

On Sense and Non-Sense
of Premodern Medical Theories:
The Example of Theories on Smallpox



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As medical historians we are used to drawing conclusions from often very scattered and disparate material on dates, developments, trends, innovations in medicine, on ways of treating diseases -- and, what seems to be the most difficult, on the thoughts and actions of the historical protagonists -- the doctors and healers of the past. From our material we can seldom be sure whether there is any relationship between theoretical approach and medical action. We mostly do not know what effect a medical theory had on practice. Actually, we do not even know whether there was any connection between theory and practice.

Medical theories of the past are a complicated product of the human mind which is difficult to examine with the available methodologies of historical understanding, modern as well as postmodern. By comparison with other intellectual creations of the past such as works of art, philosophical ideas, or myths, they are transitory and futile. The reality to which they refer cannot be reconstructed. The perception of disease and disease entities has completely changed, and, while the vital functions of the human body will always be the same, the ways of grouping and evaluating them within different systems of diagnosis can vary so much that modern disease entities can hardly be discerned.

Theories generally are created to demonstrate explicability. The person who fabricates a theory aims to explain a maximum of phenomena and processes in nature and in the human body using a minimum of categories and category relations. Large and encompassing theories of nature are mostly not created by physicians active in medical practice. Doctors and healers seldom show a strong inclination to theories and theory claims. They are interested in (therapeutic) effects. They connect symptom and therapy or, at best, cause and symptom (in an attempt to prevent disease). The claim to connect conclusively theory and practice and to achieve a certain standard in the explanations of physiological and pathological processes comes rather from the outside. In particular, doctors and healers working in an exposed position such as court physicians, personal physicians, scholar physicians, or teachers organized academically, had to explain their medical behavior and to adapt their explanations to a certain theoretical standard.

Modern and postmodern methodology of historical understanding has developed a variety of approaches to deal with historical theories and to assess their basic sense or non-sense: philological, empirical, hermeneutic, phenomenological, sociological as well as special gender and body theories, etc. Every methodology includes a different degree of

understanding and/or desire to understand the intentions of the creators or users of a given theory.

In this paper I will discuss different approaches to historical understanding as they relate to smallpox theories and practices in Chinese medical history. I will first delineate the process of theory formation -- as I perceive it. Indeed, I believe that a major innovation in medicine such as preventive smallpox inoculation needs an earlier period for the accumulation of experience and the development of theoretical concepts.^① I deem it therefore very important to reconstruct the internal logic and explanatory value of the varying concepts that have been created in the history of Chinese medical thought and to follow them in a more or less chronological order.

The historical material is very scattered, and the traces that might possibly lead us to understand the cognitive process in medical thought up to the development of inoculation, are often tangled. Although the main ideas of Chinese smallpox medicine have become common knowledge,^② many details of the historical development remain unclear. Thus, it

- ① By experience I do not mean the naive concept of experience that was used by Chinese physicians in the republican period to distance themselves from Western medicine (see Lei, Sean Hsiang-lin 2002, "How did Chinese Medicine become Experimental? The Political Epistemology of Jingyan", *Positions* 10.2, pp. 333-364) or the very dubious concept of experience as it is used in the debates on complementary alternative medicine -- in Germany often referred to as "experience medicine" (Erfahrungsmmedizin). In my opinion "accumulating experience" is intimately connected with the concept of "learning", which in turn would result in the development of more and more differentiated forms of describing, explaining and mastering the problems of the perceived reality. This concept of learning, however, does not exclude that there may be standstills, steps backwards, or loops in the development.
- ② For China, the first study to mention is the pioneering works by Fan Xingzhun 范行準 (1906-1998) on Preventive Medicine: *Zhongguo yufang yixue sixiangshi* 中國預防醫學思想史 [*History of Preventive Medicine in China*] (Beijing: Renmin chubanshe, 1954/1955), of which the part on smallpox had already been issued in the journal *Zhonghua yishi zazhi* 4.4, 1953, pp.205-223 as part 5. Fan's studies regarding smallpox were supplemented by two Taiwanese scholars: Leung, Angela Ki-che 梁其姿 1987, "Ming Qing yufang tianhua cuoshi zhi yanbian" 明清預防天花措施的演變 [Smallpox preventive measures during the Ming and the Ch'ing], *Guoshi luncong* 《國史釋論：陶希聖先生九秩榮慶祝壽論文集》 and Leung 1996, "Variolation and Vaccination in Late Imperial China" in S. Plotkin & B. Fantini (eds.), *Vaccinia, Vaccination, Vaccinology. Jenner, Pasteur and their Successors*. Paris: Elsevier, pp.65-71, Taipei: Shihuo chubanshe, pp. 239-253, and Chang Chia-feng 1996, *Aspects of Smallpox and its Significance in Chinese History* (Ph.D. thesis, London: School of Oriental and African). For smallpox disease in world history it makes still sense to consult William H. McNeill, *Plagues and People* (Garden City, N.Y.: Anchor Press-Doubleday, 1976) and Donald R. Hopkins, *The Greatest Killer: Smallpox in History*; with a new introduction. (Chicago: University of Chicago Press, 2002) (The first edition of 1983 had the title "Princes and Peasants").

