

But such a partitioning of intellectual tasks produces more problems than it solves. The case of Auguste Comte (1798-1857) can serve as an example. In textbooks for the philosophy of science, Comte has virtually disappeared. 'Positivism' is identified with a later version, with 'logical positivism', which has supplanted Comte's more historical approach.[2] In sociology Comte is routinely mentioned as having introduced the word 'sociology', some textbooks discuss his sociological ideas, but his more encompassing theory of science is ignored. As to the history of science, Comte's writings are widely held to be outdated and they are referred to only by specialists of early nineteenth century science.[3]

In part because of the current division of academic labour and the dominant views within each of the relevant disciplines, Comte's main work, the *Cours de philosophie positive* (1830-1842) is, I believe, profoundly misunderstood. The dominant views are *anachronistic* in the sense that they tend to separate epistemological, sociological and historical considerations, which for Comte himself were inseparable. The prevailing interpretations of the *Cours* are anachronistic also in another sense: they are generally based on later conceptions of positivism, either on Comte's

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2 English language reference works in the philosophy of science typicaly mention 'positivism' in the index, while adding 'see logical positivism', see, for example, the *Routledge Companion to Philosophy of Science*, New York: Routledge, 2008.

3 Concluding his monumental overview of the sciences in France around 1800, Charles Gillispie remarks that Comte drew his insights from the 'practice of science' rather than from theories of science, and that in doing so he was an 'acute, attentive, and informed critic of the science of his own time.' In contrast to contemporary reports by Delambre and Cuvier, Comte 'penetrates beneath the surface to what was fundamentally at issue with respect to both methods and results.' See C.C. Gillispie, *Science and Polity in France: The Revolutionary and Napoleonic Years*, Princeton: Princeton University Press, 2004, p. 654. Gillispie, however, refrains from commenting on Comte's epistemology, leaving that to philosophers and restricting his comments to what he apparently considers to belong to the history of science proper.

own later writings and teachings, or on the work of early twentieth century neo-positivists.

Against these anachronistic views I would like to present two arguments. Drawing on earlier work, I will first argue that the *Cours de philosophie positive* essentially proposes a *differential theory of science*.[4] Comte was, I think, the first to systematically elaborate such a conception, without, however, abandoning the idea that the sciences have important characteristics in common. In the second part I will propose an historical interpretation of this theory, and argue that Comte's *magnum opus* can be understood as a theory of the *second scientific revolution*. Historians of science have occasionally evoked a second scientific revolution, but the expression hasn't caught on and both its meaning and its implications have remained diffuse. On the basis of a growing body of scholarship, however, it can be argued that between the 1770s and 1830s a transformation of the scientific world occurred in which national academies lost several of the functions they had previously fulfilled to a range of new scientific institutions, which were based on disciplines. As a consequence, unitary frameworks such as the conception of 'natural philosophy' declined and made way for more disciplinary arrangements. This transformation forms the actual background for the questions Comte grappled with during the 1820s, and to which his *Cours* provided a both systematic and detailed answer.

What was the *Course in positive philosophy* about?

Although Comte's oeuvre has been portrayed in a wide variety of ways, curiously few authors have specifically raised the question of how to assess the intent, content and significance of the *Cours de philosophie positive* (1830-42). The most common view is that Comte's founding work demonstrated how 'positive' or scientific knowledge is to be distinguished from metaphysics, or more broadly, from other forms of knowledge. Comte's book would essentially provide an analysis that allows demarcating scientific from non-scientific statements. If such an analytic construct exists, it

[4] For a more detailed analysis, see part three of *The Rise of Social Theory*, Cambridge: Polity Press 1995, and my 'Social Thought and Natural Science', in: *The Cambridge History of Science*, vol. 7, edited by Theodore Porter & Dorothy Ross, Cambridge: Cambridge University Press, 2003, pp. 40-56.

follows that it can be applied to all sciences, which can therefore – logically or methodologically – be unified.

This view is familiar and well established; it is, of course, the view of the members of the Vienna circle and other proponents of 'logical positivism'. But this interpretation has very little to do with what Comte advanced, and it is, in fact, an astounding misreading of what the *Cours* actually contains.

The *Cours de philosophie positive*, like most of Comte's writings, has a clear and unambiguous structure. It contains two introductory lessons on 'positive philosophy' or rather 'philosophy of the sciences' as Comte would have preferred to call it. What follows after this introduction are parts on the six fundamental sciences, which Comte distinguished from the applied sciences.

In the first lesson, which is the best known, Comte presents a *historical theory of knowledge*. Human knowledge evolves from the theological or fictitious mode of understanding, to the metaphysical or abstract one, and from there to the positive or scientific one. After having understood reality as being governed by deities and abstract principles, knowledge in the positive stage refrains from accounting for the intimate nature of things (essences) and abandons the search for first and final causes. The metaphysical quest is replaced by the search for law-like regularities, that is for durable 'relations of similarity and succession' of the phenomena under study.

For this conception of 'positive science' Comte doesn't claim any originality, on the contrary, he states that it emerged over a period of almost two centuries and had become common knowledge among practicing scientists. What he did claim originality for was his identification of three, successive stages in the development of human understanding. In the tradition of Turgot and Condorcet, Comte designed his own scheme of the historical progress of human understanding, which is indeed distinct from the ones proposed by his 'illustrious predecessors'.[5]

The second lesson presents what is best called a *differential theory of science*. Observing that there is not one science, but a plurality of sciences,

[5] About this tradition of thought, see Frédéric Rouvillois, *L'invention du progrès. 1680-1730*, Paris: CNRS Editions, 2010; Jean Dagen, *L'histoire de l'esprit humain dans la pensée française de Fontenelle à Condorcet*, Paris: Librairie Klincksieck, 1977.

Comte raised the question how they are related to each other. Recognizing that any classification is more or less artificial, he argued that one could not do with less than six fundamental sciences. These sciences have to be distinguished, they cannot be reduced to one another, nor can they be understood as expressions of the same basic type or as realizations of some general model.

The oldest and most distinguished science, mathematics, consists of two branches, abstract and concrete mathematics. Abstract mathematics is a purely rational or logical endeavour, basically analysis. Concrete mathematics consists of geometry and mechanics; both have an empirical basis, but have developed into mathematical techniques rather than empirical sciences. Astronomy is directly related to concrete mathematics. Astronomers study the geometry and mechanics of celestial bodies; by combining systematic observations of planetary movements with mathematics, astronomy became a science of its own. Physics is already a more complex and less unified science: it cannot be reduced to mechanics, although physical phenomena (light, heat, electricity, magnetism) are simple enough for mathematical description. Chemists study matter at a more composite level, that of molecular composition and decomposition. In addition to the laws of mechanics and physics, these processes are subject to a specific type of regularities namely 'chemical affinities'. Biologists study beings whose conduct cannot be explained by physical forces and chemical affinities, since it depends on the anatomy and physiology of living bodies. Human beings, finally, represent an even more complex class of phenomena, because they have the capacity to learn and have acquired a mastery of their environment that no other species has.

