Tracing the Invisible

The gathering and circulation of forensic knowledge in nineteenth- century Dutch cases of criminal poisoning

Master Thesis

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Abstract

This thesis deals with knowledge practices in nineteenth-century Dutch cases of criminal poisoning involving arsenic. Using theories from Science and Technology Studies, it examines the production and circulation of forensic knowledge. Starting off with a praxiographic approach to the chemical and medical practices involved in these cases, this thesis examines how arsenic was made visible and how it was enacted. Forensic toxicology in particular plays a part in making the invisible visible through science. Applying Mol's concept of enactment to the forensic investigatory methods will show what arsenic is in the locality and context of a judicial investigation. Subsequently the issue of expertise is addressed; denoting the expert as a social and cultural construct. The expert and the Dutch law both play an important role in the circulation of forensic knowledge; an inhibiting as well as a beneficial one. When examining the circulation of knowledge, this thesis will make use of the STS concepts of 'contact zones' and travelling knowledge.

Content

Introduction

Increasing fever, nausea, shaking, blue lips, blue circles around the eyes: all signs of acute arsenic poisoning as described in a manual for forensic science written in 1825 by Anthonij Moll.[1] During the nineteenth century poisoning by arsenic was not an uncommon occurrence. In the Netherlands several well documented cases exist of criminal poisoning involving this particular poison. One especially extreme example is the case of 'Goeie Mie', a woman from the city of Leiden, who over the course of several years poisoned upwards of a hundred people for their life insurance pay outs. She managed to kill twenty-seven of them.[2] The rise of life insurance companies at the end of the nineteenth century provided people with the means to gain money from murders that went unnoticed. Arsenic was seen as a perfect tool in accomplishing this; it was cheap and widely available. This combination of motive and opportunity caused a rise in murders by poison in various western European countries like Britain and the Netherlands.[3] In response to cases like this, nineteenth-century chemists became highly motivated to develop methods of detecting poison in the bodies of people who died suspicious deaths.

Since poison, arsenic in this case, was practically invisible to the naked eye and did not always leave clear signs on the body when ingested; it took the help of expert chemists and apothecaries, as well as pathologists and medical doctors to discover its presence.[4] These experts all had their own methods of investigation and throughout the century several new methods were discovered to detect various popular poisons. Arsenic being one of the most important ones, but others like strychnine were elaborately investigated as well. For multiple reasons, arsenic in particular became popular during the nineteenth century. It was easy to come by, tasteless, odourless, cheap, and, until the discovery of among others the Marsh test, hard to detect when examining a dead body.[5] These qualities necessitated the early separation of forensic toxicology from the field of forensic medicine in order to devote more attention to investigating the attributes of poisons. Joe Nickell pinpoints the beginning

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[1] A. Moll, *Leerboek der geregtelijke geneeskunde* (Arnhem 1825) 145.
[2] V. Weterings, 'Swanenburg, Maria Catharina (1839-1915)', *Digitaal Vrouwenlexicon van Nederland* (13-01-2014).
[3] J. Whorton, *The Arsenic Century*, *How Victorian Britain was Poisoned at Home, Work and Play (Oxford 2010)* 27-28.
[4] K. D. Watson, *Forensic Medicine in Western Society: A history* (Oxford 2011) 63-64.
[5] Whorton, *The Arsenic Century,* viii; I. Moermans, *Gif als goede gave: Maria Catharina van der Linden-Swanenburg, Goeie Mie (1839-1915)* (Leiden 2001) 49.

of a separate field of forensic toxicology with the work of Mathieu Orfila (1787-1853).[6] Orfila was a scholar who wrote the first comprehensive work on forensic toxicology, *Traité des Poisons* (1813), on the workings and effects of various poisons. Working as a lecturer on chemistry in Paris, he was also brought in as a chemical expert in what is often seen as the first case of competing expertise in court: the case of *Marie Lafarge*, accused of poisoning her husband with arsenic in 1840.[7] The decades after this case were a blooming time for accusations and fears about arsenic poisoning, making the period 1850-1900 a useful period when discussing cases of criminal poisoning.

The elusive quality of arsenic makes it an interesting case study for exploring how forensic knowledge and evidence was gathered in a criminal trial. Katherine Watson phrases it nicely when she describes how in the field of toxicology: "The invisible was rendered visible through the medium of science."[8] Making *visible* the presence of arsenic in the body of a victim was essential for it to function as evidence in court. If it could be shown, it could be understood and trusted by a lay audience of judges and jurors. The nature of these cases of arsenic poisoning brought to the fore the importance of forensic expertise to interpret and explain evidence. It was the combination of expertise from the medical field, the chemical field and the field of law that together created forensic knowledge on the nature of arsenic. These cases thus also reflect the necessity of communication and transference of the gathered knowledge, more so than cases of more physically violent murder where signs of the cause of death would show clearly in a body and only medical expertise was required. The forensic field is more fragmented now than it was in the nineteenth century, displaying a high level of specialization made possible by the twentieth-century advances in technology and science. Many specialists contribute to the detecting and identifying of a poison in the twenty-first century, all with very specialized knowledge. Yet they all come together from their various fields of expertise to come to a joined conclusion on the nature of a poison and its properties. From these laboratory technicians, X-ray specialists, toxicology experts and forensic pathologists originate pieces of information that are brought together and form a coherent story of cause and effect. In the nineteenth century the different forms of expertise, chemical and medical, were not yet so far apart or diverse, but dealt with the same issue of bringing together knowledge gathered in different fields using different methods and discourse.

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[6] J. Nickell and J.F. Fischer, *Crime Science: Methods of Forensic Detection* (Kentucky 1999) 224.
[7] Nickell and Fischer, *Crime Science*, 7.
[8] Watson, *Forensic Medicine in Western Society,* 65.

Arsenic travels from science to the courtroom and is defined as being the 'murder weapon' along the way; it is made visible and given a new meaning. Within a framework of criminal poisoning cases in the nineteenth-century Netherlands I will examine knowledge practices in criminal trials. I have chosen the nineteenth-century Netherlands because it was in this time many discoveries were made in the field of toxicology and the Dutch laws privileged material evidence and use of expertise, which led to favourable circumstances for the use of toxicological expertise. My main question is: how is forensic knowledge gathered, circulated and given meaning in a nineteenth-century criminal trial? I have divided this question into three sub-questions to examine specific aspects of these knowledge practices.

First I am going to examine the production of forensic knowledge by taking a praxiographic approach to the forensic methods of investigation. This approach is about looking at practices and how a certain phenomenon can be *enacted* through different practices; meaning what it *is* in a specific situation and locality. Enactment is a concept coined by Annemarie Mol in her book *The Body Multiple* which I will discuss at more length below to answer the question: how is arsenic enacted in forensic investigations? Secondly, it is relevant to examine the element of expertise in these criminal trials. Experts and expertise create forensic knowledge and give it meaning by interpreting phenomena using their skill and experience. What role do forensic experts play in these criminal cases? And thirdly, how does knowledge circulate or travel? Forensic knowledge produced by experts in their laboratories needs to travel to the courtroom to fulfil its purpose as evidence. These three focus points will allow me to discuss the gathering of knowledge, the mobility of knowledge, and the role expertise played in these two processes.

Historiography

Toxicology and the use of arsenic have been examined as a history of scientific developments or within histories of murder and serial killers. Joe Nickell and John Fischer address toxicology in their book *Crime Science* as part of a larger field of forensic investigation methods. They are not historians, but approach the field from the perspective of the investigator and scientist. John Parascandola, a medical historian, wrote *King of poisons; a history of arsenic* in 2012 which chronicles the history of arsenic, its relation to crime and its presence in products and compounds up to this day.[9] John Emsley's *The element of murder: A history of poison* from 2005 discusses several poisonous substances found on the periodic table of the

[9] J. Parascandola, *King of Poisons: a history of arsenic* (Dulles 2012).

elements. Emsley also elaborates on arsenic and its use as a murderous tool. David E. Newton's work *Forensic Chemistry* describes the history of the toxicological field going back several centuries. It identifies poison as a strong motivator for the rapid development of the field in the nineteenth century.[10] Arsenic has spoken to the imagination of multiple scholars and has been approached from many angles. Katherine Watson is one of the first who examined files on cases of criminal poisoning at length; in her study of medical and chemical expertise she looked at hundreds of cases in nineteenth century Britain.[11] Watson discusses these cases mainly from the perspective of forensic expertise, and the importance of the developments in toxicology for the use of expertise in the courtroom. Another author who discussed arsenic murders in Britain at length is James Whorton. He examined arsenic murders specifically and elaborates on arsenic and its properties and looks both at its use as a murderer's tool and the omnipresent nature of arsenic in Britain.[12] The element of expertise comes back in both these last books on arsenic and criminal poisoning, providing useful insights in expertise in toxicological investigations. The concept of expertise itself is part of a whole body of literature. Van Lunteren, Theunissen and Vermij who co-authored an article on the social role of expertise in the Netherlands mainly discuss the position of the expert in society and their issues of trust and acceptance.[13] They view expertise in a social context and see it as something you cannot have independently of culture and society. David Horn discusses the production of scientific authority, and proposes that criminals and criminologists have evolved together.[14] Without crime no need for expertise; which actions are deemed criminal depends on the cultural values and rules of a specific society. This suggests that expertise on criminals and crime also depends on the rules and specifics of the society it is shaped in. Horn discusses the criminologist as self-fashioning or cultivating an 'image'; being a criminologist or expert required being accepted as such by society and it was an active process.[15] Another interesting article is 'Liars, Experts, and Authorities' by Graeme

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[10] D. E. Newton, *Forensic Chemistry* (New York 2007).
[11] K.D. Watson, *Forensic Medicine in Western Society: A history* (London 2011); K. D. Watson, 'Medical and Chemical Expertise in English Trials for Criminal Poisoning, 1750-1914', *Medical history 50* (2006) 373-390.
[12] J. Whorton, *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work and Play* (Oxford 2010).
[13] F. van Lunteren, B. Theunissen and R. Vermij, 'Inleiding: De maatschappelijke rol van experts in historisch perspectief', In: Idem eds., *De opmars van deskundigen. Souffleurs van de samenleving* (Amsterdam 2002) 9-21.
[14] D. G. Horn, 'Making criminologists. Tools, techniques, and the production of scientific authority', in: P. Becker en R. Wetzell eds., *Criminals and their scientists. The history of criminology in international perspective* (Cambridge and New York 2006) 317-336.
[15] Horn, 'Making criminologists', 318.

Gooday, who is questioning the difference and interchangeability of the concepts of experts and authority, taking a science history perspective.[16] He identifies a difference between expertise and authority, differences underpinned by social status and financial backing.[17] This reflects the view that being an expert is a social construct; depending on public opinion, funding and connections to institutions. This is similar to the STS perspective on expertise as socially constructed, situational and performative. Saul Halfon emphasises the importance of *context* for the performance of expertise; expertise is not a possession.[18]

The issues of premeditation – a quality connected in nineteenth-century discourse to the use of poison to kill someone but also to the nature of woman – and gender, have been reviewed in Lisa Downing's article on murder and the feminine. She takes a cultural historical approach, combining insights from among others gender studies and anthropology to come to fresh insights on the relationship between women, poison and murder. Nineteenth-century gender discourse demonstrates the view that women apparently lacked impulsive rage, but were duplicitous in nature and planned their murder.[19] A connection has often been made between women and poison as a murder weapon; whereas men would rely on physical strength and impulse, women tended to find other more premeditated ways of disposing of people; making poison a feminine killing tool. Arsenic is not only a weapon however; it is also a concern for health experts who examine its presence in ground water, paints and cosmetics. The poison is not always spread with murderous intent, but more slowly through products of modern life.[20] This makes it an object for studies outside the field of history as well: the public health sector for example and environmental studies on the substance are performed today as well as in the nineteenth century. Arsenic and toxicology have been approached from the point of view of medical history by scholars like Parascandola, from the perspective of science history by Whorton and Emsley, from a gender and cultural historical perspective by Downing and Watson, and by forensic investigators like Nickell and Fischer as part of an overview of the field of forensic science.

In this thesis I will solely examine Dutch cases of arsenic murder and focus specifically on the use of forensic methods of investigations and the way the knowledge that is gathered

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[16] G. Gooday, 'Liars, experts, and authorities', *History of Science* 46 (2008) 431-456.
[17] Gooday, 'Liars, experts and authorities', 432.
[18] S. Halfon, 'Encountering Birth: Negotiating Expertise, Networks, and My STS Self', *Science as Culture* 19 (2010) 74.
[19] L. Downing, 'Murder in the Feminine: Marie Lafarge and the Sexualization of the Nineteenth-Century Criminal Woman', *Journal of the History of Sexuality* 18 (2009) 135-136.
[20] E.g. Saha, J. C., A. K. Dikshit, M. Bandyopadhyay and K. C. Saha, 'A Review of Arsenic Poisoning and its Effects on Human Health, *Critical reviews in Environmental Science and Technology* 29 (1999) 281-313.

through these practices travels among experts and to the courtroom. My approach will be a cultural historical one; examining practices through which forensic knowledge is created and looking at expertise as a cultural and social construct. Cultural history has been described as a meeting ground for various disciplines and methodologies.[21] It deals with the everyday lives of ordinary people as well as the elites and with values, representations and practices.[22] My thesis will be a meeting ground for theories from Science and Technology Studies, an examination of four specific court cases and secondary literature from science history, medical history and cultural history. In the next paragraphs I will discuss the theoretical background more extensively and explain in more detail how I will approach the subject of forensic knowledge practices.

Theoretical framework

Ed Jonker gives a clear description of the various ways science history has been approached in the last century. Since the eighties and nineties of the twentieth century anthropological practices have attempted to approach science history locally, as a network of small local practices. Theories of praxiography, enactment and travelling knowledge fit within his description of the anthropological approach to science history. Bruno Latour is one of the most famous advocates of this approach, with his focus on practices.[23] This field differentiated itself from earlier approaches to science history in which science was seen as economic commodity, technological progression or part of social history.[24] This anthropological approach opposed the idea of grand narratives of progress and enlightenment. Part of this development was the rise of the field of Science and Technology Studies (from now on STS), which by the 1980's made us of empirical research methods in the production of scientific facts. Ethnographers look at practices of science and at the production of knowledge directly.[25] They do not make judgments, or attach meaning to practices of science and scientific knowledge. The advantages of taking this perspective are that it is possible to see science at work, science in the making, but also see science in itself apart from a larger framework of influential universal concepts.

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[21] M. Calaresu, F. de Vivo and J. Rubiés, 'Introduction: Peter Burke and the History of Cultural History', *Exploring Cultural history: Essays in Honour of Peter Burke* (London 2010) 1.
[22] Calaresu, De Vivo and Rubiés, 'Introduction: Peter Burke and the History of Cultural History', 2.
[23] E. Jonker, 'Van relativisme naar oordeelsvorming. Recente tendensen in de wetenschapsgeschiedschrijving', *Studium* 1 (2011) 4.
[24] Jonker, 'Van relativisme naar oordeelsvorming', 15.
[25] M. Berg and M. Akrich, 'Bodies on Trial: Performances and Politics in Medicine and Biology', *Body & Society* 12 (2004) 1.