is still unclear how smallpox inoculation was developed in China. The traditional account of an anonymous Chinese folk healer or a Daoist suddenly conceiving the plan to anticipate this cruel disease and inoculate healthy children with a preventive intention is evidently improbable.^③ I also do not hold the common belief that variolation should be regarded as a folk practice, which existed long before the 17th century in many places like Africa, Europe, the Osmanic empire, or China.^④ Rather I believe that the existence of inoculation practices at a certain place reflects a definite stage of experience with the disease and/or (indirect) contact with a culture which has passed this stage of experience.

Let me therefore, briefly recapitulate the main stages of the developmental process in China by reconstructing and analyzing the logical structure and development of theories on smallpox up to the point where a specific explanatory model of the disease was created, which for its part provided a highly reasonable expectation that experiments of inoculation would be successful.

The development of theories and practices relating to smallpox

Smallpox probably appeared in China around the fifth century.^⑤ It was regarded as an

③ It was mainly Joseph Needham and Lu Gwei-djen who argued for a very early practice of smallpox inoculation within a Daoist context. See the famous article by Needham and Lu, “On the Origin of Immunology”, which was first published in 1980 in *Eastern Horizon* and then revised in Lanciotti, Lionello (ed.), *Firenze e L’Oriente* (Firenze: Leo S. Olschki Editore, 1987), pp. 23-57. In an “Editor’s Note” to this article, Sivin declares himself skeptical about the early date and about Needham and Lu’s assumptions regarding Daoism in general and its role in encouraging a “rational” research of nature. See Sivin, Nathan 2000 (ed.), Joseph Needham, *Science and Civilisation*. Vol. 6.6. Medicine (Cambridge: University Press), pp.169-174. Contemporary medical historians mostly argue for the “folk healer theory”, and postpone the time to the end of the 16th century.

④ Among many other authors see Hopkins 2002, p.46, who echoes the views of Dixon 1962, Fenner/Henderson 1988, Henschen 1966, and Sterns 1950.

⑤ Smallpox is first mentioned in the prescription book *Zhouhou beiji fang* 肘后備急方 (rpt. Beijing: Renmin weisheng chubanshe, 1983) 2, p.42, written by Ge Hong 葛洪 (281-341) and supplemented by Tao Hongjing 陶弘景 (456-536). This book contains a good description of the symptoms as well as a reference to its first appearance and its spread in the era *jianwu* 建武. However, it is not clear whether this description is part of the original text or belongs to the commentary. The date *jianwu* is moreover most ambiguous, since it was used for six different reigns between the first and the fifth century. Today most medical historians tend to accept the year 495 AD. Cf. Fan Xingzhun, *Zhongguo yufang yixue sixiangshi* (Beijing: Renmin chubanshe, 1954), pp. 106-110. For further speculations see Ma Boying 馬伯英 1994, *Zhongguo yixue wenhua shi* 中國醫學文化史 [A history of medicine in Chinese culture] (Shanghai: Renmin chubanshe, 1994), p.805.

illness brought by barbarian soldiers from the south and therefore often called “prisoners’ pox” (*luchuang* 虜瘡).^⑥ We may assume that it first affected all age groups. In the course of time, however, the adult population developed a relative immunity and was less at risk. From the 12th century the disease probably became endemic. It was then mostly children who were affected. Smallpox was therefore from then on dealt with in pediatric books.