The sciences, Comte argued, thus form a series of *increasing complexity* and *decreasing generality*. The laws of mechanics and physics are relatively simple and are valid for all natural phenomena, large or small, animate or inanimate. Chemistry is a more complex and less general science: there are many physical phenomena with no chemical effect, but no chemical phenomena without physical effects. The laws of biology are more complicated again and are valid only for life forms. The laws of human societies are still more complex and less general; human beings represent the smallest subset of natural phenomena.

As a consequence of the increasing levels of complexity different methods prevail in the various sciences. In addition to the mathematical and observational methods of astronomy, physicists have developed the experimental method, biologists the comparative method, social scientists the historical method. Increasing complexity implies that a greater variety of methods can be used, but certain methods lose their significance. In chemistry, for example, mathematics is still of some use, whereas in biology the 'enormous numerical variations' of the phenomena and the 'irregular variability of effects' make mathematical techniques virtually useless.[6] The last argument applies even more strongly to the social sciences, and Comte accordingly rejected the 'social mathematics' of Condorcet and Laplace, as well as Quételet's social physics, which he considered to be nothing more than 'simple statistics' anyhow.

The sciences study distinct and irreducible classes of phenomena – relatively autonomous levels of reality as we say today – and in order to do justice to their varying degree of complexity they require specific procedures and methods. This differential model of science was an ingenious way to transcend the dichotomies and antagonistic positions that existed at the time when Comte was publishing his *Cours*. On the one hand it proposed an alternative for the reductionist views of representatives of the mathematical and physical sciences like Laplace, Condorcet, and Quetélet, who conceived of the social sciences as yet another branch of mathematical physics. At the same time it provided an alternative for the spiritualist conception of Victor Cousin and his associates of the official Academy of moral and political sciences (1832).[7] In their opposition to the legacy of Condorcet and other scientists, they resurrected a conception of the social sciences as a form of moral philosophy in the classical sense of the term, but one that fundamentally opposed the assumptions and procedures of the natural sciences.

Comte's scheme of increasing complexity and decreasing generality allowed him to reconceptualise the social sciences as being neither deriva-

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6 Auguste Comte, *Cours de philosophie positive, leçons 1 à 45* (lesson 3), Paris: Hermann, 1975, pp. 78-79. On Comte's life and work, see especially Mary Pickering, *Auguste Comte: an Intellectual Biography*, Cambridge: Cambridge University Press, 1993 and 2009 (three volumes).

7 On the Academy of Moral and Political Sciences, see Sophie-Anne Leterrier, *L'institution des sciences morales et politiques 1795-1850*, Paris: L'Harmattan, 1995; Corinne Delmas, *Instituer des savoirs d'Etat: l'Académie des sciences morales et politiques au XIXe siècle*, Paris: L'Harmattan, 2006; Johan Heilbron, *French Sociology* (forthcoming).

tive of, nor opposed to the natural sciences. Instead of founding the social sciences on one of the natural sciences, as Condorcet and Cabanis had done, he demonstrated that it was more fruitful to indirectly follow the example of biology. As a distinct science of life, the formation of biology had suggested a new understanding of the natural sciences. This new conception was based on the distinction between matter and life, between inanimate and animate bodies. Instead of conceiving them in dichotomous terms, however, Comte distinguished the life sciences from the sciences of matter in terms of increasing levels of complexity. That allowed a reconceptualisation of the social sciences as well: sociology could be conceived as being to biology, what biology was to physics.

The *Cours* thus proposed a *historical theory of knowledge* (lesson one) and a *differential theory of science* (lesson two). The first lesson pertains to the evolutionary pattern that different branches of knowledge have in common, the second lesson to how the positive sciences differ from each another. Many commentators, who have more or less adequately summarized the introductory lessons of the *Cours*, have refrained from asking the question how to characterize the remaining parts of the book. But in contrast to the stereotypes of positivism, the *Cours* is a rigorous and detailed elaboration of the second, *not* of the first lesson. What follows after the introductory lessons is not an attempt at demarcating positive science from theology and metaphysics, it is not an inquiry into 'the positive method', it is not a treatise about the 'logic' of positive science, and it is not at all an attempt to unify the sciences. Quite to the contrary. What the *Cours* actually offers is not a unified, but a differential theory of science, based on the question how the most recent advances in the sciences could be interpreted in view of the 'increasing complexity' and 'decreasing generality' of their subject-matter.

Physics, biology, sociology

The *Cours* consists of a detailed elaboration of this differential approach for each of the six fundamental sciences. Although this is rarely done, any serious discussion of Comte's main work would therefore have to assess Comte's specific interpretation of the various sciences. Although this is not possible in a single article some indications may be given as to how Comte developed his approach.

In his analysis of physics, for example, Comte primarily opposed the Laplace school and their attempt to model all branches of physics on celestial mechanics.[8] Even here, in the domain of a single science, Comte explicitly opposed the urge to unify and advocated a differential approach. It was important, he argued, to recognize that physics was a more complex and more varied science than astronomy. The astronomical view of nature, that is of a universe consisting of interacting particles, both celestial and terrestrial, had to be abandoned. Not all physical phenomena can be modelled as forces between particles. Although this Laplacean view had been dominant in France, it was confronted with various new approaches between 1815 to 1825: Fresnel formulated his wave theory of light, Fourier his theory of heat, Ampère his theory of electromagnetism.[9] Comte praised all these new developments and discussed them in detail in the lessons he dedicated to the respective branches of physics.

Instead of conceiving the various branches of physics as following the uniform model of mechanics, it had to be acknowledged that sound, light, electricity and magnetism were 'phenomena sui generis' and had to be treated as such. And in the concluding lesson on physics Comte stated: 'The human mind should finally abandon the irrational pursuit of a vain scientific uniformity, and recognise that radically distinct categories of heterogeneous phenomena are more numerous than is assumed by a vicious systematization.'[10]

Comte's interpretation of physics is a good example of his epistemological stance. He was critical of conceptions he considered to be remnants of metaphysical thinking (ethers) and rejected the Laplacean program, which transposed the principles of celestial mechanics to all branches of physics and chemistry. Comte sided with the newest forms of physics arguing more specifically that his scheme of increasing complexity was the best way to make sense not only of the relations between the sciences, but also of the internal differentiation of each one of them.

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8 For Laplacian physics see the classic study by Robert Fox, 'The Rise and Fall of Laplacian Physics', *Historical Studies in the Development of the Physical Sciences*, 4, 1974, pp. 89-136.

9 E. Frankel, 'Corpuscular Optics and the Wave Theory of Light: the Science and Politics of a Revolution in Physics', *Social Studies of Science*, 6, 1976, pp. 141-184; R.M. Friedman, 'The Creation of a New Science: Joseph Fourier's Analytical Theory of Heat', *Historical Studies in the Physical Sciences*, 8, 1977, p. 73-99; K.L. Caneva, 'Ampère, the Etherians and the Oersted Connexion', *British Journal for the History of Science*, 13, 1980. pp. 121-138.

10 A. Comte, *Philosophie première. Cours de philosophie positive, leçons 1 à 45* (lesson 33), Paris: Hermann, 1975, p. 534.