This point of view is expanded in *The Body Multiple* written by Annemarie Mol who coins the concept of *enactment* in her work, by which she means that an object or in her case a disease can be enacted in the practices they are involved in, it can be made visible, examined, influenced.[26] She asserts that a phenomenon is never disconnected from the materiality (the practices) through which it is enacted. Jensen in his review of her book sums up the ethnographic approach nicely: "An ethnographer/praxiographer out to investigate diseases never isolates these from the practices in which they are, what one may call, enacted. She stubbornly takes notice of the techniques that make things visible, audible tangible, knowable. She may talk about bodies – but she never forgets about microscopes."[27] The question is: can arsenic poisoning be discussed in this manner? Is it something different in different practices? Does it only exist through the practices connected to it? Through the practice of pathology, the poison manifests as blue lips, as a strange feel of the skin, as organs that do not look quite normal. Through medical eyes, it may be seizures and vomiting and shaking. Through the eyes of chemists it is a piece of organ, fluid from the stomach, it is a test, a powder. These enactments can be brought together in a singular meaning when a decision is called for, the meaning that can be used in a practical situation: in this case 'arsenic is present in the body'. Translating one value into another is one way to bring enactments together, others can be addition or valuing hierarchy.[28] One enactment can be more certain or more reliable and therefore be chosen over another. Arsenic enacted in chemistry is different from arsenic enacted in medicine; but both come together in a report and are given meaning as a diagnosis and a murder conviction. Jensen emphasises this aspect of enactment in Mol's work: an object is not in itself singular, but a texture of 'partially coherent and partially coordinated enactments.'[29] This coordination between different enactments is something that is actively done. The relationship between the various interpretations and enactments of arsenic can shed light on the adaptability and mobility of knowledge. It is about building up a picture of forensic knowledge through the practices of investigation and moving from one enactment to the next, through shifting, coordination and adjustments. The advantage of this approach is that you cut through a layer of language, where discourse analysis deals with the subtleties of words, expressions and interpretation, praxiography deals with the layer underneath; with how objects are handled and used and can be something different in different places. A word (*arsenic* for example) is the same

[26] A. Mol, *The Body Multiple: Ontology in Medical Practice* (Durham 2002) 32.
[27] T.E. Jensen and B.R. Winterheik, 'Book review: The Body Multiple', *Acta Sociologica* 48 (2005) 267.
[28] Mol, *The Body Multiple*, 80.
[29] Jensen and Winterheik, 'Book review: The Body Multiple', 266.

regardless of time and place, but in this praxiographic approach what arsenic is, is multiple and can mean a variety of things depending on its context.

Mol is looking at the local, practical perspective, Jonker accepts the benefits of this, but also sees the need to extend these practices and the knowledge gathered from it to a larger framework. There is a danger of fragmentation when looking solely at actions, not meanings. I agree with Jonker when he sees a need to go beyond this localized knowledge to find connections between knowledge practices. This is where the concept of travelling comes in: connections can be made and a bigger meaning attached to knowledge gathered in different places and in different fields: "historians of knowledge now opt for a cautiously evaluative history. The alternative would be an intellectually barren historicism."[30] We cannot only look at facts without at least an element of interpretation, what is the use of history writing when there is no meaning attached to the facts? I mean to start by looking at practices, but then move on to the meaning and use of the knowledge gathered through these practices. Which in this case means that I will start by looking at arsenic in its fragmented form, as it is enacted through practices and then take this knowledge of arsenic and examine how this is given meaning by experts who have to come to a conclusion, and by experts in law who use this knowledge to paint a bigger picture of guilt and evidence. In court arsenic is seen as a murder weapon, one of the elements that can elucidate what happened, who killed whom, why and how? Arsenic is a meaningful presence in the courtroom; it is enacted as 'evidence'.

The second part of my thesis will involve how this knowledge is circulated between experts and to the courtroom. I will take on the concept of expertise, examining the issue of objectivity connected to a positivist approach to science, and issues of gender and the social nature of the expert. In the debate on the mobility of knowledge I will again use concepts from STS, those of travelling knowledge and 'contact zones'. As Stephen Greenblatt stated: "mobility studies should identify and analyse the contact zones where cultural goods are exchanged".[31] The courtroom is shaped to accommodate a lay audience and law officials and functions as a contact zone for knowledge gathered by people from the medical and chemical field as well from the field of law.[32] A contact zone is not necessarily a literal place, but rather a space where knowledge from different fields can come together and be exchanged; be mutually influential. It is an exchange zone for cultural goods; the courtroom

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[30] Jonker, 'Van relativisme naar oordeelsvorming', 15.
[31] S. J. Greenblatt, 'A mobility studies manifesto' in: *Cultural Mobility: A Manifesto* (Cambridge 2009) 2.
[32] W. Ruberg, 'Travelling knowledge and forensic medicine. Infanticide, body and mind in the Netherlands, 1811-1911', *Medical History* 57 (2013) 362.

is in this case both a literal place and a space where reports and statements from various sources are joined and interpreted. James Secord states the following in regards to the mobility of knowledge: "The centrality of processes of movement, translation, and transmission is already emerging in studies of topics ranging from ethnographic encounters to the history of reading." [33] He sees the benefits of this approach for creating an effective dialogue not only among historians but also with the wider public. To him communication is a key point, and this theory of how knowledge circulates can help clarify how knowledge is communicated between scholars, historians and beyond to a wider audience.[34] His ideas are useful for describing the influence on forensic knowledge of communication between experts from different fields. In the framework of STS expertise is seen as situated and social. There is not always a clear demarcation between expert and layperson. Expertise depends on the situation, the context, level of knowledge and membership of a group. Evans and Collins coined the concept of 'interactional expertise', denoting the level of expertise needed in a subject to be able to interact interestingly with others in the field.[35] I will get back to this in the third chapter of this thesis where I will discuss the role of expertise in cases of criminal poisoning.

Forensic knowledge is gathered using a certain framework provided by law, but does this mean there are no difficulties in transferring this knowledge from one field of expertise to another? A judge requests answers on very specific questions regarding a case which the experts try to answer. In these Dutch cases the medical and chemical experts are asked to answer different questions and thus come up with different answers on the issue of arsenic. Is there a problem in communication, translation of knowledge from expert to laymen? Or between experts from different fields? Is there a different discourse? Forensic medicine and forensic chemistry had become two separate fields in the nineteenth century, but not yet with a clear boundary. Apart from chemistry and psychiatry, other forensic fields had not carved out their own area of expertise. Where we have geneticists, pathologist, chemists, anthropologists, entomologists and the like today, in the past there were not always such clear boundaries. This is something to keep in minds when discussing the transference of knowledge between these fields; it was both easier and harder.

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[33] J.A. Secord, 'Knowledge in Transit', *Isis* 95 (2004) 654.
[34] Jonker, 'Van relativisme naar oordeelsvorming', 8.
[35] S. Sismondo, 'review of *Trading Zones and Interactional Expertise: Creating New Kinds of Collaboration,* Michael E. Gorman (ed.) (Cambridge 2011)', *Technology and Culture* 53 (2012) 696.

Methodology

Drawing on primary sources, both from the judicial archives in Haarlem and the special collections library of the University of Utrecht, I will examine four cases of criminal poisoning in great detail. I will place this information in a larger perspective of secondary literature on the time period, forensic research methods (specifically on toxicology), and expertise. I will gather the source material from the North- Holland Archives (NHA) from the period of 1850-1900 in the form of files on trials and judicial decisions. The detailed information from these cases will allow me to describe the investigation of arsenic from a praxiographic perspective. This is not meant to be a comprehensive representation of Dutch criminal poisoning cases, but taking a few specific examples will allow me to examine practices in greater detail. Looking at specific cases can also shed light on the use of expertise and highlight issues that would not necessarily be discussed in secondary literature. The chosen cases all involve the use of arsenic as a murder weapon and include both a medical and a chemical investigation. They took place between 1860 and 1885, which places them in the period when arsenic murders were fairly common, when the motive of life insurance policies became an issue and next to that it was a time in which several methods of testing for arsenic had already been developed. I have chosen Dutch cases to examine the situation in the Netherlands specifically, something which has not been done extensively. Starting in chapter 1 with a historical framework discussing the field of toxicology and the qualities and attributes of arsenic I will set the stage for an examination of these four case studies in chapter 2. This chapter will analyse the four cases with regards to their forensic reports and approach them from a praxiographic perspective. This will lead to a description of what arsenic *is* in these cases of criminal poisoning. In chapter 3 this knowledge about arsenic is discussed in the context of expertise and travelling knowledge. I will compare secondary literature to the information found in the primary sources, but first: how did the forensic field develop in the nineteenth century and what was arsenic's place in this development?

Chapter 1 The nature of criminal poisoning and its place in history

"One factor that set poisoning apart from other crimes of violence was the potential difficulty in discovering that a crime had occurred at all."[36]

1.1 Introduction

Making arsenic visible was the goal of many forensic chemists working in the nineteenth century. A modern day description defines the field as: "the science that treats the composition of substances and their *transformations*, the reactions by which they undergo change into other substances."[37] Chemical analysis is divided into qualitative analysis, dealing with what elements and substances are present and quantitative analysis to determine how much of these elements have been found.[38] Both of these are necessary when performing a chemical analysis in a case of criminal poisoning: chemists need to know the identity of the poison as well as whether it is a lethal amount. The nineteenth-century forensic chemist not only needed to perform these two types of analysis, but also perform it in such a way that it is understandable and valuable as evidence in court.

Arsenic was one of the most commonly used poisons in cases of criminal poisoning and therefore required close attention of chemical experts. Arsenic's properties made it into an ideal killing tool: it was easy to come by, easily dissoluble in warm food and had symptoms mirroring other illnesses. Advances were made however in the detection and visualization of the poison. At the end of the 'arsenic century', as James Whorton dubbed it in his book on arsenic murders in nineteenth-century Britain, several more or less reliable methods had been developed.[39] Before this the field of forensic medicine was not separated in different specialties. In the late nineteenth century separate medical expertise was always requested in cases of suspected poisoning as well as chemical expertise. The work of the medical involved describing symptoms, interpreting physical signs and performing autopsies. To clarify the framework in which arsenic murders in the nineteenth century took place I will elaborate here on those scientific developments that caused the field of forensic toxicology to be one of the first to separate itself from the general field of forensic medicine. I will continue this chapter by describing the properties of arsenic and the methods used to detect

[36] Watson, 'Medical and Chemical Expertise in English Trials for Criminal Poisoning, 1750-1914', 379.
[37] Nickell and Fischer, *Crime Science,* 219-220.
[38] Ibidem 220.
[39] Whorton, *The Arsenic Century*, 82-83.

its presence in the bodies of its victims. This focus on what arsenic is and how it was tested for (the *practices*) will be the foundation for the examination of the case studies in the following chapter.

1.2 Historical context

Ed Jonker's overview of the approaches to science and science history denotes the nineteenth-century field of science as a period of analyses of information followed by a period of experimentation. From this period of experimentation and the performance of quantitative measurements, the field of *technoscience* emerged after 1850.[40] This *technoscience* refers to ways of making knowledge that are also ways of making more practical goods; a way of making and a way of knowing.[41] A positivist attitude towards science was part of this development in the late nineteenth century and denoted an attitude of empiricism, experience and objectivity.[42] "Let nature speak for itself" became the main idea behind this new type of scientific objectivity.[43] It involved the belief that there was a truth and the world could be known and examined from an objective point of view. The positivist approach to science is connected to Auguste Comte, who propagated this attitude towards science and philosophy from the late eighteenth century onwards.[44] It was real, certain, precise, objective and concrete; a grand narrative of the progress of science.[45] In this view the only valuable knowledge is created by empiricism and scientific methods. In the Netherlands the first positivist publication appeared in 1846.[46] It did not make its way into Dutch science practices easily and was seen by some as materialistic and a denial of religion, the immortal soul and free will.[47] By 1870 however a Dutch manual for forensic medicine written by Wilhelmus Koster exemplified this positivist attitude towards medicine and science: Koster viewed the primary goal of medicine as being science for science sake: study

[40] Jonker, 'Van relativisme naar oordeelsvorming', 11.
[41] J. V. Pickstone, *Ways of Knowing. A new history of science, technology and medicine* (Manchester 2000) 163.
[42] H. Krop, 'Natuurwetenschap en theologie in de negentiende eeuw. De filosofische achtergrond vande moderne theologie', *Theoretische Geschiedenis* 21 (1994) 19.
[43] L. Daston, and P. Galison, 'The Image of Objectivity', *Representations* 40, Special Issue: Seeing Science (1992) 81.
[44] K. Wils, *De Omweg van de Wetenschap*, *het positivisme en de Belgische en Nederlandse intellectuele cultuur 1845-1914* (Amsterdam 2005) 19.
[45] Wils, *De Omweg van de Wetenschap,* 39.
[46] Ibidem 66.
[47] Ibidem 71.

and research to increase the knowledge of truth, independent of possible practical purposes.[48]

The late nineteenth century appears to have been an interesting time, not only for science in general and their liking for experimentation and positivism, but for the forensic field specifically. The discovery of the structure of human and plant cells and blood types greatly increased the knowledge of the human body and Lockard's Exchange Principle laid the foundation for the idea that a criminal could be connected to the location of the crime by traces of hair, fibres and fingerprints.[49] Dr. Edmond Lockard came up with the theory that whenever a human being is in contact with another person or place, there is an exchange of trace evidence: this can be a hair, some dirt or a skin cell for example. In a case of criminal poisoning this principle was not forgotten and clothes of the suspect were often examined for traces of poison. The field of forensic science revolved around issues of identification and cause of death and made many advances in both directions. Of interest here is however the field of toxicology, dealing with toxins and chemical tests rather than motive and identity. During the eighteenth century the importance of this field of expertise became apparent. Not only the cause of death came to be considered relevant, but also the time of death, the analyses of bloodstains and the identification of poisons.[50] While this field of toxicology was still in its infancy in the late eighteenth and early nineteenth century, as Katherine Watson determined, towards the end of the nineteenth century several reliable tests had been devised to discover toxins like arsenic and strychnine in the body and answer questions about the nature and amount of poison fairly reliably.[51]

The first comprehensive work about forensic toxicology was written by Mathieu Orfila who worked in Paris as a teacher of medicine. His *Traité des poisons* (1813), describing ways to investigate the pathological effects and symptoms of various poisons, long remained a benchmark for forensic toxicological writing in Western Europe.[52] Other well-known figures in the field of toxicology were James Marsh and Hugo Reinsch, who both developed successful methods to test for the presence of arsenic.[53] The first successful use of toxicology

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[48] W.A. Koster and E. Buchner*, Leerboek der gerechtelijke geneeskunde voor artsen en rechtsgeleerden* (Tiel 1870) 1-2.
[49] Nickell and Fischer, *Crime Science*, 10.
[50] Ibidem 6.
[51] Watson, 'Medical and Chemical Expertise in English Trials for Criminal Poisoning, 1750-1914', 377.
[52] Nickell and Fischer, *Crime Science,* 6.
[53] D.S. Caudill, 'Arsenic and Old Chemistry: Images of Mad Alchemists, Experts attacking Experts, and the Crisis in Forensic Science', *School of Law Working Paper Series* 136 (2009) 27.

in a court case is in the case of Marie Lafarge in France in 1840.[54] It was a highly publicized case, which included several experts giving contradictory testimony. One of them was Orfila, already well-known at the time for his expertise on toxicological matters, who testified for the prosecutor and found the presence of arsenic in the victim's body. Lafarge was found guilty after a lengthy trial that brought to light the necessity for reliable expertise in suspected cases of poisoning and also showed a first attempt to bring in opposing testimony.[55] It was a time which saw the demand for expertise grow; a demand from within the court of law for expert witnesses to aid fair decision making.[56] The advancements in toxicology during the first half of the nineteenth-century, particularly with respect to detection of arsenic, caused numerous accusations of arrogant over-confidence to appear in the scientific field; this was not about making mistakes, but about the expert themselves being more confident than was called for by the existing methods.[57] Methods like the Marsh test were fairly reliable, but there were always elements that could interfere with the results.