During the Northern and Southern Song dynasty two famous pediatricians, Qian Yi 錢乙 (1032-1113?)^⑦ and Chen Wenzhong 陳文中 (fl. 13th)^⑧, created two opposing approaches to the treatment of smallpox, both of which were very influential not only in their own time but also during the Yuan and Ming dynasties. Both men believed that all childhood eruptions have a specific thermic quality. Whereas Qian Yi thought that their thermic quality was hot and recommended a cooling therapy, Chen Wenzhong thought it was cold and therefore recommended a warming one. Neither of these authors, however, made a clear differentiation between smallpox and measles. From their opposite approaches, we may conclude that, at least until the 13th century, smallpox, like all childhood eruptions, was recognized as a disease -- a very cruel disease which had to be treated with drugs. (This was to change in later periods.)^⑨

At about the same time a distinct pediatric concept emerged that provided an explanation for the source of early childhood diseases hitherto not dealt with in the *Huangdi neijing* 黃帝內經: the concept of embryonic poison (*taidu* 胎毒). The embryonic poison was seen as a fluid substance of hot quality that originated at the moment of conception or during the period of gestation: According to most pediatric treatises it was seen as being transmitted at birth from the mother to the new-born child and causing a great variety of neonatal diseases.

⑥ This historical explanation is given as early as the Ming dynasty by several medical authors.

⑦ His theory of children’s diseases is recorded in the earliest pediatric treatise extant, the *Xiaoer yaozheng zhijue* 小兒藥證直訣 [*Open Words on Drug Therapy for Children’s Conditions*], written down in 1119 by his disciple Yan Xiaozhong 閻孝忠.

⑧ Chen Wenzhong 陳文中, *Xiaoer douzhen fang lun* 小兒痘疹方論 [*Treatise on the Prescriptions for Children’s Eruptions*], written in 1253.

⑨ See Volkmar, Barbara, *Das Kind in der chinesischen Heilkunde* [*The Child in Chinese Medicine*], Ph.D. dissertation. University of Freiburg, Institute for the History of Medicine, 1985, pp. 39-46.

With the development of this new concept in pediatrics, different prophylactic and therapeutic methods were developed to eliminate the poison or to prevent the poison being transmitted to the child. As smallpox became more and more a childhood disease, explanations as to its cause were given now in terms both of epidemic seasonal *Qi* (時氣) from the outside and of embryonic poison (胎毒) from the inside. The first recipes to prevent smallpox by eliminating the “embryonic poison” at birth can be found in medical literature from at least the beginning of the 14th century. Let us look at the explanatory value of these concepts in table 1.

The concept of embryonic poison for smallpox disease explained a common observation: this was that every human being had to have smallpox once in his/her life; the reason for this was that everyone carried a more or less strong embryonic poison in her/his body. On the other hand, the concept of seasonal epidemical *Qi* together with the theory of the five periods and six *Qi* (五運六氣) could explain why the disease occurred in cyclical periods and why it always affected many children at once. These three fundamental causal concepts of Chinese smallpox medicine were supplemented by concepts such as physical condition, climate or human fate to explain the varying violence of the disease. Current designations for smallpox at the time were “pea or bean pox” (*wandouchuang* 豌豆瘡) because of the pustules, form, “heaven pox” (*tianchuang* 天瘡), because they were transmitted by the seasonal *Qi* of heaven, or “a hundred year-pox” (*baisuichuang* 百歲瘡), because they only occurred once in a man’s lifetime.^⑩

From about the beginning of the 16th century smallpox was given a theoretical shape very different from that of every other specialty or disease in Chinese medicine -- a shape that was to dominate until the end of the Qing dynasty. Chinese medicine was going through a period of combining natural philosophy and empirical experience, particularizing its knowledge, and undermining old precepts.^⑪ Within the realm of pediatric literature this led

^⑩This historical explanation is given by several Chinese medical authors as early as the Ming dynasty.

^⑪Compare with Harold J. Cook’s descriptions of “The new philosophy and medicine in seventeenth century England” in Lindberg and Westmann (eds.), *Reappraisals of the Scientific Revolution* 1990, pp. 422-424.

to the formation of a specialized literature on smallpox and a focus on understanding the particular ways in which smallpox could manifest in individual cases and be dealt with.¹²

Surprisingly, the sophisticated smallpox theories in China of the 16th century (which, by the way, reflect enormous clinical experience) are more or less ignored in Chinese medical history, although they actually formed the decisive prerequisite for the development of smallpox inoculation.¹³ The underlying idea for these new theories was that smallpox was no longer considered as a disease, but rather as a normal stage in human development -- a kind of threshold condition¹⁴-- that everybody had to go through, because a person's embryonic poison had to come out. As the course and outcome of this "cleansing process" was basically seen as a matter of fate and heavenly benevolence, prognosis became even more important than medical treatment.