While Comte's interpretation of physics concerned a well established science, this was not the case with life sciences, which formed a fragmented domain divided in specialties such as botany, zoology, natural history and medicine. Comte's writings in this area were primarily concerned with working out how to conceptualize the life sciences as a relatively autonomous and fundamental science. Biological processes could not be reduced to chemical and physical ones, as vitalists had rightly stressed, but contrary to another of their assumptions, life forms were dependent on the 'environment'. The relations of organisms to the environment they lived in, needed to be part of the subject-matter of biology. In response to mechanists, Comte emphasized the unity and specificity of life forms; in response to the vitalists he stressed their dependence on the environment. This proved a fruitful way to transcend one of the main controversies that characterised the life sciences in the late eighteenth and early nineteenth centuries.

When Comte was writing his *Cours* the life sciences formed neither institutionally nor theoretically a coherent field of study. There was no section for biology in the Academy of sciences, the subject was not taught at universities, and there was no learned society for biologists either. The term 'biology', which suggested a more coherent conception of the life sciences, had been coined in the 1790s, but was very rarely used. Comte had a marked preference for it, and used it to refer to a general and fundamental science of life. According to historians of biology, it is largely thanks to Comte and his students that the term came into more general use.[11] Among the founders of the Société de biologie (1848), which was the first learned society for biology, there were two physicians who were students of Comte. One of them, Charles Robin, wrote the articles of the society and proposed its theoretical statement, basing his views on Comte's theory of science and his conception of biology.[12]

Biologists were the first and for quite some time the only academic group to appreciate Comte's work. This recognition was related to the function Comte's epistemology fulfilled for an emerging science like biology. Comte effectively countered reductionist claims of chemists and physicists

[11] W. Coleman, *Biology in the Nineteenth Century*, New York: John Wiley & Sons, 1971, p. 1.
[12] G. Canguilhem, *Etudes d'histoire et de philosophie des sciences*, Paris: Vrin, 1983, pp. 61-74; E. Gley, *Essais de philosophie et d'histoire de la biologie*, Paris: Masson, 1900, pp. 168-312.

with arguments in favour of an autonomous science of biology. Confronted with the clinical orientation of Parisian physicians, Comte similarly emphasized that biology needed to be conceived as a fundamental science and not merely as a corpus of clinical knowledge. And in response to the institutional and cognitive heterogeneity of the life sciences, Comte provided an elaborate and fruitful taxonomy. The programme that Charles Robin designed for the Société de biologie was based upon these features.

After biology, Comte devoted the last volumes of his *Cours* to sociology. He introduced the term in Volume Four, and its use gradually became more and more frequent. The word was coined by analogy to biology: just as biology had to be conceived as the fundamental science of life, which would integrate heterogeneous specialties such as botany, zoology and medicine, sociology would similarly integrate the study of politics, the economy and the family within an overarching framework.

The basic notions of the last three volumes of the *Cours* are relatively familiar to sociologists. Comte began his analysis by defending the necessity of a social science. In the following lessons earlier efforts were critically evaluated and Comte explained in more detail than he had done before why his predecessors had either not been scientific enough or had erroneously tried to conceive the social sciences as derivative of physics (Condorcet, Laplace, Quételet) or physiology (Cabanis). Volume Four closed with an overview of the two main branches of sociology, statics and dynamics. Volume Five and the beginning of Volume Six expanded upon dynamics and contained detailed elaborations of historical developments based on the law of the three stages.

The Sixth and final volume opened with a 'personal foreword', in which Comte drew attention to the injustice that had been done to him. In 1838, shortly before he began working on the sociological part of his *Cours*, Comte had gone through another crisis. He was overworked and tense, and sombre prospects for the future put him off balance. He viewed the chances of gaining recognition for his sociology as even slimmer than for his earlier writings. For the first time, he now stated that 'any hope of support from scientists (…) has to be abandoned'.[13] Scientists 'distrusted' questions that

[13] A. Comte, *Cours de philosophie positive* (lesson 46), Paris: Hermann, 1975, p. 162.

went beyond the boundaries of their own discipline and were merely interested in their careers.

When Comte in 1838 lost the hope of gaining any support from the scientists, he felt isolated and weakened, and stopped reading anyone else's work. This infamous 'cerebral hygiene' symbolized his new attitude toward the intellectual world and may be seen as the beginning of his 'second career'. Comte was about to turn his back on the group he had hitherto seen as his primary audience. When a few years later, in 1844, his dismissal as entrance examiner at the École polytechnique was followed by another crisis, his life conclusively took a different turn. He met Clotilde de Vaux and after a 'year without precedent', he devoted his remaining years to what would become a secular religion, the religion of humanity, for which he now vested all his hopes in the least educated groups in society: women and workers. The theory of the sciences he had grappled with now seemed irrelevant, and few readers have been able to comment on the *Cours* without alluding to the prophetic figure that the author would become.

And yet the six volumes of the *Cours de philosophie positive* contained neither a world view, nor a theory about how 'science' could be demarcated from 'metaphysics', or a logical foundation for the unity of science. Comte's analysis had a very different purpose. Instead of inquiries into scientific unification or prophesies about modernity, it was concerned with making sense of how the six fundamental sciences related to each other, and why different methods dominate each one of them: the experimental method in physics, the comparative method in biology, the historical method in sociology. The significance of this differential theory is probably most salient in the passages Comte dedicates to the newest scientific developments. Wherever such issues came up Comte becomes more incisive and polemical. Time after time, Comte defends the newer and more complex sciences against the claims of the more established ones. Monist views of nature and reductionist research programs are vividly rejected and attacked. Comte was well aware that in every science, there is the tendency to annex the following science in the name of an 'older and more established positivity'.[14] Countering these tendencies toward 'usurpation' his differential theory of science proposed a well argued defence of the relative

[14] Auguste Comte, *Système de politique positive*, Paris: L. Mathias, 1851, vol 1, pp. 50-51.

autonomy of the different sciences, without giving up the idea that the sciences, in all their heterogeneity, share the aspiration of being or becoming a positive science, that is an empirically founded body of knowledge, pertaining to 'relations of similarity and succession' of the specific class of phenomena under study.

The *Cours* in context

In order to understand Comte's *Cours* it has to be related to the peculiar position he occupied in the scientific world of his time, and to the rapid transformation that the scientific field had gone through during the decades around 1800. As a student of the École Polytechnique, Comte shared many of the aspirations of his schoolmates, but he was tempted neither by engineering nor by specific research issues in the mathematical and physical sciences. Interested in more general questions of science and society, Comte became increasingly critical of the unlimited claims some of his fellow scientists made. When during the Restoration, Comte and other pupils were expelled from the École Polytechnique; he involved himself with oppositional groups, worked for the prophetic figure of Saint-Simon, and wrote his first articles and essays. What distinguished him from Saint-Simon and other reformers was that he continued to pursue his study of the sciences in order to find a truly scientific basis for reform. Decisive in this quest for a new science of society was his appreciation of the life sciences, where, thanks to early theorists of biology like Bichat and Blainville, he encountered different methods of inquiry and other modes of thinking than those of the mathematical and physical sciences in which he was trained. His understanding of the life sciences would eventually provide the intellectual impetus for both his theory of the sciences and his reconceptualisation of the social sciences.