Originally the forensic field was not separated into the many factions we have today. It was not until the late eighteenth century that the forensic field split up in multiple factions and an independent field of knowledge and practices of forensic chemistry came into being. As Anthonij Moll stated in his early nineteenth century manual of forensic science: "chemistry and psychiatry have made the most significant advances".[58] Similar to forensic psychiatry, forensic chemistry dealt with the invisible. This quality of invisibility was what made it necessary for chemists and apothecaries to devise reliable methods that could indicate the presence of toxic substances in the body: substances not easily detectable with the naked eye or through a physical examination. It was not only necessary for chemists, but more so for the judges who required proof in cases of poisoning. Evidence had no value if it could not be brought to light: "Criminal poisoning fitted neatly into this area of overlap between science, medicine and the law because of the clear difficulties that proving a crime that was so often hidden from view posed to a legal system that desired certainty."[59] The experts in law, medicine and toxicology were the ones tasked with bringing arsenic to light in this framework of overlapping fields. Medical experts and chemical experts worked together in cases of criminal poisoning; the first were usually first at the scene and could diagnose the

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[54] Nickell and Fischer, *Crime Science*, 7; L. Downing, 'Murder in the Feminine', 123.
[55] Ibidem 7; Ibidem 123.
[56] Ruberg, 'Onwetendheid. De rol van de forensische geneeskunde en psychiatrie in Nederlandse verkrachtingszaken (1811-1920)', 91.
[57] Caudill, 'Arsenic and Old Chemistry', 5.
[58] Moll, *Leerboek der geregtelijke geneeskunde*, Introductie XXII.
[59] Watson, 'Medical and Chemical Expertise in English Trials for Criminal Poisoning, 1750-1914', 378.

cause of death or at least determine possible causes. The chemical expertise was needed to confirm cases of poisoning and to answer more specific questions like: what poison was used? Was it a lethal amount? How was it administered?[60] These questions were provided by a judge or other law professional who already shaped the results in a way that was most useful in a courtroom.

The earliest forensic scientists came from a medical background and were educated through an apprenticeship or at universities.[61] Education is not only important for being an expert (as in knowledgeable and skilled) but also for being accepted as one. Watson also emphasises the academic background of most nineteenth-century experts.[62] It was in a scientific context that the term 'expert' arose as it became necessary to identify who was qualified to give evidence.[63] Since the beginning of the century several institutions provided laboratories for chemistry research as well as teaching opportunities. By Royal Decree of 1815 the three biggest universities in the Netherlands, Leiden, Utrecht and Groningen, founded a separate faculty of mathematics and natural sciences. An important part of this was the notion that each of these universities was obliged to have a decent chemical laboratory.[64] By the end of the century there was both a need for chemical expertise as well as opportunity to create this expertise. Arsenic had become a tool for murder and an object of interest for the forensic toxicologist.

There were however several matters that hampered the development of the field of forensic medicine in the nineteenth century. A.H.M. Kerkhoff suggests that a lack of attention from the legal field hindered the development of the forensic field into a wholly separate are of expertise.[65] From 1815 onwards every university was obliged to teach the subject, but this task was mostly given to professors from other fields who took on this forensic aspect as a secondary duty. These professors performed both the role of academic and in a more limited fashion that of forensic expert; a more practical occupation. Thomas Gieryn examines this distinction between scientist and what he calls *mechanic*. The first, scientist, values knowledge for knowledge sake (fitting in with the positivist attitude), acquiring knowledge through experimentation and developing theories; the second, the mechanic, has a more

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[60] G. Cooper and A. Negrusz, *Clark's Analytical Forensic Toxicology* (London 2013) 2.
[61] Nickell and Fischer, *Crime Science*, 6.
[62] Watson, *Forensic Medicine in Western Society*, 48.
[63] Ibidem 48.
[64] H.A.M. Snelders, 'Chemische Laboratoria in the negentiende eeuw', *Tijdschrift voor Geschiedenis, Geneeskunde, Natuurwetenschappen, Wiskunde en Techn*iek (1986) 215.
[65] A.H.M. Kerkhoff, 'Over de verhouding tussen gerechtelijke geneeskunde en openbare gezondheidszorg: Een historisch overzicht', in: B.A.J. Cohen (red.) et al., *Forensische geneeskunde: Raakvlakken tussen geneeskunst, gezondheidszorg en recht* (Assen 2004) 3.

practical purpose, works for money and acquires knowledge through observation rather than experimentation – the forensic expert seems to fall in between those categories.[66] They are not working for pure knowledge's sake, but within clear practical boundaries and with a specific purpose. This could be the reason it was such a difficult position to be in for many scientists: they were professors and researchers who were asked to do this more practical forensic work as a secondary duty. It was not a field clearly defined by law either; it was a boundary crossing field in more than one respect.

Regulating the forensic field by law was seen as necessary but exactly how this was going to be done was a matter for debate. The four laws regarding medicine introduced by Thorbecke in 1865 hardly mention forensic medicine; they merely stated that forensic medicine had to be a part of a medical degree examination and the knowledge of certain poisons has to be in the examination of apothecaries.[67] Giving forensic testimony was not an attractive job and one that did not involve a high payment. Kerkhoff acknowledges a lack of interest in the field in the Netherlands and mentions Anthonij Moll as one of those who were unsatisfied with this attitude. Moll decided to aid matter by writing a fairly comprehensive manual of forensic science in 1825, which deals elaborately with toxicology and the properties of arsenic.[68] Kerkhoff suggests other inhibiting factors for the development of the forensic medical field in the Netherlands: there was not enough forensic work to create full time positions for experts, and most medical professionals approached the forensic field from the perspective of their own specialization, which led to a lack of expertise that encompassed the whole field of forensic medicine: rather every subfield of medicine developed its own branch of forensics. Forensic toxicology was one of those branches that developed into its own field of expertise however.[69] And it was a branch pushed forward by its need to detect and identify arsenic and other poisons.

1.3 Arsenic: the perfect weapon

As said before, arsenic was one of the most famous and ubiquitous toxic substances in the nineteenth-century Netherlands. It could kill quickly and was readily available for only a few coppers at the local apothecary in the form of rats bane and other compounds. Arsenic was

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[66] T. Gieryn, 'Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists', *American Sociological Review* 48 (1983) 786.
[67] Kerkhoff, 'Over de verhouding tussen gerechtelijke geneeskunde en openbare gezondheidszorg', 4.
[68] Ibidem 5.
[69] Ibidem 17-18.

the poison of choice in all of the four cases that will be discussed in this thesis: either mixed with porridge or mashed potatoes, or dissolved in a kettle of boiling water, it was a highly lethal substance.

1.3.1 Qualities of Arsenic

"Poison in the forensic sense, denotes a substance, that, in accordance with other substances, in small amounts introduced to the body, negatively influences health and life."[70] Arsenic certainly falls within the bounds of this nineteenth-century description of the nature of poison. There are several forms of arsenic compounds found in nineteenth-century sources: white Rats bane (Oxydum Arsenici album s. Acidum Arsenicosum), Rats bane acid (Arseniates), yellow Sulphuric Rats bane or Operament (Sulphuretum Arsenici Flavum), red Sulphuric Rats bane or Réalgar (Sulphuretum Arsenici Rubrum) and Fly-poison or Fly-stone (Arsenicum oxydulatum nigrum).[71] Mostly named after their use, rats bane was for killing rats and other vermin and Fly-stone was used as a fly repellent.

James Whorton describes arsenic and its many properties and qualities at great length, showing the deadliness and ubiquitous presence of this substance. The substance is highly poisonous even in small amounts: as little as 300 mg of this substance can be lethal to a human being.[72] Arsenic, *As* on the periodic table of elements, is the twentieth most common element in the earth's crust and it is only toxic in combination with other elements, like sulphur or iron. The most commonly used version in the nineteenth century was arsenious acid (As_2O_3).[73] Arsenic in this form resembles sugar or flour and can thus be easily mistaken for a more innocent substance. It is a substance that can be added to food or drinks without raising suspicion right away; in small amounts it does not even alter the flavour of a dish noticeably. The downside (or upside) is that this poison is not easily soluble in cold liquids and can therefore be detected in a drink that has cooled off, or in a kettle of water that has not been boiled yet.[74] Arsenic is usually measured in *grains*, for it resembles grains of sand in its poisonous form. One grain weighs about 64.8mg and these grains have a crystal-like structure when examined under a microscope.

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[70] "Door vergift (venecum, virus, toxicum) in den Geregtelijke-Geneeskundige zin, verstaan wij: elke zelfstandigheid, welke, in evenredigheid tot andere zelfstandigen, in kleine giften in of aan het lichaam gebracht, gezondheid en leven benadeelt." In: Moll, *Leerboek der geregtelijke geneeskunde,* 8.
[71] Ibidem 144.
[72] Whorton, *The Arsenic Century*, 10
[73] Ibidem 8
[74] Ibidem 35-36.

1.3.2 Effects of arsenic poisoning on the body

"Agonies that would soften the heart of a savage"[75]

A dose of arsenic can kill in two hours or the process of increasing agonies could last up to three of four days.[76] This period of suffering entailed copious vomiting and other excretions. In Moll's forensic manual from 1825, the symptoms of acute poisoning with *rats bane* were described as follows: seizures, coppery metal taste in the mouth, lips turning blue, blue circles around the eyes, swelling and itching of the whole body, discoloration of the skin and yeast-like rash, and finally hear falling out, the top layer of the skin is loosened and then death sets in.[77] Rightly called by a mid-nineteenth century newspaper editor: "such an instrument of death and agony".[78] Subsequently Moll describes the symptoms related to the chronic version of arsenic poisoning as: attacks, weakness, disturbed intake of food and bowl movements, cramping of the chest, difficulty breathing, coughing, rashes on the skin, swelling of limbs, paralysis, hear and nails falling off, parchment-like dryness of skin, and finally after weeks, months, or even years, death follows by fever and complete exhaustion.[79] Descriptions of the symptoms in Whorton's work are more figurative as they come from the victims of arsenic themselves: "a fireball in the stomach" and "his teeth dropping out of his head, whole from their sockets"[80]. In short, death by arsenic is not a pleasant way to go.

In the case of accidental poisoning the effects were usually of the chronic kind. Arsenic could be found in all sorts of medicine, food and the general environment. In the case of murder, the dose of the poison was usually so high it presented as acute poison symptoms. Several contemporary experts on the matter agree that one of the effects of arsenic poisoning is that it prevents the body from decaying rapidly and that these bodies remain well preserved much longer than bodies of people that died ordinary deaths. One of the experts involved in the case of Maria Swanenburg, Dr. Zaaijer, wrote an article dedicated entirely to this subject, using information he gathered while investigating her case.[81] He

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[75] Ibidem 11.
[76] Ibidem 15.
[77] Moll, *Leerboek der geregtelijke geneeskunde,* 145.
[78] Whorton, *The Arsenic Century,* 16.
[79] Moll, *Leerboek der geregtelijke geneeskunde,* 145-146.
[80] Whorton, *The Arsenic Century,* 3.
[81] T. Zaaijer, *Een gerechtelijk-geneeskundige studie*, Koninklijke Akademie van Wetenschappen, Amsterdam (1885) no page numbers available.

came to the controversial conclusion that this assumption that the presence of arsenic aided in the mummification of bodies was not true and did not have any forensic value.

1.3.3 Availability

Arsenic was, for several reasons, the most popular poison of the nineteenth century. It has a long history as a medicine as well as a poison. In use as a green pigment in paints and a component of facial cream, it was said to work as an anti-aging substance in the latter. The use of arsenic as a poison drew a lot more negative attention however and in several notorious murder cases arsenic was shown to be the cause of death. Of all know poisoning cases in the 1840's Britain around 70% was an arsenic murder.[82] In the Netherlands in 1818, the legal guidelines for apothecaries show strict rules on selling poisonous substances. Arsenic, *rats bane* and others forms of the poison, are mentioned specifically. They were not allowed to be sold to people other than doctors, apothecaries, physician or midwives and only for specific intentions.[83] This did not prevent anyone from buying the more innocent substance of arsenic mixed with chalk, which was used to kill bedbugs. These materials could then be easily separated and the toxic segment used for more deadly purposes. As shown in Moll's manual for forensic medicine there are several types of arsenic compounds available; in Dutch the most well-known version is r*attekruid.* Whorton uses the term *rats bane* for the same compound in English and *mort-aux-rats* for the French; demonstrating that all over Western Europe the compound was used to exterminate rats and was therefore in high demand.[84] *Rats bane* was also used for washing sheep before they were shorn, so the wool would be clean and whiter.[85] Another regular use of an arsenic compound was as a pesticide or to kill vermin in and around the house, which meant that acquiring it would not immediately rouse suspicion.[86]

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[82] Whorton, *The Arsenic century,* 25.
[83] *Verzameling van Wetten, Besluiten en Regelementen, betrekkelijk de Burgerlijke Geneeskundige Dienst in het Koninkrijk der Nederlanden* ('s Gravenhage 1818) 208-210.
[84] Whorton, *The Arsenic Century*, 27.
[85] This information was found in a apothecaries' notebook present in the criminal file of Nicolaas Geerekink. Noord Hollands Archief (hereafter NHA), Gerechtshof Amsterdam (hereafter GA), inv nr. 93, file 66, 1885.
[86] Moermans, *Gif als goede gave,* 49; Whorton, *The Arsenic Century,* preface viii.

1.4 Detecting Arsenic: methods and tests

During a court case there were two types of practices that would enact arsenic in the body: lay observations and statements, and expert examinations and analyses. The first consists of witness statements from family, friends and others with a direct link with the victim, and sometimes from the victims themselves; in case they only got ill, they could describe their symptoms and share their suspicions on how they had been poisoned. The goal of forensic investigators was primarily to clarify matters in the case of a suspicious death. These experts would go beyond mere description of experiences; the medical experts would examine the bodies involved, both living and dead. Pathologists performed autopsies on the bodies of victims of a crime, even when those victims had long since been buried. This could present problems; the exhumation of a body could conflict with religious ideas on proper burials. There was also a common superstition that to touch a dead body communicated a moral pollution.[87] In the nineteenth century bodies were called 'commodities', 'materials' and 'waste'.[88] The medical profession treated them at the time as bodies without a person, the identity was separated, and they were just things to be used as learning tools. Even stillborn babies and foetuses were in the eyes of the law non-persons and could be seen as waste material.[89] It was however possible to exhume bodies in the nineteenth century for the purpose of a judicial investigation; with a court order or permission from close relatives. After the medical investigation, the chemical experts would take the samples given to them by the medical experts and analyse them for the presence of arsenic or other harmful substances.

If a person was poisoned with arsenic, how could this be proven, and proven in a way valuable as evidence in a courtroom? Orfila outlined the way one should go about a forensic toxicology investigation early in the nineteenth century in his famous *Traité des poisons*; these principles are still valid today and can be summarized as follows:

> (1)All chemists who undertake this work must have toxicological experience, (2) the analyst must be given a complete case history that contains all the information available, (3) all the evidential material, suitably labelled and sealed in clean containers, must be submitted and

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[87] M. Sappol, *A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in the Nineteenth-Century America* (New Jersey 2002) 14-15.
[88] S. Ferber and S. Wilde, *The Body Divided: Human Beings and Human 'Material' in Modern Medical History* (Surrey 2011) 15.
[89] Ferber and Wilde, *The Body Divided,* 18.