In the 16th century smallpox theory systematically incorporated divination categories in the diagnostic scheme.¹⁵ These divination categories, which may have derived from the ancient tradition of "iatromancy",¹⁶ (which still formed an important current in Ming

¹²This development led finally to the establishment of a specialty of smallpox at the Imperial Academy of Medicine in the year 1572.

¹³In her most valuable study Chang Chia-feng 1996 has gathered and evaluated many approaches to smallpox from Chinese literature. Unfortunately, she fails to examine the textual authenticity of her sources and to put them in a chronological order. Her chapters on smallpox etiology and treatment in Chinese medical especially are therefore more an assemblage of ideas created in China than a description of a developmental process. See Chang Chia-feng 1996, pp. 48-121.

¹⁴In a religious context the idea of a childhood "threshold condition" was very important. Such conditions were prognosticated by astrologers and treated ritually. See Volkmar 1985, pp. 72-76 and the forthcoming article "Das 'Überschreiten der Grenzpassé'. Ritualisierte Erfahrung in der Kindheit nach einer südchinesischen Volkstradition" [The 'Passing of the Barriers'. Ritualized Experience in Childhood according to a Chinese Folk Tradition].

¹⁵To my knowledge, the first medical author to include divination categories in smallpox medicine was Wei Zhi 魏直 (fl. 1510) in his *Bo'ai xinjian* 博愛心鑑 [*Essential Mirror for universal love*].

¹⁶The term iatromancy was created by Donald Harper, who defines it as a belief that illness is a spirit world calamity and that its onset and resolution are keyed to hemerological and calendrical systems. On iatromancy in early Chinese literature see Harper 2001, "Iatromancy, diagnosis, and prognosis in Early Chinese medicine" in Hsü, Elisabeth (ed.), *Innovation in Chinese Medicine* (Cambridge: University Press, 2001), pp.99-120. and Harper 2004, "Dunhuang Iatromantic Manuscripts: P2856R* and P2675 V*" in Vivienne Lo and Christopher Cullen (eds.), *Mediaeval Chinese Medicine* (forthcoming). Don Harper was so kind as to send me a draft of his article.

thought),¹⁷ were meant to indicate whether a certain smallpox condition should be treated or not. In contrast to religiously based divination, the assignment of the categories “lucky” (*ji* 吉) or “unlucky” (*xiong* 凶), however, merely relied on clinical symptoms and seasonal aspects. (See table 2 and the illustration on page X.)

In contrast to the former Song theories, smallpox was now conceived as a condition that could manifest in conditions of either heat or cold, with countless subdivisions. The label of “fortune” or “luck” (*ji* 吉) was given to such normal courses of smallpox which occurred at a favorable seasonal period (for instance in spring and summer) and which through all the defined five stages (see table 3) showed no complications. These smallpox courses were not regarded as disease and should not be treated at all. They were termed “favorable” (*shun* 順).

The physician should treat only such smallpox conditions that showed a so-called “critical” course (*wei* 危 or *xian* 險). His treatment should aim at giving those conditions a favorable course. When, however, he had to prognosticate an “unfortunate”, “unlucky” (*xiong* 凶) or “unfavorable” (*ni* 逆) smallpox condition, it was time for his immediate withdrawal so as not to run the risk of being blamed for the death of a patient -- a common situation which could have fatal consequences for the physician. A smallpox specialist of the Ming dynasty had therefore often the role of a mere spectator and/or prognosticator. Most of all, he had to be careful not to be held responsible for a possibly fatal outcome of the disease. His low status in Ming society aggravated the problem.

¹⁷ Charts for calculating lucky and unlucky months and days for certain events and activities, including illness and medical treatment, can be found in Ming encyclopedias, such as in the *Sancai tuhui*, edited by Wang Qi 王圻 and Wang Siyi 王思義 in 1607. Reprint of the Wanli edition (Huaiyin caotang). Taipei: Chengwen chubanshe 1970, Vol. 3, pp. 879-940 and in the everyday encyclopedia *Wanbao quanshu* 萬寶全書 [*Complete Book of Thousand Treasures*]. A reprint of several Ming editions was edited by Sakai Tadao 酒井忠夫, Sakade Yoshinobu 坂出祥伸, Ogawa Yoichi 小川陽一 in *Chûgoku nichiyô ruisho shusei* 中國日用類書集 (Tokyo: Kyuko shoin, 1999).