The main reference group Comte acknowledged for the 'philosophy of the sciences' he was elaborating consisted nonetheless of the mathematicians and physicists at the Academy of sciences and the École polytechnique. Comte made no effort to secure a chair anywhere else, and he initially insisted that biologists and sociologists ought to study mathematics and physics before embarking upon the study of more complex matters.

What Comte reproached his former colleagues for was unjustly claiming a monopoly on knowledge. There were other positive sciences than mathematics and physics, where different methods of research and modes of conceptualisation prevailed than the ones they were accustomed to. In his criticism of the practice of mathematicians, Comte used arguments from theorists from the life sciences, although he had reservations about several of their claims as well. Biology studied a specific order of phenomena, but contrary to arguments of vitalists this was not an 'independent order'. On the contrary, a central feature of more complex phenomena was their dependence on less complex ones. While biological theories gave Comte him insight into the limitations of mathematical and physical models, his links with the École polytechnique and his own training stimulated him to appropriate them in a critical fashion, so that the result was not a rejection but a reassessment of the significance of mathematics. Comte's departure from 'intellectual absolutism' as he called it, was made possible by the fact that he had a different attitude toward the sciences than their practitioners. As a critical mathematician, he became interested in the life sciences; as an admirer of biological theorizing, he once again focused his attention on mathematics and physics, constructed a more general theory of science, and then presented this theory to the same mathematicians and physicists.

The result of this inseparably social and intellectual dynamics was a more comprehensive and differential theory of scientific knowledge. Comte's distance to the scientific establishment enabled him to see what insiders did not and outsiders could not perceive with sufficient precision. By elaborating upon the insights acquired in this fashion, he hoped to win back what he had been deprived of since he was expelled from the École polytechnique. His differential model limited the claims of the established sciences to what Comte considered was their proper domain of validity, it liberated mathematical physicists from the illusions of possessing a universal kind of knowledge, and it stimulated newly emerging sciences such as biology and sociology to circumscribe their own domains and develop an appropriate conceptual apparatus and research methods.

A second scientific revolution?

While Comte's theory was based on the particular position he occupied with regard to the different sciences, the relationships between the sciences themselves had undergone a profound transformation during his life time. From the 1770s to the 1830s the sciences had in France acquired an unprecedented prominence. Scientific institutions expanded rapidly, research fields diversified and scientific careers professionalized.[15] Together these developments produced a major transformation of the scientific world. The core of these far-reaching changes was the transition from a relatively small world that had been controlled by the Academy of sciences, to a larger and more diversified field structure in which disciplines were becoming the primary units for the production and reproduction of knowledge. The various branches of natural philosophy became more autonomous, biology emerged as a distinct and fundamental science of life, and the social sciences were for the first time institutionalized as a distinct scientific domain when a separate class of 'moral and political sciences' was established at the national Institut de France (1795-1803). Analogous to the disintegration of the overarching conception of 'natural philosophy', moral philosophy and natural law, which had been the general frameworks for the human sciences in the early modern period, went through a similar process of decomposition. The Second Class of the Institut de France (1795-1803), and, somewhat later, the Academy for moral and political sciences (1832) was divided in separate sections for philosophy, morals, history, political economy, law, and geography. Taken together this process of discipline formation may be interpreted as a second scientific revolution, and

[15] This process of expansion, diversification and professionalisation is well documented in Charles Coulston Gillispie, *Science and Polity in France at the End of the Old Regime*, Princeton: Princeton University Press, 1980; id., *Science and Polity in France: the Revolutionary and Napoleonic Years*, Princeton: Princeton University Press, 2004; Maurice Crosland, *Science Under Control: the French Academy of Sciences 1795-1914*, Cambridge: Cambridge University Press, 1992; Nicole and Jean Dhombres, *Naissance d'un nouveau pouvoir: sciences et savants en France (1793-1824)*, Paris: Payot, 1989; Ivor Grattan-Guinness, *Convolutions in French Mathematics 1800-1840* (3 vol), Basel: Birkhäuser Verlag, 1990. For the social sciences, see Brian Head, 'The Origins of "la science sociale" in France, 1770-1800', *Australian Journal of French Studies*, 19, 1982, pp. 115-32; Johan Heilbron, *The Rise of Social Theory*, Cambridge: Polity Press 1995; Johan Heilbron, Lars Magnusson & Björn Wittrock (eds), *The Rise of the Social Sciences and the Formation of Modernity: Conceptual Change in Context, 1750-1850*, Dordrecht: Kluwer Academic Publications, 1998/2001; 'Naissances de la science sociale 1750-1850', *Revue d'histoire des sciences humaines*, no. 15, 2006.

Comte's *Cours* is best understood as a theoretical account of this historical transformation.

Although the interpretations vary, the first scientific revolution is generally associated with the mathematisation of the physical sciences, with the triumph of 'natural philosophy' as a general view on nature and natural science, and with the establishment of national academies like the Royal Society (1760) and the Académie des Sciences (1766). Although the concept of the (first) scientific revolution is not undisputed, it is based on long tradition of research.[16] This is not the case with the idea of a second scientific revolution. Historians of science have occasionally used the expression, but its meaning has not been properly specified and elaborated, and neither the expression nor the idea behind it have caught on.

In his study *Revolution in Science* (1985) I. Bernard Cohen briefly discusses a few studies that evoke the concept of a second scientific revolution.[17] Thomas Kuhn seems to have been the first to use the expression in his 1961 article on mathematical and experimental traditions in physics.[18] A few others followed, most notably Roger Hahn and Enrico Bellone, but more than half a century after Kuhn's inaugural suggestion the main characteristics of the second scientific revolution – its time frame, location, cognitive content and scope – are still diffuse.

While a proper debate about the second scientific revolution still lies in the future, there is sufficient evidence that a profound restructuration of the scholarly world took place in the period between the 1770s and the 1830s, and in all likelihood Paris formed its centre. While Kuhn's notion was limited to the physical sciences, Roger Hahn broadened the notion to the various domains over which the Academy of sciences had jurisdiction. Although it was merely in a very brief passage, Roger Hahn observed that the organisation of the natural sciences around 1800 was marked by 'the eclipse of the generalized learned society and the rise of more specialized institutions, and by the concurrent establishment of professional standards

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16 See Floris Cohen, *The Scientific Revolution: A Historiographical Inquiry*, Chicago: Chicago University Press, 1994; Steven Shapin, *The Scientific Revolution*, Chicago: Chicago University Press, 1996.