> examined, all the known identification tests should be applied and adequate notes made at the time, (4) all the necessary reagents used for these tests should be pure, and blank tests should be performed to establish this fact, (5) all tests should be repeated, and compared with control samples to which the indicated poison has been added.[90]

Using these guidelines experts had to answer three important questions when examining the evidence in trials. What was the poison? Was it a lethal amount? How was it administered? It was necessary to structure their examination in such a way the results would be clear to the people in courtroom. The report had to uphold certain scientific standards and had to be signed to show the truthfulness of the results. According to Anthonij Moll, the forensic expert had to answer the following questions: is this a case of poisoning? If yes, what kind of poison has been used? In the case of death after poisoning has been proven, is this poison the cause of death? Has the person been poisoned by another of by himself?[91] Unlike Orfila, Moll does not differentiate between the medical and chemical expertise, there are just four relevant answers to be found and brought to the judge. Moll writes about his concept of the complete forensic professional; capable of both medical and chemical expertise, as well as knowledge of law and other related matters.

Toxicology experts usually worked in small laboratories. Samples of bodily fluids and other matters were taken by physicians and then sent to chemical experts for further examination. Careful notes were made of the items of evidence and had to be signed for by the people that received them. Materials plus a written report were handed back to the judge to be examined. Examinations could last several days, in the case of Maria Swanenburg, where sixteen victims had to be examined, it took much longer.[92] They made use of tools like magnifying glasses and microscopes, as well as more complicated materials and instruments. These instruments had to be carefully cleaned and maintained; contamination could easily occur. The reagents had to be purified as well; chemical substances that came from factories could contain traces of other materials that would possibly interfere with an analysis. A contaminated reagent or instrument could affect the outcome of a chemical analysis and eventually affect the outcome of a trial. This purification and cleanliness was thus essential for a reliable outcome.

In 1825 Moll described many more or less functional tests. His book, written twelve years after Orfila wrote his, includes Orfila as a source and mentioned a test method names

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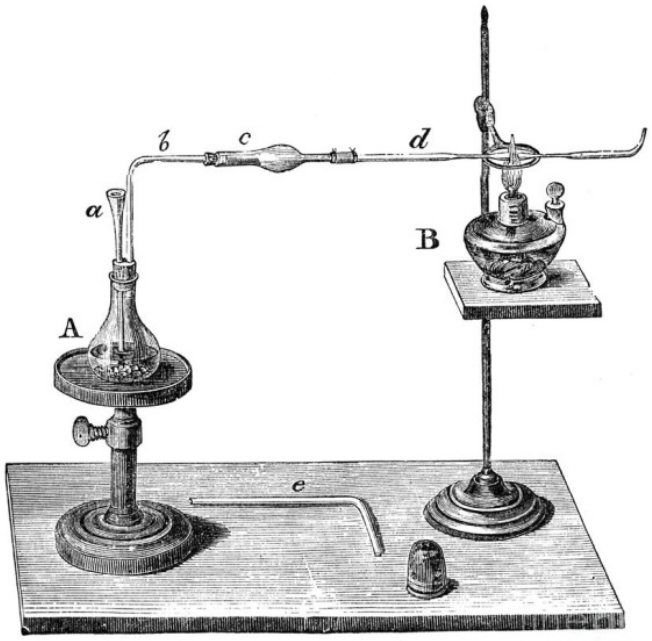
[90] Cooper and Negrusz, *Clark's Analytical Forensic Toxicology,* 2.
[91] Moll, *Leerboek der geregtelijke geneeskunde,* Part III, 31.
[92] Weterings, 'Swanenburg, Maria' (last updated 13-01-2014).

after him. Moll starts with explaining several simple methods, one of them was burning residue from organic material which caused a white smoke smelling of garlic and leaving a trace on a metal plate held above the flame.[93] Another was the Fresenius and Babo test, which entailed heating with cyan potassium and hydrogen acid, and was based on the Marsh test and made use of the same apparatus.[94] One of the most famous tests that have been discovered for detecting arsenic in a human body and other evidence like food samples was this Marsh test. James Marsh was a chemist working in Britain, who in 1832 became intent on finding an improved more reliable method of testing for arsenic. Spurred on by the failure of other tests and intent on proving himself he, after a couple of years of work, devised what is now named after him, the Marsh test. [95]



Nineteenth-century representation of the Marsh test apparatus[96]

The Marsh test involved introducing either sulphuric acid or hydrochloric acid to the material evidence. This was followed by an addition of zinc. This acid-zinc reaction generates hydrogen, any arsenic present bonds with the hydrogen to form arsine (AsH_3), and the arsine gas bubbled out of the solution. Marsh found that by passing the escaping arsine through a glass tube with a fine nozzle at the end and igniting it as it exited the nozzle he could get

[93] Moll, *Leerboek der geregtelijke geneeskunde* (1825) 149.
[94] R. de Clerqc, 'Prof. Dr. Felix Daels en de vergiftigingszaak te Steendorp', *Uit het verleden van de RUG* (Gent 1992) 18-19.
[95] Whorton, *The Arsenic Century*, 85-86; Newton, *Forensic chemistry*, 7.
[96] Image 'Marsh Test Apparatus, 1867', taken from fine art America website.

metallic arsenic to precipitate as a black mirror on a sheet of glass held next to the flame.[97] Amounts as small as 0.02 mg could be detected this way; the test was extremely sensitive, which showed in the fact that it could also be used to discover the presence of arsenic in bodies long since buried, proven to work in a body that had been underground for 22 years.[98]

The test was still far from perfect or even safe however, causing at least eight deaths among the analysts using this method. Arsine gas could escape the apparatus and this is a highly toxic gas. Other problems had more to do with the accuracy of the test: did it exclusively show the presence of arsenic or could other elements also provide a positive result? Another concern was the foaming of organic materials interfered with the forming of arsine gas. Orfila worked out a solution to these problems by separating the organic matter chemically rather than mechanically. He used nitric acid and heat to destroy the organic animal matter to allow for a clear sample of arsine gas.[99] While improving the Marsh test he discovered the impurity of the elements used in this test: zinc and sulphuric acid were often contaminated with traces of arsenic themselves and could therefor cause false positives. A chemical analyst must purify these elements first before using them in a Marsh test. As mentioned before this impurity in materials remained an unfortunate issue for a long time.

1.5 Conclusion

An investigation is started when either a doctor or person close to the victim gets suspicious about the cause of death or illness. First the body was examined for physical signs of disease and violence. In cases when poison was suspected, samples of the body and materials related to the crime were then sent on to people who possessed chemical expertise. The forensic investigations were dictated by the questions that needed to be answered for the judge in the courtroom. The nature of these questions was based on the need for useable evidence and first and foremost *clearly visible* evidence that could be presented to a non-expert audience.[100] The matter of criminal poisoning using arsenic brings together the fields of law, medicine and chemistry and does this by finding out what arsenic is and what it means in the context of judicial procedures. Practices involving arsenic were developed and improved during the nineteenth century. It is these practices that can show what arsenic is and how it is enacted in a criminal trial. In this chapter we have seen the background of arsenic and its

[97] Newton, *Forensic chemistry*, 7-8
[98] Whorton, *The Arsenic Century*, 86.
[99] Ibidem 88-89.
[100] "According to one observer, they were not convinced of Marsh's evidence because they had not actually *seen* the arsenic (a metallic grey substance)." in: Newton, *Forensic chemistry*, 6.

presence in history and I have discussed the methods of detection that were developed in the nineteenth century spurred on by the elusive nature of arsenic. In the next chapter this information will function as a framework for examining four case studies from the Dutch files on criminal poisoning from the North Holland Archives. These files provide detailed information on medical and chemical examinations which can be approached from an STS perspective. As I have discussed in the introduction, this perspective entails looking at the production of scientific knowledge.

Chapter 2 The Enactment of Criminal Poisoning in the Netherlands

2.1 Introduction

From the North Holland archives in Haarlem I have chosen four cases of criminal poisoning: three involving women and one with a male perpetrator, who all used arsenic to get rid of one or more people around them. All four chosen cases include both the use of medical expertise and chemical expertise. Both were necessary to come to a comprehensive understanding of the crime; a physician to determine cause of death and a chemist or apothecary to determine the type of poison involved and whether it was a lethal amount. Other witnesses were also called in to testify to motive, means and opportunity of the accused. Often these were neighbours or family members who could reflect on the mental state of the accused or their behaviour. In some cases, when a person's mental health was in question, a psychiatrist or other expert of the mind was called in to testify. In the next chapter I will focus on the element of expertise presented in these case studies. Using these specific cases I will examine the nature of expertise, gender roles, travelling knowledge and the value attached to expert knowledge in court.

But first, in this chapter, I will discuss these cases from a praxiographic perspective, focusing specifically on the forensic methods of investigation; examining practices and processes that were used to gather knowledge in these cases of murder by arsenic. Taking this approach to these cases can aid in understanding how knowledge on arsenic was created and how this knowledge was adapted and circulated between these practices. Or to use Mol's terminology: how was arsenic *enacted* in these nineteenth-century poisonings*?* It is about what arsenic *is*, but not in the essential meaning of the word, it is not about the nature of arsenic that is the same everywhere. It is rather about what it is in a certain situation, related to certain practices and people: 'to be is to be related'.[101] It is about when and where as well as what: it is about locality. This locality is important when different enactments come together; in some localities a certain enactment might take precedence of another. Enactments can contradict each other; arsenic can be enacted in a chemical analysis, but go unseen in a medical examination, or denied in a witness statement. But doesn't a single name come with a coherent body? Does not a single word like arsenic come with a single coherent description? There is a hierarchy, one enactment can win and the other be ignored.

[101] Mol, *The Body Multiple*, 54.

A composite picture, balanced, added up or subtracted.[102] Forming a singular arsenic is an active process; making arsenic into 'the murder weapon' is making it singular. Translating one value into another is one way to bring enactments together, addition or valuing hierarchy are others.[103] After introducing the cases, the discussion of the chemical, medical and lay enactments will elucidate how this singular arsenic developed in the framework of a case of criminal poisoning.

2.2 Introducing the case studies

The first case involves Nicolaas Geerekink, a worker aged 53, who in 1885 killed his brother and attempted to kill his niece by putting arsenic (*rats bane*) in their mashed potatoes and sauerkraut.[104] The brother named Daniel Geerekink was visited by a doctor while he was still alive, but the physician did not recognize it as a case of poisoning and left after he handed out a prescription for some medicine. He did not return until the victim had died. When suspicion rose about the circumstances of Daniel Geerekink's death, an investigation was launched. The body of the victim was first examined by medical experts and then the internal organs were handed over to chemistry experts for further investigation. It was eventually proven that Nicolaas Geerekink killed his brother for the insurance money and had a prior conviction for stealing. The director of the life insurance company Piëtas confirmed his motive by showing the policy of Daniel Geerekink's life insurance. Under direction of W.H. Elias, judge of the court of Amsterdam, the evidence was gathered and expertise requested. The major of Uithoorn, E.H. Fremer Rolf also played a part in guiding the investigation which eventually led to the conviction and death of the accused.

The second case is about Aagje Wismeijer who was married to a farmer named Hendrik Hendriksen, but she was not a happily married.[105] They lived together for years, and had been witnessed by neighbours to have shouting matches and even physical struggles. Aagje claimed to have been beaten and teased by her husband and she wanted pay back by putting something in his porridge on November 22nd in 1885. She first claimed it was lead-white and she only wanted to make him feel ill, not kill him. Throughout the trial she maintained her innocence, but when confronted with the evidence of the presence of arsenic in her husband's body, she started to change her story. Several doctors and chemists were

[102] Ibidem 70.
[103] Mol, *The Body Multiple*, 80.
[104] NHA, GA, inv. nr. 93, file 66, 1885.
[105] NHA, GA, inv. nr. 93, file 91, 10 juni 1886.

involved in the examination of the body and the porridge she poisoned. During her trial she underwent a mental examination which concluded she was mentally unstable and could not be held accountable for her crimes. Aagje was, although guilty, released accordingly.

The third case involved a young girl, Cornelia Wilhelmina Loopwijk, who was seventeen years old when she poisoned her family.[106] She was born in Zaandam and lived in Koog aan de Zaan with her niece, Barbara Christina Stephan-Fobbe, and her niece's husband, dr. Bruining Stephan, and child. She helped around the house and did not have a specific occupation. On the 12th of January 1860 she put arsenic powder in a kettle of water meant to be used by her family, first to make a drink for the little girl and later on for making coffee and tea after dinner for everyone in the house. She did this by convincing the errand boy, Jan Boon, that it was sugar, and that he should put it in the water kettle. A house maid named Maartje Plekker, Frans Kuijpers, a apothecary servant, Heije Faber, also an apothecary servant, dr. Stephan and the child all fell ill, and showed symptoms of poisoning like vomiting and shaking, but eventually no one died. Dr. J. Mulder, a medical doctor from Zaandijke, was called in to examine the people in the household who showed symptoms and had the presence of mind to take possession of the suspected medium of the poisoning; the coffee and water kettle. Suspicion fell on Miss Loopwijk at an early stage in the investigation and she was arrested. When confronted with several pieces of evidence she eventually confessed to poisoning her family and was found guilty.

The last case is about Maria Catharina van der Linden-Swanenburg who lived in Leiden in North-Holland from 1839 till 1915. This was the most famous case of the four; Maria Swanenburg is the real name of the serial poisoner from Leiden mentioned in the introduction. She was usually called *Goeie Mie* (Good Mie), as she was known to help families around the house and with child care and laundry. She did not turn out to be so *good* however, as more and more people were dying around her. After several suspicious deaths, she was arrested in December of 1883 and questioned for several days.[107] Maria Swanenburg at first denied culpability, but later on confessed to at least two instances of putting *chlorine* in people's food in order to cause their deaths or at least illness. It was discovered that she bought a yellow powder that was normally used to kill lice and other vermin, this powder consisted of arsenic mixed with chalk. After a trial that lasted almost a year and a half and included examinations of over sixteen bodies by several chemical and medical experts, she

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[106] NHA, Provinciaal Gerechtshof Noord-Holland (hereafter PGNH), inv. nr. 196, file 296, 12 mei 1860.
[107] Moermans, *Gift als Goede Gave*, 47.

was convicted of the murders of the Frankhuizen family and spent the rest of her life incarcerated.[108]

2.3 Chemical methods of investigation

All of these cases included a report on the chemical analysis of evidence. This evidence could be a sample of the victim's liver, a jar with left over porridge or a water kettle containing poisoned water. All these items underwent were examined using several different methods to confirm whether arsenic was present and if so, in what amount. Unlike Annemarie Mol in her praxiographic approach to a disease, I cannot observe these practices in person. Be that as it may, these case files contain very elaborate descriptions of the investigation that took place, which will allow me to discuss these practices nonetheless. At the start of each examination the experts involved were asked to answer the following questions, or a similar version thereof: can traces of poison be found in the pieces of evidence delivered to you? If so, which one? Could these traces have caused the death of a person?[109] These questions were used as judicial guidelines in the examination and determined that the methods of analysis focussed on the matter of identity and amount of the poison used.