17 I. Bernard Cohen, *Revolution in Science*, Cambridge, Mass.: The Belknap Press, 1985, pp. 91-101.

18 Thomas Kuhn, "Mathematical versus Experimental traditions in the Development of Physical Science" (1961), in: T. Kuhn, *The Essential Tension*, Chicago: Chicago University Press, 1977, pp. 31-64.

for individual scientific disciplines.'[19] It seemed that at the very end of the period he studied 'professionalized science cultivated in institutions of higher learning and perfected in specialized laboratories was replacing the age of academies that had dominated the scene since the middle of the seventeenth century.'[20]

Hahn's characteristic can in turn be broadened by including not merely the natural sciences, but the social sciences and parts of the humanities as well. The second scientific revolution then can be seen as a process which – however unevenly – concerned the whole spectrum of science and scholarship, for which disciplines were becoming the primary units for the production and reproduction of knowledge.[21]

The formation of disciplines, which was an inseparably social, cognitive and institutional process, implied that research and teaching in a variety of domains became more independent from that in other areas, on the one hand, and from the supradisciplinary structures that were the national academies, on the other. Since France seems to have been at the centre of this development it is worth briefly considering the most significant aspects of the transformation.

Early modern France had a dual system of higher learning. Universities with a monopoly on granting degrees coexisted with state academies for the new domains of learning and the liberal arts (literature, science, fine art, music). Academies and other learned societies quickly overshadowed conservative universities that were dominated by the clergy. Academies received state support in exchange for assuring useful activities in the service of the kingdom: conserving the clarity and elegance of the French language, mapping the heavens and the seas, surveying flora, fauna and mineral resources, and vetting mechanical inventions. In the latter half of the eighteenth century, academicians were increasingly called upon for teaching purposes as well. Newly founded state schools such as the École

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19 Roger Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1666-1803*, Berkeley: University of California Press, 1971, p. 275.

20 Roger Hahn, *Ibid*.

21 For a more elaborate discussion of discipline formation in this period, see my 'A Regime of Disciplines: Toward a Historical Sociology of Disciplinary Knowledge', in C. Camic, H. Joas (eds), *The Dialogical Turn: New Roles for Sociology in the Postdisciplinary Age*, Lanham: Rowman & Littlefield, 2004, p. 23-42. See also Rudolf Stichweh, *Zur Entstehung des modernen Systems wissenschaftlicher Disziplinen: Physik in Deutschland 1740-1890*, Frankfurt am Main: Suhrkamp, 1984; id., 'The Sociology of Scientific Disciplines: On the Genesis and Stability of the Disciplinary Structure of Modern Science', *Science in Context*, 1992, nr. 5, pp. 3-15.

des mines (1783) recruited members of the academies, and during the Revolution this tendency triumphed and swept away the old system. The sciences gained an unprecedented prestige, universities were abolished and the new educational system was dominated by elite state schools like the École polytechnique (1794), the École normale supérieure (1794), and the Écoles de santé (1794). Many of the scientists, whose careers had previously centred on the Academy of sciences, now taught courses as well, published textbooks and adapted this work to the professional requirements of their students, who were to serve the Republic as engineers, scientists, doctors, and teachers.

Under the new institutional and political conditions, mathematics, physics and chemistry became more separate domains of knowledge and more independent from the supradisciplinary frames of reference in which they had been embedded previously. Chemists and physicists formed groups of their own, each with its own institutional arrangements (journals, sections, chairs, curricula), and both profiting from the opportunities to expand their respective domains. A small and selective circle like the Société d'Arcueil played a pivotal role in the new conception of physics. It was largely through their research, textbook production, and academic politics that 'physics' underwent a major change: it no longer generically referred to empirical natural science, but became a more strictly defined mathematical and experimentally constituted discipline.[22] Something similar happened in the case of chemistry, which was transformed by the work of Lavoisier and his associates. Innovations in the life sciences came from natural history, which was concentrated at the Jardin des plantes, as well as from the newly founded Société de médicine (1776), which challenged the conservative university Faculties of medicine.

The best single indication of the process of discipline formation is the emergence of disciplinary journals. Prior to the 1770s the most important scientific journals were general publications like the *Journal des scavans*, the *Mémoires* of the Academy or the *Philosophical Transactions* of the Royal Society.[23] The first specialized journals appeared in the 1770s and

[22] Maurice Crosland, *The Society of Arcueil*, London: Heinemann, 1967; Robert Fox, "The Rise and Fall of Laplacian Physics", *Historical Studies in the Development of the Physical Sciences*, 4, 1974, pp. 89-136.

[23] Hélène Gispert, 'Les journaux scientifiques en Europe', in: M. Blay and E. Nicolaïdis (eds), *L'Europe des sciences: constitution d'un espace scientifique*, Paris: Seuil, 2001, pp. 191-211.

the their number multiplied quickly, in France especially during the revolutionary and the Napoleonic period, when the *Annales de chimie* (1789), *Journal de l'École polytechnique* (1794), *Annales du Muséum d'histoire naturelle* (1802), and the *Annales de mathématiques* (1810) were founded. Because the more disciplinary mode of working implied not only research and publications but teaching as well, mathematicians, physicists, and chemists could recruit their own students, some of whom would continue their work. The so-called 'French' schools of chemistry (Lavoisier) and physics (Laplace) are good examples of the process, becoming widely known in Europe and beyond and serving as primary examples of the new mode of practising science.

The emergence of disciplinary journals, chairs and learned societies, as well as the creation of scientific schools and the concomitant transformation of the universities brought about a much stricter division of labour between mathematics, physics and chemistry, while simultaneously including biology as an emerging general science of life, and the formation of the social sciences as an organized field of inquiry of its own. One of the consequences of the rapid intellectual and institutional differentiation of science and scholarship s occurring around 1800 was that it undermined the unitary conceptions of natural as well as moral philosophy. Not only physics, chemistry and the life sciences because more strictly disciplinary endeavours, the same tendency can be observed in the social sciences, although undoubtedly to a lesser extent. During the Enlightenment political, moral or economic considerations were generally considered to be part of natural law or moral philosophy. Adam Smith studied and taught moral philosophy, and considered political economy to be one of its branches. To his most prolific follower Jean-Baptiste Say, who in 1819 occupied the first chair in political economy, economics needed to be clearly separated from the study of politics. In his *Traité d'économie politique* (1803) he argued that whereas economic science was concerned with the production, distribution and consumption of wealth, politics dealt with the relations between the government and its citizens and the relations of different states to each other.[24]

In the first decades of the nineteenth century, then, a shift occurred from a unified conception of natural and moral philosophy with various branches

[24] Jean-Baptiste Say, *Traité d'économie politique* (1803), Paris: Calmann-Lévy, 1972, pp. 8-9.

toward a division in more autonomous disciplines. Encompassing terms such as 'nature' and 'reason' lost some of their appeal, and the overarching conceptions of both 'natural' and 'moral' philosophy declined or disappeared altogether. The notion of philosophy underwent a similar change; it tended to become a discipline as well, a superior one perhaps, but a discipline nonetheless. From being a general notion of systematic knowledge, philosophy was redefined as a specialty for transcendental analysis (Kant) or for analyzing ideas. Destutt de Tracy's project for a new science of ideas, an *idéologie*, is less well known than that Kant's critical philosophy, but it was no less typical. In his four-volume *Eléments d'idéologie* (1801-15) Tracy observed that the progress of the sciences had been so swift and so broad in scope, that traditional metaphysics should be replaced by a new 'science of science' or a 'method of methods' for which he coined the term 'ideology'.[25] Philosophers, as Comte observed, were inescapably becoming specialists as well: specialists in generalities.