The first case that will be discussed is the one involving Nicolaas Geerekink since it included one of the most elaborate descriptions of chemical analyses. The first item to be investigated in this examination was an amount of sauerkraut floating in liquid, the suspected carrier of the poison. A sample in liquid form was taken from this last meal of the victim and this was combined with hydrogen sulphide gas. After a while this left a yellow coloured deposit, which after further examination was determined to be arsenic sulphide. When the deposit dried up to form a sort of powder it was further examined with a magnifying glass. The investigators saw a structure similar to grains of sand, and stated that it could be *rats bane*, the readily available poisonous substance discussed above. Further tests were deemed necessary to increase the reliability of the results. Some grains of this supposed rat bane poison were heated in a glass tube until a white sublimate became visible, corresponding to the appearance and origin of arsenic. Another sample of grains was sublimated on a glass plate and examined under the microscope. The structure, like crystal, was also determined to be consistent with a control sample of arsenic. These three results, the piece of glass with the sublimated sample, the glass tube with the heated sample and the

[108] V. Weterings, 'Swanenburg, Maria' (last updated 13-01-2014).
[109] E.g. judicial request for chemical expertise in the case of Nicolaas Geerekink: NHA, GA, inv. nr. 93, file 66, item 14, 1885.

first sample of grains, were carefully placed in a small box and sealed with wax. The whole sample of sauerkraut was then treated with various chemicals and the arsenic acid ammonia magnesia that was the result was weighed and in conclusion the investigators determined the existence of at least 53 milligrams of *rats bane* or arsenic was present in the leftover meal of the victim.

The second item to be investigated was a flask containing the stomach of the victim and its contents. The stomach floated in a liquid with recognizable bits of sauerkraut in it as well as a small amount of blood. A liquid sample was taken to be tested before the stomach itself was examined. The inside of the stomach was examined using a magnifying glass; no traces of anything suspicious were found, apart from a visible redness and dark stripes on the stomach wall. A large part of the stomach was then placed in a bath of hydrochloric acid; the resulting liquid filled with elements drawn from the stomach sample was tested using the same method as described above. The result again showed the presence of arsenic, and was calculated to be 317 milligrams. The third item, containing a liver sample of the victim, was examined in the same manner and revealed the presence of 73 milligrams of *rats bane* in one part of the liver and 117 milligrams of the poison in another piece of the liver. After testing these various organ samples, the fourth item containing the spleen of the victim did not warrant an investigation, seeing as the others clearly and conclusively showed the presence of arsenic.

The chemical report subsequently describes the examination of the clothing and bedding of the victim. The forensic investigators were looking for traces of vomit, urine or other traces of bodily fluids that could be examined. Hardly anything was found; one spot on a pillowcase was cut out and further examined. No trace of arsenic was found. A shirt was also placed in a bath of hydrochloric acid and the extracted liquid further chemically examined; again no trace of poison was found. As well as the clothing, other items pertaining to the medium in which the poison was administered were examined. These items included three forks, a pepper grinder and a jar filled with butter, vinegar and flour. The three forks were not examined, because they had been rinsed clean, and there was not a sufficient sample to test. The pepper grinder was tested for arsenic, but none was found. When testing the last jar, containing a mixture of butter, vinegar and flour, the result was again negative. The two investigators determined that besides these items to be clear of arsenic; that the glazing of the jars themselves contained no traces of the poison and could therefore not have

contributed to the poisoning of the food of Daniel Geerekink by accident or on purpose.[110] In a later stage of the investigation the same two experts, Gunning and Stoeder, were asked to compare the content of the box suspected of holding the poison to the evidence found in the organ samples. They were asked to confirm this box as the source of the poison, in order to possibly link it to the accused. Arsenic was discovered through several complementary methods.[111] The poison was identified as a structure under a microscope, several chemical compounds, yellow deposit and a white sublimate on a glass plate. All these presented arsenic, and could be presented to court in this recognizable forms of stains and deposits.

In the case of Aagje Wismeijer the toxicological investigation was conducted by Dr. Hendrik Wefers Bettink, professor of mathematics and physics at the University of Utrecht. Four items were examined: a jar of sugar and a substance found in the victims stomach, a flask holding the rest of the stomach contents, a flask with a sample from the intestines and the fourth item contains the remains of the heart, kidneys and liver of the victim. The chemical report shows the use of several methods of chemical analysis: one of them used on all the samples is the making of an arsenic mirror. This is consistent with the Marsh method, which creates a mirror like stain on a test tube when arsenic is present in a tested sample.

Another test shows the result of arsenics staining on porcelain. This test is conducted using an apparatus involving electricity and heat, a gas is formed out of the test sample and subsequently burned; if this sample contains arsenic the fumes will leave a stain on a slate of porcelain held above it. This method has the advantage of making arsenic visible, like with the Marsh test the stain can be presented in court as evidence. The two experts found sulphur arsenic and acidum arsenicosum or *rats bane* to be present in the tested samples. To be sure they also showed the crystal-like structure of arsenic to be present: in comparison to a separate arsenic sample the structures 'matched completely'.[112]

In the third case involving Cornelia Loopwijk there were two separate teams of chemical experts at work. The first commented on the general properties of the two kinds of poison used: arsenic and aqua lauro-cerasi. Dr. Lubach, a medical doctor, stated that for one person the amount of one or two grains of arsenic is enough to cause death. Dr. Egeling, also a medical doctor, stated that aqua lauro-cerasi is poisonous in large quantities, but not necessarily in this specific case, because it was diluted in a kettle of water. When answering

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[110] Chemical report in the case of Nicolaas Geerekink: NHA, GA, inv. nr. 93, file 66, item 85, 1885.
[111] Second report on chemical examination in the case of Nicolaas Geerekink: NHA, GA, inv. nr. 93, file 66, item 93-94, 1885.
[112] Chemical report in the case of Aagje Wismeijer: NHA, GA, inv. nr. 93, file 91, items 32-34, 10 June 1886.

the question about how much arsenic would be needed to kill a person, he answered 2 to 3 grains. Swallowing a large quantity of arsenic can cause vomiting and prevent the death of a person. Both experts seemed to state these amounts with certainty, but both determined different amounts to be lethal.

Two apothecaries, Hans Cornelis Kruseman and Herman Broos conducted extensive examinations of the material evidence consisting of ten items containing samples of vomit of the victims and water suspected of holding the poison as well as items related to the method of poisoning like the clothing of the accused. On the 27th of January at ten in the morning the two experts started their examination in their laboratory. A pot of water was examined first by filtering the water and then washing the pot with hydrochloric acid and adding that to the filtrate. This was examined with the naked eye for sediments and other signs. Then a current of sulphuric hydrogen gas was introduced to the liquid (corresponding to method 5 mentioned in Moll's forensic manual).[113] This was kept up for several hours. A yellow deposit was found and set aside for the next day. The same procedure was repeated with the leftover liquid and the resulting yellow deposit was separated from the liquid. Subsequently the deposit was dried and weighted; the result was 21 grains of sulphuric arsenic. After several calculations the two apothecaries came to the conclusion that 16.9 grains of arsenic (*white rats bane* to be precise) had been dissolved in the water found at the scene of the poisoning.

The water kettle was examined as well and a greyish deposit weighing 28.5 gram was collected from the bottom of the kettle. A few grains of this deposit were heated together with carbon and showed an arsenic mirror. The rest was added to the rest of the water from the kettle and was tested as described above. An amount of sulphur arsenic was found corresponding to 6.44 gram of *Rattekruid*. In the pot of coffee another 4.23 gram of poison was found. In the clothing nothing suspicious was found and they were not tested further for the presence of arsenic. In conclusion the two experts testified to the purity of the materials and reagents they used in the testing as well as to the care taken of the equipment.[114]

This need to point out the purity of the materials and reagents was a necessary one. In the nineteenth century the biggest problem with chemical tests was the purity of the materials available. Reagents like zinc and sulphuric acid could contain traces of arsenic and therefore present a false positive.[115] The sample of vomit of Dr. Stephan was examined

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[113] Moll, *Leerboek der geregtelijke geneeskunde*, 150.
[114] Chemical report in the case of C.W. Loopwijk: NHA, PGNH, inv. nr. 396, file 296, item 24, 12 mei 1860.
[115] Whorton, *The Arsenic century*, 89.

according to the Marsh method. And for another sample the method of Fresenius and Babo was used, the method mentioned specifically by name.[116] Arsenic was found as a yellowish deposit of sulphur arsenic and as a Marsh mirror. As confirmation, similar to the previous cases, the grainy substance and the crystal like structure were confirmed to correspond to the qualities of arsenic.

In the case of Maria Swanenburg the chemical investigation involved the highest amount of victims: sixteen bodies had been examined. The analysis was performed by Dr. Eduard Alexander van der Burg, since 1877 a professor in mathematics and physics and teacher in medicine and toxicology. In his pharmaceutical laboratory he examined pieces of the organs of the victims and also samples of the earth that surrounded their graves.[117] He discovered arsenic in almost all cases. Writing a report consisting of over 200 pages he detailed the analysis of all the samples and tests he performed. This is too much to discuss here completely, but it can be assumed that similar methods have been used to the ones described in the three other cases. He showed the results in court; he brought an arsenic mirror, and a piece of porcelain containing arsenic spots.[118] These are the results of two different methods of testing for arsenic, of them the Marsh test.

2.3.1 Concluding remarks

The practices of examination that we have seen in these case studies correspond to the ones outlined in chapter 1, among them the Marsh test and the Fresenius and Babo test. The terminology was also similar; the division of kinds of arsenic into *rats bane* and others was adhered to in these files. So what was arsenic in these chemical practices? As we have seen it was a shiny mirror-like stain when analysed with the Marsh test. This was a test performed in most cases and seemed to be seen as a reliable if not standard test for the presence of arsenic. This counted on the chemical reactions arsenic underwent with other elements, as well as on the process of burning. Arsenic was the compound arsine for example or sulphuric arsenic. It was also a smell, when burning a sample of organic material arsenic could be present as a smell similar to garlic. This was not an exclusive property of arsenic however and was not in itself enough to count as proof of the presence of arsenic, but it did support the results of other tests. A more conclusive enactment of arsenic in these tests was the stain it left on porcelain, this was a method used in multiple cases. The result relied on the

[116] Chemical report in the case of C.W. Loopwijk: NHA, PGNH, inv. nr. 396, file 296, item 24, 1860.
[117] Whorton, *The Arsenic century*, 57.
[118] *Rotterdamse Courant*, 24-4-1885.

elementary properties of arsenic and the way it reacted with other chemical reagents. The results of these tests, the Marsh test included, were only as reliable as the reagents and materials used. The presence of arsenic or the enactment of arsenic was therefore not completely certain; this uncertainty showed in the way multiple tests were performed on the same sample. Combining enactments of chemical properties, with visual aspects and smell was a way to come to single arsenic. Arsenic as 'arsenic present in the body' emerges from several enactments of a varying degree of certainty that are added together. There is no contradiction in the enactment, but there is a hierarchy: an arsenic mirror is more influential than the smell it causes or the yellow deposit it leaves.

2.4 Medical enactments of arsenic

I have chosen to discuss the chemical enactment of arsenic before the medical enactment even if this is not the order in which the examination takes place during an investigation. The chemical enactments often reached a higher degree of certainty and reliability in the matter of arsenic however, and were therefore valued higher as evidence of the presence of poison in the body.

The experts performing the examination in the case of Nicolaas Geerekink, dr. Merkus Doornik, a physician and Adrianus Boom, a male midwife and healer, started by describing the external condition of the body. The length (1.72m), the stiffness and the condition of the skin, his facial expression, hair colour and the condition of the eyes were all meticulously described. They described the stomach area as green and blue and the finger nails as showing a bluish colour, and finish the external investigation by describing an uncommon feature: through the tip of the penis two small silver earrings are pierced as well as a copper stud. The two doctors commented that this was a (not very effective) method of preventing sexual intercourse; the victim was a widower who was supposed to remain chaste. In the internal examination the chest cavity, the abdomen, and the skull and brain were examined. The intestines were found to contain a rice-watery liquid which resembled the effects of *cholera,* and show signs of inflammation and redness. The kidneys were red and bloodied. The stomach contained evidence of the victim's last meal of potatoes and sauerkraut and also showed signs of infection. The doctors concluded that 1) the deceased had generally been a healthy person; 2) he suffered from a pneumonia; 3) the deceased shows an old infection of his testicles that had not healed well; 4) he drank too much; 5) 2 nor 3 had been the reason for his death; 6) he was most likely poisoned after he had eaten sauerkraut, but the nature of the poison has not been determined; 7) he died slowly by

vomiting and diarrhoea until he was exhausted. At the end of the examination several samples were taken from the internal organs like the liver and stomach, to be sent on for further investigation.[119]

The examination of the body of Hendriksen, poisoned by Aagje Wismeijer was performed by only one doctor, Dr. Cox, who could not determine the cause of death for certain, but marked several signs of illness and defects. During the autopsy he found no sign of physical violence or long term illness. The victim showed signs of inflammation in the stomach, the start of inflammation in the intestines and a strange object covered in white dots. He lacked the instruments to examine the brain (later on in the investigation this was corrected; the body was exhumed in order to examine the brain and skull). The doctor concluded that only further chemical testing can shed light on the cause of death; he determined that there is a strong possibility that the victim has been poisoned; all other options were disproven by the autopsy. The first doctor on the scene, Dr. Jongeneel, had stated he did not at that time suspect the symptoms were caused by poison and stated the cause of death as colic.[120]

In the case of Miss Loopwijk no autopsies were performed since all of her victims survived the poisoning. The medical examination of the effects of arsenic was limited to an examination by a physician, Dr. Mulder, and one of the victims himself who was a physician. They describe the symptoms in detail, using both personal experience and observation of the other victims. They did not mention many visual signs, but focussed on the symptoms including tickling in the throat, feverishness, pain in the legs, vomiting and smell.[121] These medical examinations did not involve specific practise and instruments, but mostly depended on lay descriptions.

The last case, of the serial poisoner Maria Swanenburg involved the highest number of victims and examinations. This was the only one of the four that included the examination of bodies that had been exhumed. Examining bodies that have been buried and that are in an advanced state of decomposition created different descriptions of the internal and external state. In the cases of Aagje and Nicolaas the bodies of the victims were only recently deceased at the time of the investigation allowing for a review of visual signs related to cause of death. These visual signs were for a large part no longer present or altered too much to be

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[119] Medical report on Daniel Geerekink in the case of Nicolaas Geerekink: NHA, GA, inv. nr. 93, file 66, item 15, 1885.
[120] Medical report on Hendrik Hendriksen in the case of Aagje Wismeijer: NHA, GA, inv. nr. 93, file 91, item 21, 10 June 1886.
[121] Witness statement of Dr. Stephan in the case of C.W. Loopwijk: NHA, PGNH, inv. nr. 396, file 296, item 2 and 23, 1860

of use in a body that had been buried for months or even years in some cases. In the report of Dr. Zaaijer, whom I mentioned earlier in regards to his research on the effects of arsenic on the preservation of bodies, the condition of the remains is described in detail, including condition of the coffin and clothes and the smell. The report does not give an interpretation of these visual signs.[122]

2.4.1 Concluding remarks

Enacting arsenic in medical practices is more uncertain than in chemical practices. Arsenic can be a stain, a colour, an inflammation. But all these signs can represent other underlying causes as well; they are not particular to the influence of arsenic on the body. This is exemplified by the determination of the cause of death as *colic* in one case, or identifying an inflammation as resembling *cholera* in another. The medical enactments were less certain and in themselves were often not enough to enact arsenic with certainty, but they did not contradict the chemical enactments. These medical interpretations can be added to the chemical enactment of arsenic in the body to increase the certainty of its presence. The physicians who performed these examinations knew up front to look for signs of poison, but this did not lead them to be overly confident in their conclusions; they would not claim to be certain of the use of poison as the cause of death, let alone the identity of the poison. Their examination involved bodies in different states: surviving victims, recently deceased corpses or even bodies that had been dead and buried for a long time. Exhumations were rare, but in the case of Maria Swanenburg it was seen as necessary due to the amount of suspected victims involved. Each different state of the body presented with different symptoms and signs of arsenic poisoning.

2.5 Lay descriptions: what is arsenic to a victim?

Some of the intended victims in these cases survived the poisoning with arsenic. They were able to give a description of their experiences and symptoms. These people do not use medical or chemical discourse but rather describe in plain language what they feel. Arsenic in this context is more a matter of feeling and emotion, but can also present as physical signs. A smell is one of the things that are commonly connected to arsenic as well as the other

[122] T. Zaaijer, *Een gerechtelijk-geneeskundige studie*, no page numbers available.

poison, *aqua lauro-cerasi*, involved in the case of Cornelia Loopwijk.[123] Symptoms recounted in these files, mostly in the file of Loopwijk and Maria Swanenburg since they involved surviving victims, included vomiting, shivering, painful legs, headaches, feverishness, bad taste in the mouth, and tickling in the throat. To this can be added the descriptions and interpretations made by victims and people close to them about the food and water the poison was dissolved in. They indicated a garlic-like smell, a strange flavour, yellowish sediment, a white powder and a grainy substance. All these are analogous with arsenic, but like the symptoms, they do not exclusively indicate its presence. All of these separately could be caused by something else. Together these enactments of poisoning do point towards arsenic being present, a strong enough indicator that a death or illness was suspicious and warranted further examination.

2.6 Conclusion

The enactment of arsenic in a judicial investigation took place in different locations and involved both experts and lay people. The examined chemical reports reflect how arsenic was found in the form of a smell, a stain of a piece of porcelain, a mirror in a glass tube, a yellow deposit in a liquid and a yellow smoke. All these different results *enact* arsenic with a fairly high degree of certainty. In the medical reports arsenic was only hinted at, it could be a redness of the stomach wall, an inflammation of the intestines, blue marks on the skin and a papery feel to the skin. Arsenic is all these things; it is also the pain in a stomach and a sand-like substance, a white powder in an envelope and a weird taste in a bowl of porridge in the lay perspective. These practices, chemical, medical and lay, enact arsenic poisoning. Together they show that in these cases knowledge about arsenic came together from the various fields to get the label of 'cause of death' or 'murder weapon'. In the introduction to this chapter I have discussed how different enactments can come together to form a singular enactment of arsenic. In this case this singular arsenic we are looking for is 'arsenic as a murder weapon', though it was not in all cases a successful murder weapon. The hierarchy of the different enactments has to do with the degree of certainty with which they enact arsenic. The enactment of arsenic in a sample of liver through chemical analysis has a higher degree of certainty than a smell or inflammation of the stomach wall. These various enactments show no contradictions, they can be added together and enrich the picture of what arsenic is in the

[123] Expert statement on properties of arsenic and aqua lauro-cerasi: NHA, PGNH, inv. nr. 396, file 296, items 26 and 27, 1860

case of criminal poisoning. The chemical enactments are made singular into 'arsenic present in the organic material' and added to this are the medical enactment of 'the possibility of arsenic' and in lay description I would say arsenic is 'the experience of pain and discomfort', not specifically arsenic. These enactments are actively made into 'arsenic as murder weapon' by the instigator of the judicial investigation. It is in the context of the courtroom that arsenic is enacted as murder weapon.

In this chapter I have clarified what arsenic *is* in these murder trials and how knowledge about it was created. I have yet to discuss the people involved in this process of knowledge creation and how this knowledge is used in the bigger picture of a criminal trial. The purpose of the next chapter will therefore be to take on these cases and look at the mobility of knowledge in these judicial proceedings. I will discuss the mobility of knowledge with a focus on expertise, using STS concepts of contact zones and travelling knowledge. Experts have played different parts in these cases and I will discuss how they relate to the STS view on expertise and the concept of expertise in the nineteenth century.

Chapter 3 On expertise and the mobility of forensic knowledge

"A dead body tells no tales except those it whispers to the quick ear of the scientific expert, by him to be reported to the proper quarter."

—Sir Andrew Douglas Maclagan, British professor of medicine, Edinburgh University, 1878[124]

3.1 Introduction

The proper quarter mentioned in the quote above denotes the judge and jury in the courtroom. The expert constitutes the connection between the dead body and this proper quarter, or in this case the link between science and the courtroom. "An expert witness is one who, in a court of law, is permitted to give evidence of facts and opinion, to help judges and juries come to accurate decisions."[125] Seeing the expert as a connection between fields makes him (*him* because in the nineteenth century most of the expert witnesses were men) a person able to mobilize knowledge; to translate knowledge and allow it to travel from one place, science, to another, the courtroom. The courtroom in the Netherlands does not include a jury like it does in Britain; it is the judge who gathers information and makes a judgment in these criminal cases.

In cases of criminal poisoning both medical expert witnesses and chemical expert witnesses were called in as producers of forensic knowledge. A physician or male midwife would examine physical signs on and in the body to reach a decision on cause of death, after which an apothecary or chemical expert would analyse samples provided by these physicians and other items related to the act of poisoning. Both specialties have a different approach to a criminal investigation and different answers to give, but both have to work within a framework of the law and the proceedings of court. From the court of law they are handed a framework of questions and reports; aiding the communication between the two fields. A third form of expertise, psychiatry, is called in occasionally as well. Experts in psychiatry work mostly separate from the other fields; a mental health expert does not require information about the nature of the poison or the condition of the body for example in order to come to a diagnosis. In this chapter I will discuss the concept of expert witness and the way knowledge travels using both secondary literature and the four case studies as source material.

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[124] U.S. National Library of Medicine, online exhibition visible proofs, 'Upon a view of the body' (2014).
[125] Watson, *Forensic Medicine in Western Society*, 46.

3.2 Expertise in secondary literature

I have been working with theories from the field of STS, but I have not yet elaborated on their view of the nature of expertise. There are some interesting aspects to their way of viewing expertise, Saul Halfon claims: "expertise is situational, social and cannot be wielded alone".[126] Being a valuable expert meant that the laity had to trust the expert to be knowledgeable and impartial; that their expert status is socially constructed necessitated them to defend their expertise.[127] Halfon proposes that "we channel and occupy expertise. Expertise is situational and social—performative—and cannot be wielded *alone*. It is not about what we know, but how, where, and with whom we know it."[128] Expertise is not only about having knowledge, experience and skill, it has to have meaning in a specific context: being able to build a website can be an expertise in a social group, but not in a class full of computer programmers for example. Expertise is not a possession.[129] Collins and Evans agree on this social nature of expertise: membership of a group having expertise can allow you to acquire expertise. This means that expertise can be 'distributed' into institutions, social networks and laboratories; expertise does not reside in one individual.[130] They use the concept of 'trading zones', which is very similar in a way to the idea of contact zones coined by Greenblatt. Both represent a place where two or more cultures, fields of science or perspectives come together and a new language can be created or information can be exchanged.[131] They coined the concept of 'interactional expertise', which lies between formal knowledge and embodied skill. This interactional expertise will allow you to converse expertly about a certain subject, without being an actual embodied expert on this subject.[132]

I have discussed the positivist approach earlier and the importance of the element of objectivity in this approach to science. Daston and Galison identify a negative trait in this attempt at objectivity: it attempts to 'eliminate the mediating presence of the observer'.[133] The role of the observer, or expert in this case, becomes less influential in such an attempt at objectivity. Whether this is happening in the case studies I will discuss later on.

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[126] Halfon, 'Encountering Birth', 61.
[127] Gooday, 'Liars, experts, and authorities', 443- 444.
[128] Halfon, 'Encountering Birth', 69-70.
[129] Ibidem 74.
[130] E.M. Sellinger, and Robert P. Crease, Dreyfus on expertise: The limits of phenomenological analysis, *Continental Philosophy Review* 15 (2002) 247-248.
[131] H. Collins, R. Evans and M. Gorman, 'Trading zones and interactional expertise', *Studies in History and Philosophy of Science* 18 (2007) 657.
[132] H. Collins, 'Interactional expertise as a third kind of knowledge', *Phenomenology and the Cognitive Sciences* 3 (2004) 127.
[133] Daston and Galison, 'The Image of Objectivity', 82.

3.2.1 Nineteenth-century Forensic Expertise

"Physical evidence cannot be wrong; it cannot perjure itself; it cannot be wholly absent. Only its interpretation can err. Only human failure to find it, study and understand it, can diminish its value."[134]

The job of the experts in these cases is to find and interpret physical evidence and it is not an easy one. Anthonij Moll gives a very demanding definition of what a forensic medical expert should know and do: pathology, diseases, dissection, anatomical knowledge, human biology and physics as well as medical treatments, healing arts, midwifery, the expert should practice the sciences, specifically chemistry and finally he should have a feeling for philosophy and not be a stranger to the laws of the land.[135] All in all this is a very complete description of the perfect forensic expert. However this is unlikely to be a very realistic picture of the actual forensic medical expert of the day. By the time he wrote this, in 1825, the field of medicine, toxicology and psychiatry had already started to separate and the various specializations drew further apart towards the end of the century.

Watson discussed the terminology of the expert witness; the term has a scientific connotation and it has emerged within the framework of science, medicine and technology. A regular 'lay' witness can only discuss events and people they have direct knowledge of; they do not generalize or interpret.[136] Watson reflects on the special role the toxicological expert played in being at the forefront of the use of expertise in the courtroom. In the field of toxicology experts dealt with the invisible, as discussed earlier, and thus more expertise was required to render visible the evidence waiting in the victim's body. Gooday discusses scientific expertise in a more general sense, focussing on the trustworthiness of the nineteenth-century scientific witness and the dichotomy between expert witnesses and laity. He identifies a difference between expertise and authority that is underpinned by social status and financial backing.[137] The expert had more authority when attached to an

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[134] Kirk (1953) 4, in: dr. C. de Poot, 'Wetenschap op de plaats delict', *Lectoraat forensisch onderzoek* (Amsterdam 2011) 7.

[135] "Den geregtelijke Geneeskundige behoort te dien einde bekend te zijn met de Ontleedkunde en het mes weten te voeren: ook moet hij geen vreemdeling in de vergelijkende en ziektekundige Ontleedkunde zijn. Hij behoort de Mensch-Natuurkunde, de algemeene en bijzondere Ziektekunde, de Leer der Teekenen, de geneeskundige Ziektebehandeling, de Heelkunde, de Verloskunde, de Natuur- en wel inzonderheid de Scheikunde, vlijtig beoefend te hebben. Hij moet, eindelijk, met de Wijsbegeerte gemeenzaam en niet geheel en al vreemd in 's Lands Regt zijn." in: Moll, *Leerboek der geregtelijke geneeskunde*, 24.

[136] Watson, *Forensic Medicine in Western Society,* 46.

[137] Gooday, 'Liars, experts, and authorities', 432.

institution with a high social status and funding. Gieryn states that scientists cannot avoid ambivalence and because of contradictions within science, scientists can vary their interpretations to accommodate their various goals.[138] These goals could be receiving extra resources, make money or increase authority for example. As Van Lunteren states when questioning the impartiality of experts in the courtroom: "especially in the event of opposing interests, we come across discord among experts" (my translation).[139] Courts on the European continent typically required a panel of experts to arrive at a *collective* judgement; the inquisitorial system was not as conducive to a battle of expertise as the American system.[140] It was a court system based on an investigatory process in which the judge would base his judgment on written testimony provided by external sources, like medical doctors.[141] This means that the European system valued cooperation amongst experts rather than competition; experts exchanged knowledge and produced knowledge together in most cases.

3.2.2 Mobility and travelling of knowledge

Knowledge travels both between expert witnesses and between experts and the judge in the courtroom. Experts allow knowledge to travel; they are the main contributors to the mobility of forensic knowledge. Experts themselves can impede the mobility of knowledge as well, because of ignorance or by errors in the production of knowledge, by social issues of gender and class and by something as simple as funding. Will experts make an appropriate effort when the pay is low, or will they change their interpretation based on who is paying them? I have briefly introduced the concepts of travelling and 'contact zones' earlier in this thesis.[142] Contact zones and trading zones are spaces for exchange and communication. James Secord proposes that communication lies at the foundation of science[143]; understanding science as a form of communication, meaning that every action, image and object is 'the trace of an act of communication, with receivers, producers, and modes and conventions of transmission'.[144] Scientific experts are both producers and receivers of knowledge, and the judge mostly a receiver in these cases. The role of experts in the communication and travelling of knowledge

[138] Gieryn, 'Boundary-Work and the Demarcation of Science from Non-Science', 792.
[139] Van Lunteren, Theunissen and Vermij, 'Inleiding: De maatschappelijke rol van experts in historisch perspectief', 3.
[140] Gooday, 'Liars, experts, and authorities', 433.
[141] Watson, *Forensic Medicine in Western Society*, 24.
[142] Greenblatt, 'A mobility studies manifesto', 2.
[143] J.A. Secord, 'Knowledge in Transit', *Isis* 95 (2004) 654.
[144] Secord, 'Knowledge in Transit', 661.

is not always a positive one. An expert can also choose *not* the examine something, or be influenced by preconceived notions of gender and social class. These can be issues that bar the production and circulation of knowledge.

In STS this notion of travelling involves knowledge that goes from one place or field to another and the process of how this happens. Knowledge can be barred from a place, it can be in a different discourse, it can be an addition to knowledge already present, and it can overrule other knowledge or replace it. Locality is important, both for the value of expertise and the meaning of arsenic. In cases of criminal poisoning knowledge would generally travel from science to the courtroom. The forensic field itself requires a form of 'interactional expertise': each expert with a separate specialty has enough knowledge to communicate with others from different fields. One could say that forensic expertise in itself is a contact zone for which interactional expertise is required. An example of this was that the adaption of the expert reports to the framework of the field of law at the start of an investigation made communication easier. The forensic scientist is provided with a body or other pieces of evidence and asked a set of specific questions based on assumptions made earlier in the process. Boundaries exist between the different fields involved in an investigation, boundaries created by a different skill set and experience. But these were not always clearly defined and there was crossover between fields.

3.3 Expertise and the mobility of knowledge in case studies

There are several ways that these cases reflect expertise and travelling knowledge. I have divided them in five themes: cooperation and interaction between experts, distribution of expertise, objectivity and certainty, social issues and finally mobility. Gender issues will be discussed as well in more detail at the end of the paragraph. I will start by discussing the interaction and cooperation between experts. In the court cases I have examined it often occurred that an examination was performed by two experts rather than one. The resulting hand written report was based on a cooperation of expertise and signed by both experts; this was the case for both chemical and medical examinations. In none of the files I encountered evidence of counter-testimony or strong disagreement among experts. In a few cases multiple medical experts were requested, when the first or closest one was not capable of performing an autopsy for example. Willemijn Ruberg examined Dutch cases of infanticide in the same period and did find instances of disagreement among experts and the use of

counter-expertise.[145] This difference might lay in the way the medical and chemical fields relate to each other; when the medical expert was uncertain the chemical expert could aid in increasing the certainty of an examination. In the case of infanticide, the signs on an infants' body were difficult to interpret and the cause of death hard to determine.[146] This degree of uncertainty may have played a role in the conflicting expert interpretations.