Conclusion

Discipline formation transformed the legacy of the Enlightenment, and raised the question of unity and difference in the sciences in an entirely new manner. That process was the central issue of the *Cours de philosophie positive*. And Comte's differential theory of science is best seen as an original and 'positive' response to the differentiation of the scientific field of his time.

While modern science aspires to produce empirically founded knowledge and establish law-like regularities, the sciences could no longer be thought of as being realisations of one and the same type, but, on the contrary, had to be differentiated, specifying for each one of them the peculiarities of its object-matter and its particular mode of inquiry and conceptualisation. Comte thus discussed the most recent developments in the physical sciences, assessed the new status chemistry had acquired, and paid particular attention to newly emerging fields such as the life sciences and the social sciences. Comte's enterprise can thus be seen against the background of what is here referred to as an enlarged conception of the second

[25] Destutt de Tracy, *Eléments d'idéologie: Grammaire* (1803), in *Oeuvres complètes*, tome IV, Paris: Vrin, 2013, p. 34.

scientific revolution. Much of this conception needs further elaboration and debate, but there is sufficient evidence to underpin the idea of a profound transformation of the scholarly world in the decades around 1800. Although the establishment of an institutional regime based on disciplines was an uneven and long process, the period between the 1770s and 1830s may well be considered to have marked its central transformative phase.

In elaborating his insights into a general theory of the sciences, Comte relied on the scientific capital he had accumulated, and profited from the fact that he did not belong to any scientific group or institution in particular, neither in the physical nor in the life sciences or social sciences. But as the reception of his work tragically shows, that independence proved to be very vulnerable in social and institutional terms. Within the academic field of his time, Comte's theory was too broad in scope for the increasingly specialized scientists at the Academy of sciences, it was too critical of the dominant school in mathematical physics, while at the same time being too scientific for the leading representatives of the moral and political sciences. Gradually Comte turned away from the academic establishment and in his 'second career' mobilized his theory of the sciences for quite different purposes, soliciting other groups and seeking other gratifications than the academic recognition he had aspired to.

Laudatio G.S. Yablonsky

D. Constales

Mathematics is often associated primarily with physics, but chemistry too gives rise to highly advanced mathematical applications. Very aptly, the life of Georges Sarton illustrates this, since he wrote a paper on chemistry that won him a gold medal in 1908, and was awarded a doctoral degree from Ghent University in mathematics in 1911. The combination of chemistry and mathematics is also at the core of the scientific work of prof. Gregory Yablonsky, who obtained his doctorate in 1962 at the Kiev Polytechnic Institute. After two years as a chemical engineer in Kiev, he joined the Boreskov Institute of Catalysis in Novosibirsk to pursue his academic career. In those years he was also one of the leaders of the student club "Integral", which was disbanded for political reasons after the invasion of Czechoslovakia, and whose members later saw their work hampered by a ban on foreign travel ban during more than twenty years, which also affected him.

Nevertheless, he developed in the period to 1991 the intensive application of mathematical methods to chemistry and chemical engineering, for decoding complex chemical reactions based on qualitative "fingerprints" such as bistability, oscillations and other temporal patterns. The "Siberian chemical-mathematical Team" (V.I. Bykov, A.N. Gorban, V.I. Elokhin, M.Z. Lazman) obtained general results in this area under his guidance, by using advanced techniques from graphs and bifurcation theory. In particular, carbon monoxide and hydrogen oxidation reactions were studied, results that proved also crucial for industrially applied chemistry.

After spending 1986 to 1991 in Kyzyl (capital of the Soviet Republic of Tuva) as head of laboratory and vice-director of the Tuvinian Technical

Institute, and a stay of 1992-1994 in Ukraine as professor of chemical engineering at the Kiev Polytechnic Institute and as vice-president of the International Solomon University, Yablonsky left in 1995 for the prestigious Washington University in St. Louis (Missouri), to work as a Research Associate with Professor JT Gleaves, inventor of the Temporal Analysis of Products reactor and methodology. Presently he has become a citizen of the United States of America, and an associate professor at Saint Louis University.

He has developed a grand theory of pulse response study based on accurate catalyst characterization. This theory is used by many research teams in the United States, Belgium, France, Great Britain, Ireland, Germany, Japan and Thailand; many of the results were obtained in collaboration with a chemical-mathematical team from the Ghent University consisting of Guy Marin, Roger Van Keer, and myself.

Prof. Yablonsky is committed to the organization of meetings and cooperation between chemical engineers and mathematicians, and organized many conferences on this theme in Russia and Thailand. He was also Chairman of two sessions in the chemical-mathematical IMACS conferences in Berlin in 1997 and 2005 in Paris. Together with scientists from the University of Ghent, he organizes the international conferences on "Mathematics in Chemical Kinetics and Engineering" or Mackie for short, in 2002 in Ghent, 2007 in Houston; again in 2009 in Ghent, and 2013 in Chennai, India. He is a honorary doctor of Ghent University since 2011 and received the Lifetime Achievement Award in recognition of outstanding contributions to the research field of chemical kinetics at the Mackie-2013 conference.

But Yablonsky also has a keen interest in the humanities and the arts, as is evinced by his articles on the history of catalysis and reaction kinetics, and his essays on the role of metaphors in science. We can mention specifically his study of Goethe, Dobereiner and Catalysis, and the special chapter devoted to the relationship between catalysis and the philosophical nature of time, in his "bible" book on the subject, "Kinetic Models of Catalytic Reaction".

Prof. Yablonsky also writes stories and poems in Russian, and essays about the great Russian writers like Tolstoi and Pushkin. He is now also an editor of the Russian almanac "Middle West".

In the many facets of his intellectual activity, be they chemical, technical, mathematical, literary or historical, I think we can summarize Yablonsky's role as that of a scientific catalyst, and to be precise, as an exceptionally ACTIVE SITE: we are most grateful for his providing an inexhaustible source of scientific inquisitiveness, ever encouraging us on towards new challenges and the insights they will bring.

An Early Hidden History of Time in Chemistry

Gregory S. Yablonsky

"The only reason for time is so that
everything doesn't happen at once"
Albert Einstein

"The history of science is the only history which can
illustrate the progress of mankind"
(George Sarton)

Chemical kinetics is a special area of chemistry related to the temporal chemical evolution which is characterized by some rate of the substance transformation

Time in chemistry…There are at least three different concrete meaning of this term in chemistry.

1. "Clock" time, or astronomic time, or "external" time of the system, t. This time relates to a change of chemical composition observed during some time interval.
2. "Internal" or "intrinsic" time. Typically, we consider this time when we are talking about the hierarchy of times of different chemical processes or reactions.
3. Residence time. This time reflects the "transport time" of a chemical process because every chemical process is characterized by some physical transport, convectional or diffusional, through the zone of reaction. "Transport time" is used as a measuring stick for the rate of chemical change.

However what is a general meaning of chemical time?

Is it just a scale for presenting the complex process, i.e. complex sequence of chemical events (substance transformations)?