Cooperation between experts was aided by the nature of the law in the Netherlands and ensured a more balanced and objective report. According to Daston and Galison in their discussion of objectivity as a nineteenth-century concept: "the all-too-human scientists must, as a matter of duty, restrain themselves from imposing their hopes, expectations, generalizations, aesthetics, even ordinary language on the image of nature".[147] Striving towards objectivity is easier said than done, Daston emphasises that even language is an element of interpretation and influence over physical reality. In the four cases discussed here the experts pursue objectivity, but the report is written; the visual signs on the body and of how an arsenic deposit looks are only described, not always shown. One could therefore argue that these results are already an interpretation of facts and therefore a subjective presentation of arsenic poisoning. The experts in these cases made an effort to be objective and in most cases reached a conclusion through consensus. Expertise is not wielded alone according to STS and neither is it in these cases.

The cases correlate with the way the distribution of expertise is described in the secondary sources on the subject. There is a division between medical, toxicological and psychiatric expertise. In these cases, the experts were all divided in these three areas, but they did not always restrict themselves to one area of expertise. In the case of Carolina Loopwijk the two medical experts called in to share their knowledge on arsenic and aqua lauro-cerasi, were also asked to judge her mental state.[148] There was no separate mental health specialist called in, it suggests a blurring of the boundary between medicine and psychiatry in this case. In the other two cases involving female perpetrators, it was a separate expert who was requested to perform an investigation. These experts were connected to mental health institution, providing them with practical experience as well as theoretical knowledge on the subject. Besides this, a connection to an institution lent them a position of authority and reliability. Experts were usually called in from the area, so proximity is certainly a factor. Similar methods were used in all cases; reflecting that knowledge from other

[145] Ruberg, 'Travelling knowledge and Forensic Medicine, 373.
[146] Ruberg, 'Travelling knowledge and Forensic Medicine', 374.
[147] Daston and Galison, 'The Image of Objectivity', 81.
[148] Psychiatric report on C.W. Loopwijk: NHA, PGNH, inv. nr. 196, file 296, 12 May 1860.

countries had made its way to the Netherlands. In the case of the chemical reports, two kinds of experts were called in: apothecaries or professors in mathematics and physics. The latter were scholars educated in most of the natural sciences apparently; mathematics, physics, medicine and chemistry. The apothecaries were mixers of medicine and shop owners, mostly educated through an apprenticeship, which correlates to the secondary literature on the background of experts. Their expertise was distributed across different places as well as different people. In the laboratory expertise on medical and chemical matters took precedence, while in the courtroom expertise on the law ranked highest. This showed that expertise was situational, it depended on the context and the locality.

Thirdly I will address the issue of certainty: how sure were experts of their results and did they stand by them? These cases show occurrences of experts being asked a second time, after their initial report was handed in, whether they stood by their results and whether they were certain of their conclusions. In one case, of Aagje Wismeijer, a chemical expert was contradicted by a witness statement, but the expert stood by his results.[149] In another case two experts were asked the same question regarding lethal amounts of arsenic and cherry-laurel water, both giving a different answer, but with equal certainty. This difference did not seem to matter for the investigation. A certain amount of interpretation is allowed when being an expert witness, though always (hopefully) based on facts and correct results. What struck me was the use of the word 'overtuigingsstukken' (pieces for convincing); so not pieces of proof, but pieces to *convince* people. Which is interesting, it says something about the value of this evidence. The gathered knowledge is used to convince the judge, it is an active process rather than a simple stating of facts. And experts were the ones most active in this process of convincing. In the case of Aagje Wismeijer chemical expertise and the statement of the defendant contradicted each other. The evidence provided by the forensic expert was valued over that of the defendant's own version of events. It showed that the expert was willing to stand by his results and had confidence in his abilities to state the presence of a specific poison with certainty. That the statement of the defendant was not taken to be completely trustworthy might be explained however by the fact that she was released for reasons of insanity later on in the trial.

The fourth area of interest is the influence of social issues on expertise. Most cases reflect a disregard of the medical doctors for the illnesses of the poor. This confirms the claim made in the secondary literature that doctors often did not put much effort in helping those who could not pay. In three of the four cases it transpired that a doctor called in to examine a

[149] Expert statement in the file of Aagje Wismeijer: NHA, GA, inv. nr. 93, file 91, 1860.

victim simply prescribed a tonic or medicine without proper investigation and did not make an effort to discover cause of death. The death of Hendrik Hendriksen was ruled as a case of colic and another case was ruled as death by 'natural causes'. These doctors first on the scene were often small town doctors, who were called in because they lived closest to the victims. The social and financial situation of the victim played a part in the production of knowledge and the degree of expertise. It was not until suspicion rose in other quarters that an effort was made to investigate these cases. In the case of C.W. Loopwijk, one of the intended victims was a doctor himself and was therefore likely better able to judge what was happening and did not have to rely on the expertise of others. Dr. Stephan played a double role, as both victim and lay witness using his experience and observation and as expert, being a doctor and having some knowledge about arsenic and other poisons. Dr. Stephan was asked about the properties of arsenic, its presence in his house, and the way he kept it. The arsenic used by Miss Loopwijk came from a locked cabinet in Dr. Stephan's house to which Loopwijk had access. The small cabinet of poisons ('het vergiftkastje') was in accordance with how it should be kept legally.[150] He was questioned quite extensively, being in this interesting position of both expert and victim which blurred the lines between being a lay-expert discussing experiences and an expert witness with a scientific background. He played a particular role in the circulation of knowledge; providing as well as receiving information.

Lastly, the case studies indicate several ways knowledge could travel during an investigation. In most cases knowledge travelled in one direction, but this did not always occur: it happened that the medical doctor who had left open the cause of death in his concluding report would be asked to change this to 'death by arsenic' after this was confirmed by a chemist or apothecary. On the 5th of January 1886, Dr. Cox was presented with the results from the chemical experts and other rapports about the case. Based on this he changed his statement to state that the cause of death was poisoning with rats bane and that this could be said with a high degree of probability. The knowledge about arsenic starts out by excluding other possible causes of death during the medical examination. It was not their purpose to produce knowledge of arsenic, but rather exclude other possibilities and prepare samples for further investigation. This left the production of knowledge about arsenic to the chemist and their examinations. As discussed in chapter 2, arsenic was enacted during these examinations in multiple ways: a powder, a yellowish colour, a smell and a crystal-like structure. This became 'rats bane' and 'murder weapon', and was communicated

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[150] *Verzameling van Wetten, Besluiten en Regelementen, betrekkelijk de Burgerlijke Geneeskundige Dienst in het Koninkrijk der Nederlanden,* 221.

in written form to a judge. This knowledge thus made its way to court and via there back to the medical expert who was asked to corroborate this knowledge of arsenic as cause of death. The communication between different fields happened with the judge as a medium, he was the centre who received and passed on knowledge to the other actors involved.

3.3.1 Gendered expertise

The issue of gender arose in several ways in these case studies: there were only male experts involved, there is a connection between psychiatric reviews and women, and there was a possibility that male and female bodies were treated differently during a medical examination. In the secondary literature it was already clear that female expertise was rare in the nineteenth century, only midwives were sometimes requested in cases involving infanticide or pregnant women. In these cases there was a male midwife involved, but no involvement of female expertise. I will discuss the cases of Aagje Wismeijer and C.W. Loopwijk here with regards to the second issue of psychiatric expertise.

Dr. Johan Pieter Theodor van der Lith, ex- physician and ex- head of the mental health institution in Utrecht and Dr. Anthony Theodor Moll, Utrecht, current head of the mental health institution, together conducted an examination during the investigation of Aagje Wismeijer into the mental state of the accused. They agreed on the conclusion that she was not fully accountable for her actions and existed in a state of *monomania*, with delusions and idée fixe and even hallucination of feeling.[151] These conditions were typical of the nineteenth-century ideas in the field of psychology and psychiatry. Monomania refers to: "the diminished power of self-control and the irresistible urge of some criminals to commit certain acts while they seemed to be normal and reasonable at first sight".[152] It was a definition of partial insanity; people's moral conscious and emotional life was diminished while their rational powers remained mostly intact.[153] The doctors involved based this conclusion on witness statements, examination of the patient and on the fact that her mother and uncle were also treated for insanity. The psychiatric report on Loopwijk concluded that she was capable of distinguishing good from evil and well aware of the consequences of her actions. They came to three conclusions: she shows no signs of stupidity or mental illness, she has had a decent education and has an expected level of knowledge

[151] Psychiatric report on Aagje Wismeijer: NHA, GA, inv. nr. 93, file 91, 1860.
[152] H. Oosterhuis and A. Loughnan, 'Madness and crime: Historical perspectives on forensic psychiatry', *International Journal of Law and Psychiatry* 37 (2014) 5.
[153] H. Oosterhuis, 'Treatment as punishment: Forensic psychiatry in The Netherlands (1870‑2005)', *International Journal of Law and Psychiatry 37* (2014) 38.

and lastly that she has a sense of right and wrong comparable to others of her age. Apparently these two doctors were deemed qualified to make such a judgment, since so separate mental health expert was called in. In several cases the examination into the mental health of these women involved more than the view of an expert. Lay witnesses were also questioned regarding the development of the women involved. The same was the case for Maria Swanenburg; in her case multiple lay people were asked about her mental state and personality. She was also examined by an expert in psychiatry, but was declared capable of differentiating right from wrong and thus to stand trial.

The interesting aspect of these cases was that only the women were given a mental health examination; psychiatric experts were called in all three cases. But this did not occur in the case of the only male poisoner, Nicolaas Geerekink. This suggests a gendered view of the criminal poisoner: was it so much harder to think of a woman who rationally and with premeditation killed someone than a man doing the same? Lisa Downing discusses the relationship between women and poison, using the Lafarge case from 1840 in Paris as example, a case where a violent murder by a woman contradicted notions about gender roles and female qualities.[154] Downing argues that this case indicated an underlying fear of the active and masculine woman.[155] It disturbed the general view of what a woman should be and how she should behave. Connected to this is the nineteenth-century concept of hysteria, a medical construction including all notions of feminine unpredictability, nervous temperament and excess.[156] This idea of hysteria was linked causally and analogously to murderousness, the woman who showed an inability to contain herself was capable of all sorts of crimes. Murder was maybe the ultimate effect as well as sign of this hysteria. This connection between hysteria and crime elucidates why the female murderer was such a difficult concept in the minds of men and apparently required additional mental examination and explanation. The fact that these are murders involving poison had also been the subject of gender debates; the connection between woman and the use of poison goes back centuries.[157]

Thirdly I noticed a possible omission in the medical examinations in these cases which might be that the genital area of the male victims was mentioned in the results, but not those of the female victims as far as I can tell. I cannot make assumptions based on so few cases, but it might indicate an active ignorance as discussed by Nancy Tuana. Ignorance

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[154] Downing, 'Murder in the Feminine', 122.
[155] Ibidem 127.
[156] Ibidem 127.
[157] Ibidem 134.

is socially constructed in her view; it connects to issues of cognitive authority, doubt, trust, silencing, and uncertainty.[158] It seems that the female genitals were practically ignored in these investigations I have seen, while they had no issue with discussing the male genitals. The people performing these investigations on the body were almost always men; this might have had an influence on this. It was likely not a lack of knowledge on the female physique, but rather involved social issues and ideas on gender roles.

3.4 Conclusion

Judges generally seemed to value and trust expert witness statements more than lay witness statements, and experts stood by their methods and results. The experts in these cases used forensic discourse, which gave them a position of authority. The way experts handled themselves in these cases shows they were seen as possessing a degree of reliability. According to Horn: "this scientific authority [...] had much to do with the practical abilities of physicians and others to regularize tools and measurements, to stabilize interpretations, and to deploy the rhetoric of the "expert"".[159] The actions of the experts in these cases correspond predominantly to this description; they used the discourse of an expert, the standard framework of reporting and used standardized tools and methods of testing. Expertise was a performance; experts went through a ritual of being requested, agreement to be truthful, signed a standard form and were sworn in. The experts involved agreed to take on this role of expert witness. There was a difference in willingness to perform in this role of expert witness between the small town medical practitioners first on the scene and the ones called in specifically later on in the investigation. Being a forensic expert appeared to be an unpopular profession; there was an unwillingness to devote much time to it in nineteenth-century Netherlands.[160] This unwillingness did not seem to be present in these files regarding the experts requested in a later stage. I have discussed the reluctance of small town practitioners to aid poor people who could not afford them: the financial issue was certainly a factor. Another factor was the involvement of gender issues in psychiatric expertise; there was no psychiatric evaluation in the case of the male perpetrator. This can be linked to gender roles present in the nineteenth century and the concept of hysteria.

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[158] N. Tuana, 'Coming to Understand: Orgasm and the Epistemology of Ignorance', *Hypatia* 19 (2004) 195.
[159] Horn, 'Making criminologists', 318.
[160] Kerkhoff, 'Over de verhouding tussen gerechtelijke geneeskunde en openbare gezondheidszorg', 17-18.

In most cases two experts from the same field worked together to come to coordinated results and interpretation. It does not show in the files how the work was divided or whether there was a hierarchy between these experts. There was no battle of expertise here, only cooperation. There is no evidence that the defence used different expertise or counter expertise even in cases where a lawyer was appointed to the accused. This cooperation possibly provided a more objective interpretation of the results. Objectivity was held in high regard in the positivist attitude towards science present in the nineteenth century. The same goes for experimentation, these chemical examinations especially reflect the result of much experimentation with chemical elements and compounds. Objectivity is a troublesome concept however; several factors influenced this attempt at objectivity. Issues of ignorance of certain aspects and gender bias skewed the neutrality and objectivity of knowledge. These issues influenced the travelling of knowledge as well; if this knowledge was not produced it could not be brought to light in the courtroom.

The experts played their part in the circulation of knowledge. The nature of the Dutch criminal law was mostly a positive influence on the travelling of forensic knowledge, even though, as I have discussed earlier, the Dutch law did not promote forensic expertise as a separate field. The courtroom functioned as a contact zone in which the judge sent and received information to and from various experts. In this contact zone there was an exchange of knowledge between the experts from different fields and between witness statements and input from law officials. The arsenic that was discovered in the forensic investigations was translated into 'evidence' when it reached the courtroom. In that place it has a new meaning; its locality influenced the role it played in the investigation. Knowledge about arsenic and expertise was distributed in different places: in laboratories, apothecaries' shops, courtrooms and in the homes of the victims. This knowledge was added to other kinds of information gathered from witness accounts and statements made by the accused. 'Arsenic as the murder weapon' could be added to this knowledge from other sources and usually presented a high degree of certainty and was valued higher than an account of an apothecary who sold the poison. If there were no contradiction between the information from the different fields, there were no issues barring the knowledge from travelling to the courtroom and be added to the other knowledge gathered from other sources. If there were, the elements of hierarchy and certainty became involved and influenced how the knowledge on arsenic that came from the fields of medicine and chemistry was valued. From the different fields of law, medicine and chemistry came different 'arsenics', but they were all part of the language of forensic science. This seems to be an example of Evans and Collins' concept of 'interactional

expertise', which requires just enough expertise for communication between fields. Every expert could understand the contributions of other experts well enough to work together effectively.

Conclusion: Tracing Arsenic

This thesis has examined knowledge practices in the case of criminal poisoning. After having discussed three different components of these practices, I will bring them together here to examine how they help to answer the question: how was forensic knowledge gathered, circulated and given meaning in these nineteenth-century cases of criminal poisoning? Or specifically how was arsenic made visible, traced throughout an investigation and given meaning in a courtroom? Within the historical and scientific context provided in chapter 1 I have discussed the enactment of arsenic taking an STS approach, the use of expertise in these cases and the mobility of knowledge. There were two layers of mobility: forensic knowledge travelled between enactments and then between experts from the different fields. Knowledge was produced by experts from three fields, medicine, chemistry and psychiatry, and it was taken up and given meaning in the context of the law by a judge and other professionals in the field of law. Knowledge was distributed amongst experts and across different places; it was produced in laboratories and people's homes and then given meaning in the courtroom. Arsenic was made visible.

In the second chapter I took a praxiographic approach to the forensic investigation, giving me the advantage of looking at knowledge in the making. The enactment of arsenic showed it to become 'arsenic as cause of death' through the combination of various enactments. This was a process of addition influenced by hierarchy and certainty, enactments with a higher degree of certainty were valued over others, but they all added up to come to the same conclusion: arsenic was present and had been used as a deadly poison. Arsenic was detected and made into evidence, a singular arsenic that made its way to the judge clearly and was applicable to this specific locality. It was given meaning as 'cause of death' in a medical and chemical examination and then made visible and turned into 'murder weapon' when it reached the courtroom. The results themselves were not adapted to a different context; it was the meaning that was adapted from a statement of facts to a concept including intent and implying guilt. Looking at the different enactment of arsenic in the forensic investigations allowed me to review the certainty of the presence of arsenic, the value that was given to different enactments of arsenic and the relationship between medical and chemical practices. It clarified that arsenic is not one singular object in every situation; it is enacted in different ways depending on its context. This approach ensures that we do not take an essentialist perspective and overlook how an object or phenomenon plays a different role depending on its locality and situation. While focussing on the details and the specific enactments of arsenic in these cases gave me an interesting insight in how

knowledge about arsenic was produced, this approach sometimes disregards the bigger picture of society, politics and the influence of language and does not show how arsenic was regarded and discussed within society. By focussing on expertise and travelling knowledge in the third chapter I have shown how arsenic played its part in the bigger story of a criminal case, including influences of society and experts dealing with nineteenth-century gender bias.

The third chapter traced arsenic from science and its practices to the courtroom and the various experts that gave it meaning. Experts played an important role in the mobility of knowledge; they transferred their conclusions to the courtroom and shared their knowledge with other experts. In STS expertise is seen as "situational and social—performative—and [it] cannot be wielded *alone"*.[161] Expertise in these nineteenth-century cases was a performance involving a request, acceptance and being sworn in. It also depended on the context and situation; chemical expertise was valued higher in the chemical laboratory than medical expertise and vice versa. The last part is certainly reflected in these cases as well, since most investigations involved cooperation among experts. The battle of expertise that took place in some other countries and with other types of crime did not occur in these cases. Cooperation between experts from different fields and within the same field seemed to be more common. This could be explained by the relationship between the fields of expertise: their contributions complimented each other rather than contradict each other in these cases of criminal poisoning. The ambiguity of the signs on the bodies of the victims was explained by the chemical examination, and the medical experts seemed to accept this explanation. The psychiatric examination dealt with the issue of accountability, not guilt, and therefore did not attempt to contradict other findings. The cooperation between fields is possibly made easier by the fact that the fields did not always have clear boundaries; medical experts sometimes discussed mental health issues and could also be asked about the qualities of a poison. Each forensic expert possessed a degree of 'interactional expertise'; a common language that benefited the communication between experts from different fields. The courtroom functioned as a medium of communication between these experts, it was a contact zone; information from the different forensic fields was brought together there and combined to form a coherent picture of events.

There were however also elements that had a negative influence on the mobility of forensic knowledge: social issues, financing and gender roles. The poor often lacked the funds to pay for a doctor and therefore did not receive proper attention either before or after death. A forensic witness was not paid well and this was not an incentive for experts

[161] Halfon, 'Encountering Birth', 69-70.

who already had other jobs to do. Being a forensic expert was a secondary duty according the secondary literature, which is true in these cases as well. There was not one expert who's occupations was listed as 'forensic chemist' or 'forensic physician', mostly they were professors of natural sciences, physicians or apothecaries. Women and men were treated differently in a medical investigation and especially with regards to a psychiatric investigation; men often did not warrant a psychiatric review, whereas women in all these cases underwent a mental examination. Forensic knowledge was gathered in the course of a judicial investigation, given meaning in the context of the courtroom and in the end used to reach a decision on guilt and accountability. There were several elements inhibiting this process, but more that were conducive to it. Knowledge travelled from science to the courtroom with the aid of forensic expert, and with little need for translation or adaption to the level of non-experts. Experts could be inhibiting factors in the production of knowledge, but less so in the communicating of forensic knowledge. The Dutch law was both a positive and negative factor in a forensic investigation: it called for expertise in general and material evidence, but in regards to forensic medicine specifically the law did not grant the field much clarity or rights.

For forensic knowledge to have played a relevant part in a nineteenth-century judicial investigation it needed to be produced in the framework of the law, be seen as reliable and the experts involved needed to be seen as trustworthy and have a scientific background. The positivist approach to science present in the nineteenth century scientific field ensured that experts were trying for objectivity and truth. A forensic investigation is a process that constructs knowledge in both a scientific and a social environment. Forensic knowledge was produced by several different experts; these different *enactments* were brought together into a meaningful singular 'arsenic' and then transferred to the courtroom where it played its part as evidence. Apothecaries, professors, physicians and surgeons were involved in the production of forensic knowledge with the judge as receiver. Forensic knowledge was sent through a standardized process of forms and questions and encountered a change in meaning in this process; from 'arsenic is present' to 'murder weapon and evidence'. Both the Dutch law and experts were inhibiting as well as beneficial factors in this process. The cooperation between experts from different fields was rarely troubled: every field looked at different aspects of the problem and their results could be added together to create a complete picture of events. This addition rarely required translation or adaptation of results; mostly the various fields enriched each other's conclusion. It would be interesting to examine how the various forensic fields cooperated

and communicated today: it is more fragmented now and more specialized, increasing the distance between the various types of forensic knowledge which creates an increased need for communication and interactional expertise between forensic experts and the judge in the courtroom.

Bibliography

Illustrations

Front: Effect of arsenic exposure on the skin, found on:
http://www.ualberta.ca/~xcle/arsenic.html.
Page 23: Marsh test apparatus, found on:
http://fineartamerica.com/featured/marsh-test-apparatus-1867-science-source.html.

Archival material

Geerekink, Nicolaas, criminal case: Noord Hollands Archief, Gerechtshof Amsterdam, inv. nr. 93, file 66, 1885.
Loopwijk, Carolina Wilhelmina, criminal case: Noord Hollands Archief, Provinciaal Gerechtshof Noord-Holland, inv. nr. 396, file 296, 1860.
Wismeijer, Aagje, criminal case: Noord Hollands Archief, Gerechtshof Amsterdam, inv. nr. 93, file 91,10 June 1886.

Primary printed sources

Article about the trial of Maria Swanenburg, *Rotterdamse Courant*, 24-4-1885.
Beekman, J.P., *Verzameling van Wetten, Besluiten en Regelementen, betrekkelijk de Burgerlijke Geneeskundige Dienst in het Koninkrijk der Nederlanden* (’s Gravenhage 1836).
Koster W.A. and E. Buchner, *Leerboek der gerechtelijke geneeskunde voor artsen en rechtsgeleerden* (Tiel 1870).
Moll, Anthonij, *Leerboek der geregtelijke geneeskunde* (Arnhem 1825) in: Bijzondere Collectie Universiteit Utrecht.
Zaaijer, T., *Een gerechtelijk-geneeskundige studie*, Koninklijke Akademie van Wetenschappen (Amsterdam 1885).

Literature

Berg, Marc and Madeleine Akrich, ‘Bodies on Trial: Performances and Politics in Medicine and Biology’, *Body and Society* 12 (2004) 1-12.
Bijker, W.E., *The paradox of scientific authority. The role of scientific advice in democracies* (Cambridge and London 2009).
Calaresu, M., F. de Vivo and J. Rubiés, ‘Introduction: Peter Burke and the History of Cultural History’, *Exploring Cultural history: Essays in Honour of Peter Burke* (London 2010) 1-28.
Caudill, David S., ‘Arsenic and Old Chemistry: Images of Mad Alchemists, Experts attacking Experts, and the Crisis in Forensic Science’, *School of Law Working Paper Series* 136 (2009) 1-34.
Clercq, de, Rudi, ‘Prof. Dr. Felix Daels en de vergiftigingszaak te Steendorp’, *Uit het verleden van de RUG* (Gent: Universiteitsarchief Gent, 1992).

Cooper, Gail and Adam Negrusz, *Clark's Analytical Forensic Toxicology* (London 2013).
Collins, Harry, 'Interactional expertise as a third kind of knowledge', *Phenomenology and the Cognitive Sciences* 3 (2004) 125-143.
Collins, Harry, Robert Evans and Mike Gorman, 'Trading zones and interactional expertise', *Studies in History and Philosophy of Science* 18 (2007) 657-666.
Crozier, Ivan Dalley, 'The Medical Construction of Homosexuality and its Relation to the Law in Nineteenth Century England', *Medical History* 45 (2001) 61-82.
Daston, Lorraine and Peter Galison, 'The Image of Objectivity', *Representation* 40, Special Issue: Seeing Science (1992) 81-128.
Downing, Lisa, 'Murder in the Feminine: Marie Lafarge and the Sexualization of the Nineteenth-Century Criminal Woman'*, Journal of the History of Sexuality* 18 (2009) 121-137.
Ferber, Sarah; Wilde, Sally, *The Body Divided : Human Beings and Human 'Material' in Modern Medical History* (Surrey 2011).
Gieryn, Thomas F., 'Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists', *American Sociological Review* 48 (1983) 781-795.
Gooday, G., 'Liars, experts, and authorities', *History of Science* 46 (2008) 431-456.
Greenblatt, Stephen J.,'A mobility studies manifesto' in: S.J. Greenblatt, *Cultural Mobility: A Manifesto* (Cambridge: Cambridge University Press, 2009) 1-3.
Halfon, Saul, 'Encountering Birth: Negotiating Expertise, Networks, and My STS Self', *Science as Culture* 19 (2010) 61-77.
Horn, D. G., 'Making criminologists. Tools, techniques, and the production of scientific authority', in: P. Becker en R. Wetzell eds., *Criminals and their scientists. The history of criminology in international perspective* (Cambridge and New York 2006) 317-336.
Inman, Keith and Nora Rudin, *Principles and Practice of Criminalistics: The Profession of Forensic Science* (Boca Raton: CRC Press, 2000).
Jensen, Torben Elgaard and Brit Ross Winterheik, 'Book Review: The Body Multiple: Ontology in Medical Practice', *Acta Sociologica* 48 (2005) 266-268.
Jonker, Ed, 'Van relativisme naar oordeelsvorming. Recente tendensen in de wetenschapsgeschiedschrijving', *Studium* 1 (2011) 2-15.
Kerkhoff, A.H.M., 'Over de verhouding tussen gerechtelijke geneeskunde en openbare gezondheidszorg: Een historisch overzicht', in: B.A.J. Cohen (red.) et al., *Forensische geneeskunde: Raakvlakken tussen geneeskunst, gezondheidszorg en recht* (Assen 2004).
Krop, H., 'Natuurwetenschap en theologie in de negentiende eeuw. De filosofische achtergrond van de moderne theologie', *Theoretische Geschiedenis* 21 (1994) 16-31.
Leder, Drew, (ed.), *The body in medical thought and practice* (Dordrecht 1992).
Lunteren, F. van, B. Theunissen and R. Vermij, 'Inleiding: De maatschappelijke rol van experts in historisch perspectief', In: Idem eds., *De opmars van deskundigen. Souffleurs van de samenleving* (Amsterdam 2002) 9-21.
Moermans, Ingrid, *Gif als goede gave: Maria Catharina van der Linden-Swanenburg, Goeie Mie (1839-1915)* (Leiden 2001).
Mol, Annemarie, *The Body Multiple: Ontology in Medical Practice* (Durham: Duke University Press, 2002).
Mol, Annemarie and John Law, 'Embodied Action, Enacted Bodies: The Example of Hypoglycaemia', *Body & Society* 10 (2004) 43-62.

National Library of Medicine: Technologies: Forensic Imaging. Online exhibition description and educational programs (last updated 05-06-2014).
Newton, David E., *Forensic chemistry* (New York: Facts on File Inc., 2007).
Nickell, Joe and John F. Fischer, *Crime Science: Methods of Forensic Detection* (Kentucky: University Press of Kentucky, 1999).
Oosterhuis, Harry and Arlie Loughnan, 'Madness and crime: Historical perspectives on forensic psychiatry', *International Journal of Law and Psychiatry* 37 (2014) 1–16.
Oosterhuis, Harry, 'Treatment as punishment: Forensic psychiatry in The Netherlands (1870–2005)', *International Journal of Law and Psychiatry 37* (2014) 37–49.
Pickstone John V., *Ways of Knowing: A New History of Science, Technology, and Medicine* (Manchester 2000).
Poot, de, Christianne, 'Wetenschap op de plaats delict', *Lectoraat Forensisch Onderzoek* (Amsterdam: Hogeschool van Amsterdam, 2011).
Ruberg, W., 'Onwetendheid. De rol van de forensische geneeskunde en psychiatrie in Nederlandse verkrachtingszaken (1811-1920)', *Tijdschrift voor Sociale en Economische Geschiedenis* 9 (2012) 87-110.
Ruberg, W., 'Travelling knowledge and forensic medicine. Infanticide, body and mind in the Netherlands, 1811-1911', *Medical History* 57 (2013) 359-376.
Sappol, Michael*, A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in the Nineteenth- Century America* (New Jersey: Princeton University Press, 2002).
Secord, James A., 'Knowledge in Transit', *Isis* 95 (2004) 654-672.
Sellinger, Evan M. and Robert P. Crease, 'Dreyfus on expertise: The limits of phenomenological analysis', *Continental Philosophy Review* 15 (2002) 245-279.
Sismondo, Sergio, 'Trading zones and interactional expertise: creating new kinds of collaboration: review', *Technology and Culture* 53 (2012) 696-697.
Snelders, H.A.M., 'Chemische Laboratoria in the negentiende eeuw', *Tijdschrift voor Geschiedenis van Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek* 9 (1986) 204-215.
Straten, van, Hans, *Moordenaarswerk* (2e druk; Amsterdam: de Arbeiderspers, 1990)
Tuana, Nancy, 'Coming to Understand: Orgasm and the Epistemology of Ignorance', *Hypatia* 19 (2004) 194-232.
Ward, Jennifer*,* 'Origins and development of forensic medicine and forensic science in England, 1823-1946', *PhD thesis* (The Open University, 1993) 1-291.
Watson, Katherine D., *Forensic Medicine in Western Society: A history* (Oxford: Routledge, 2011).
Watson, Katherine D., 'Medical and Chemical Expertise in English Trials for Criminal Poisoning, 1750-1914', *Medical history* 50 (2006) 373-390.
Weterings, Vera, 'Swanenburg, Maria Catharina', *Digitaal Vrouwenlexicon van Nederland* (last updated 13-01-2014)
httpp://resources.huygens.knaw.nl/vrouwenlexicon/lemmata/data/goeie_mie.
Whorton, James C., *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work and Play* (Oxford: Oxford University Press, 2010).
Wiener, Martin, 'Judges v. Jurors: Courtroom Tensions in Murder Trials and the Law of Criminal Responsibility in Nineteenth-Century England', *Law and History Review* 17 (1999) 467-505.
Wils, Kaat*, De omweg van de wetenschap: het positivisme en de Belgische en Nederlandse intellectuele cultuur 1845-1914* (Amsterdam: Amsterdam University Press, 2005).