Or it is an essential exhibition of complex chemical transformations.

Chemistry is a science about the change of substances, and this change is occurred in time. The pioneers of chemical kinetics Williamson, Wilhelmi, Sainte-Claire Deville, Berthelot, Pean de Sainte Jille and, finally, the authors of the mass-action-law, Guldberg and Waage, had chosen the etherification reactions as subjects of their investigations. As a rule, these reactions were catalytic.

Catalysis and chemical time

Catalysis as a specific chemical phenomenon of the dramatic change of chemical substance rate in the presence of some substances (catalysts) had been identified earlier, in 1810s-1820s, by Davy (England) and Doebereiner (Germany). I think Doebereiner has more priority than Davy because of his enthusiasm. Generally, catalysis discovery is more interesting than any Hollywood movie. Main characters of this movie are:

1. Johann-Wolfgang Doebereiner, a chemist
2. Johann-Wolfgang Goethe (1749-1832), a German writer, scientist and statesman. He was the prime-minister of the small German dukedom in Weimar
3. Carl-August, the Duke of this Saxe-Weimar dukedom
4. Maria Pavlovna, the Russian Tsar's sister and Duke's daugher-in-law,

Goethe, the greatest German poet, who wrote a masterpiece "Faust" with the famous saying "Werd ich zum Augenblicke sagen:/Verweile doch: du bist zu schoen/Dann magst du mich in Fesseln schlagen, /Dann will ich gern zugrude gehn" (In English ""Stop time, thou art so beautiful!" etc) had a unique interest in different aspects of science, in particular chemistry considering it as a model of human relationships. Doebereiner, the chemist, never graduated from any University. Nevertheless, Goethe recognized his talent and hired him as a court apothecary. Based on Doebereiner's chemical ideas, Goethe wrote his third novel "Elective Affinities" ("Die Wahl-

verwandschaften"). Doebereiner enthusiastically studied the hydrogen oxidation reaction and experimentally found an amazing increase of its productivity in the presence of platinum. In fact, he observed an explosion. Unfortunately, he had no platinum enough for reproducing experimental data. Platinum minerals can be taken only from South America, however in 1810s-1820s South America was a place of civil wars, and trade contacts between Europe and South America had been limited. In addition, the Spanish, starting from the conquistadores, were unimpressed by platinum's appearance and dismissed it as an inferior metal ("the little silver"). However, at the same time platinum had been proved to be present in Russia, in the gold fields of the Ural Mountains, and Goethe wrote a special letter to Maria Pavlovna who was the wife of Carl-Friedrich, son and heir of Carl-August, the Duke, asking her to bring the Russian minerals, especially platinum. She did it, and there was a historical turning point. Doebereiner reproduced a discovery of the new phenomenon, and the Duke wrote official letters to different European academies being impressed by the Doebereiner-Goethe's presentation. Later, catalysis was confirmed by Faraday (England), Dulong and Thenard (France) and many other scientists. In 1835, Berzelius (Sweden) first used the word "catalysis" and a concept of the "catalytic force":

> "It is then shown that several simple and compound bodies, soluble and insoluble, have the property of exercising on other bodies and action very different from chemical affinity. The body effecting the changes does not take part in the reaction and remains unaltered through the reaction. This unknown body acts by means of an internal force, whose nature is unknown to us. This new force, up till now unknown, is common to organic and inorganic nature. I do not believe that this force is independent of the electrochemical affinities of matter; I believe on the contrary, that it is a new manifestation of the same, but, since we cannot see their connection and independence, it will be more convenient to designate the force by a new name. I will therefore call it the "Catalytic Force" and I will call "Catalysis" the decomposition of bodies by this force, in the same way that we call by "Analysis" the decomposition of bodies by chemical affinity."

In this Berzelius' statement, there is no mention of the rate and the time. However there is a word **'change'.** It was a remarkable moment. Chemistry started to pay attention to the **process of change** of reactants and products.

Discovery of catalysis promoted introducing the concept of time into chemistry. However catalysis as a phenomenon was remaining mysterious as telepathy until 1880s when Ostwald (Germany) legalized it via kinetic studies. It was a kind of paradoxical cycle: catalysis sparked kinetic studies implementing the concept of time, and kinetics, in its turn, legalized catalysis as a scientific phenomenon.

Introducing time: Williamson and Wilhelmi

Catalysis 'catalyzed' the development of chemical kinetics. As mentioned, the first reactions studied in chemical kinetics were catalytic reactions of etherification.

Williamson (USA) said: "There exist many evidences that chemical processes need time, but this commonly accepted fact is not taken into account in treating various phenomena".

but did not force its acceptance. Williamson seems to be the first scientist who used the term "dynamics" with respect to processes which are changed in time, i.e. non-steady-state processes. A tit1e of the Williamson's paper published in 1851 was "Some considerations on chemistry dynamics exemplified by the etherification theory". Presently "dynamics" is the very modern term for these processes.

In the same year 1851, Wilhelmi (Germany) presented the first quantitative re1ationship for the reaction rate for the description of the effect of acids on cane sugar. It was a1so the catalytic reaction as well.

The relationship was of the form

$$(dZ/dT) = MZS \qquad (1)$$

where, in accordance with the Wilhelmis's terminology, Z and S are the amounts of sugar and acid catalyst, respectively, T is the reaction time, and M is, the mean amount of sugar which has undergone inversion during an infinitesimal period of time under the effect of unit concentration of the catalyzing acid. M is similar to the kinetic coefficient which is traditional in contemporary chemical kinetics.

In some extent, Wilhelmi anticipated a relation of equation (1) to the nature of catalytic action. "I must leave chemists to decide whether the relation-

ships found can be used and, if so, to what extent they are applicable to other chemical processes. In any case, however, I believe among them must be all those processes whose occurrence is ascribed to the catalytic effect".

However it was a very beginning of the long journey. The development of catalytic kinetics properly started only in the second decade of the 20th century (Langmuir, USA).

In fact, the Wilhelmi's equation (1) was the first kinetic equation in history of chemistry. In this equation, time was explicitly introduced into chemistry via the simple differential equation. Later, the Wilhelmi's achievement was highly estimated by Ostwald who said: "We must consider Wilhelmi as a founder of the chemical reaction rate". But Ostwald admitted that "Wilhelmi's studies had remained absolutely ignored though his paper was published in a rather widespread "Annals of Physics" by Poggendorff. It remained unknown for the later researchers working on similar problems … Only after this field of science had already been so developed, some people beginning to think about its history, then the basic Wilhelmi's result was recognized"

There is a striking coincidence in the early history of catalysis: two scientists from different countries published papers in the same year expressing the similar ideas and having the similar names, Williamson and Wilhelmi.

Mass-action-law (case story of Guldberg/Waage and van 't Hoff)

It is a part of the **hidden history of chemical kinetics.** In 1862-1863 Berthelot and Pean de Sainte-Jille (France) studied the equilibrium states in etherification reactions. In 1862-1867 Gu1dberg and Waage (Norway), on the basis of Berthelot and Pean de Sainte-Jille's experiments and their own data, suggested a primary formulation of the law of mass action. The reaction equilibrium was represented as a balance of the oppositely acting "affinity" forces

$$k(p)^{\alpha}(q)^{\beta} = k'(p')_1^{\alpha}(q')_1^{\beta} \qquad (2)$$

where p, q, p' and q' are the "action masses" of the reactants, and k and k'are affinity coefficients, being functions of the "attraction forces" of the

reactants. It was ***an equilibrium law*** of chemical transformation named as the mass-action-law. It should be noted that Guldberg and Waage introducing chemical kinetics in their pioneer work (1864) used an expression whose form is close to the present-day dynamic formulation $k(p)^{\alpha}(q)^{\beta}$. However in the further study "Investigations of chemical affinity" (1867) they decided it would enough apply the equilibrium formula kpq = k'p'q'.

According to Berthollet, "chemical affinity also meets the conditions specified by mechanics for the phenomena depending оп the mass-action-law". The main concept by Guldberg-Waage was very Newtonian. As known, scientists of the 18th and 19th centuries, in particular chemists, admired Newtonian mechanics. In 1783, the French genius Lavoisier (France) wrote in his paper "Affinity of oxygen origins": "It is possible that one day the accuracy of the available data will be increased to such an extent that the geometer (in this case it is a mechanician-mathematician) sitting in his study-room will be able to calculate the phenomena which accompany any chemical process by the same method which he calculates motions of celestial bodies by. Viewpoints expressed by de Laplace in this connection and the experiments we are planning on the basis of his ideas to express the affinity forces numerically already permit us not to consider this hope as some chimera". Mechanics was considered as a paragon of the very developed science, and interactions between physical masses and chemical ones have been considered to be similar.

It is evident that Guldberg and Waage proceeded from the mechanical interpretation of chemical laws. They formulated a statement: "In chemistry like in mechanics the most natural methods will be to determine forces in the equilibrium states".

In 1879 Guldberg and Waage substituted the equlibrium formulation of the mass-action-law by its ***dynamic*** version. For the interaction between the initial substances A, B, C, …, taken in the stoichiometric ratio of α to β to γ, i.e. $\alpha A + \beta B + \gamma C$, the reaction rate, W, was expressed as

$$W = K p^{\alpha} q^{\beta} r^{\gamma} \qquad (3)$$

There was used a symbol "**W**" for the reaction rate from the German word "Wahrscheinlichkeit". Presently we are using **R** (or **r**) from the English word "reaction".

The scientific situation was completely changed by van 't Hoff (Netherlands), the first Nobel Prize in Chemistry awardee, 1901. In 1884, he published a book "Etudes de Dynamique Chimique" which became a bible of the early chemical kinetics. Van 't Hoff strongly criticized general Guldberg-Waage's concepts. Van 't Hoff's message was very clear: "As a theoretical foundation I was not going to accept the concept of mass action (1 had to leave this concept in the course of my experiments)". One can say that his position was 'pro-chemical' in difference from the 'pro-mechanical' Guldberg-Waage's position. Van 't Hoff suggested the main types of normal chemical transformations presenting the "natural" classification of simple reactions according to the number of molecules that are simultaneously present in the reaction. He put forward the principle: "The process of chemical transformation is characterized solely by the number of molecules whose interaction provides this transformation". Therefore, the physical meaning of reaction orders was clarified.

Van 't Hoff also examined the effect of temperature on the course of chemical transformations and drew a fundamental conclusion: "The temperature effect must be gradual and not sudden". Van 't Hoff, and Arrhenius (Sweden, Nobel Prize in Chemistry, 1903), who further developed his ideas, claimed that the temperature is not the reason for the reaction, but for a **change** of the reaction rate. This conclusion can be compared with that made by Galilei for mechanics: a force is not the reason for motion but for acceleration.

Nevertheless, the real chemical behavior is more complicated than conceptual idealizations. Now it is evident that the conclusions of van 't Hoff and Arrhenius on temperature dependences of reaction rates are rigorously valid only for simple (elementary) reactions. For complex reactions, which consist of many reactions, the temperature dependencies of substance change rates can be not gradual, but jumpwise exhibiting critical effects, ignition, extinction etc.

As for proposed normal transformations, van 't Hoff however suggested that they take place very rarely because of the effect of the medium on the reaction rate. A perturbation ('perturbation actions') was one of the most applicable terms in "Etudes de Dynamique Chimique". Van 't Hoff did not concentrate on such 'perturbation effects' as inhomogeneity, non isothermicity, and the occurrence of some secondary reactions. To his mind, the

main thing, that merits special considerations, is the effect of the medium on the reaction rate ("primarily the effect of the media of obviously chemical nature"). That was the van 't Hoff"s position. For modern kinetics of heterogeneous catalysis, van 't Hoff words: "…the effect of the medium оп the transformation rate during transformation processes is the most important and the most real" retain their significance.

In comments on the van 't Hoff's"Essays", Semenov (Russia, Nobel Prize, 1956) wrote

> "…reading this book one feels as if the author was much more interested in the reasons for the abnormal reaction course and the perturbation effect rather than in further extending his knowledge of the normal process, since he treated them as virtually evident … Van 't Hoff's considerations of the abnormal behaviour of reactions are thrice as much".

To our mind, this splendid principle, which was proposed in "Essays" implicitly, should be especially distinguished in modern chemical kinetics.

It has to be stressed that implementing the temporal evolution and rate dependences into physical chemistry was done via the strong interpenetration of physico-chemical and mathematical approaches. How it was achieved? Primarily through the cooperation of experts in different fields of science. Guldberg, a theoretical chemist and applied mathematician

who never dealt with experiment, and chemist Waage, a scrupulous experimenter, cooperated closely during many decades. "Guldberg and Waage have shown the way to apply mathematical laws in chemical sciences" – so said the English chemist Mouir, their contemporary.

Almost concurrently, English scientists Harkurt, a mathematician, and Esson, a chemist, found an expression similar to the mass-action-law equation by Guldberg and Waage.

As for van 't Hoff, he has two scientific personalities inside his 'beautiful mind' and defined himself as follows: "This double inclination to mathematics on the one hand and to chemistry on the other manifested itself in all my scientific interests".

Summing up, the historico-scientific situation is difficult and in many cases even impossible to reconstruct in detail.

For example, it is not clear why van 't Hoff rejected the concept of 'mass action' so decisively.

It seems the new value designated by him as a 'concentration' was practically the same as the value previously used by Guldberg and Waage as an 'active mass' ("amounts of these substances with respect to the same volume") What is that? Some misunderstanding? A kind of mistake?

Conceptual dissonance? Now we are not able to solve this puzzle.

However we able to determine the final historical result of the 'clash' between Guldberg-Waage's and van 't Hoff's concepts. It is a quite fruitful paradox. In contemporary chemical kinetics we are using the Mass-Action-Law (MAL). This term was coined by Guldberg and Waage. At the same time it reflects the van 't Hoff's idea of the "natural" classification of simple reactions according to the number of reacting molecules (reaction stoichiometry).

So, in contemporary Chemistry we are successfully working with this strange theoretical 'centaurus' and don't care about its origin.