In the text of the most famous smallpox specialist of the 16th century, Wan Quan 萬全 (1500-1585),¹⁸ we find the first appearance of the term “smallpox planting” (*zhongdou* 種痘) which was to become the technical term for smallpox inoculation. Wan Quan is therefore often said by medical historians to be one of the first (openly active) inoculators. He, however, used the term just as a metaphor to refer to the natural infection of a patient by evoking the image of heaven planting seeds of smallpox on the human skin. His approach was at odds with smallpox theories current in the 16th century. Wan Quan was by no means an inoculator (not even in secret).¹⁹ He saw himself as a medical specialist who had to interpret the distribution and appearance of smallpox signs (like milfoil stalks in divination) on the surface of the human body in order to judge the possible regular or irregular processes inside the body and treat every case, every stage, every condition individually. In the Qing dynasty, he was therefore acknowledged as the most important representative of the “treatment school”, alongside the preventive “inoculation school” represented by the *Yizong jinjian* 醫宗金鑑 (*Golden Mirror of the Medical Tradition*), published during the Kangxi period (1742) by imperial order.

It is hardly conceivable that as early as the Longqing period (1567-1572), when the Ming dynasty was still stable, smallpox inoculation was common practice in a prefecture of modern Anhui, as is asserted by a medical author by the name of Yu Maokun 俞茂鯤 in

¹⁸The importance of Wan Quan’s smallpox medicine in Qing medical discourse is reflected in the great number of his treatises published between the 16th and the 18th century and the reprinting of large parts of his books in the encyclopedia *Gujin tushu jicheng* 古今圖書集成 [*Great Collection of Illustrations and Books of Old and New Times*]. The rubric “*Yibu quanlu*”, division “*Douzhenmen*”, chap. 460-461. and chap. 464-470 all record his pox treatises or plagiarized versions of his pox treatises. See Volkmar, B., “The Physician and the Plagiarists. The Fate of Wan Quan’s Legacy”, *The East Asian Library Journal* IX.1 (2000), pp.1-77.

¹⁹In the case of Wan Quan’s writings we can follow the different versions of a manuscript on smallpox medicine which was later published as a book. Thus, we are able to observe the gradual production of medical knowledge in relation to a certain stage of experience. We have also the unique opportunity to examine texts on smallpox of both exoteric and esoteric (*michuan* 秘傳, *jiachuan* 家傳) transmission. Neither of Wan Quans’s manuscripts and texts contains any reference to inoculation. See Volkmar, B., *Medizin und Lebenswelt in der Mingzeit. Leben und Werk des Arztes Wan Quan* [*Medicine in a Context of ‘Life World’. Life and Work by Wan Quan*]. Habilitationsschrift (Postgraduate thesis submitted to the Philosophical Faculty in Heidelberg in 2002). Forthcoming.

1727.²⁰ The source this author is relying on is not reliable at all: it is one of the many plagiarisms produced in the 16th century.²¹ The further argument of the same author that the technique had been received from “extraordinary men” (*yiren* 異人) seems most suspicious. Plagiarists loved to publicize their faked books by saying that they had included secret prescriptions and techniques (*mifang* 秘方) given them by extraordinary men.²² The growing importance of empirical information and its exchange in a context of increasing commercialization led to many such cases of sensation-seeking disclosure of allegedly secret prescriptions and treatises of all kinds.²³ As medical historians we should not take such statements seriously.

It is also implausible, that individual physicians at the end of the 16th century could already practice smallpox inoculation on hundreds of children -- as is asserted by a smallpox specialist in 1741 who maintained that his family had learnt the technique from a three generation family of smallpox physicians active in inoculation.²⁴ To be sure,

²⁰ The original text by Yu Maokun is translated in Needham/Lu/Sivin 2000, p.134.

²¹ Yu Maokun's book is based on the smallpox treatise *Douzhen jinjinglu* 痘疹金鏡錄 (1579) -- a bestseller during the Qing dynasty. The alleged author, Weng Zhongren 翁仲仁, however, evidently plagiarized the work of the much more famous physicians Gong Tongxian 龔廷賢 (fl. 1581-1604) and Wan Quan 萬全 (1500-1585?). It was the Japanese smallpox specialist Ikeda Jūko 池田柔行, who first drew attention to this matter in 1800. Ikeda's ancestors had learnt from Gong Tingxian via the Chinese physician Tai Manko (chin. Dai Mangong 戴曼公), who settled in Japan as a Buddhist monk in 1653. His very plausible argument is quoted in detail in the famous bibliography *Zhongguo yijikao* 中國醫籍考 [*Investigation into the Old Medical Literature of China*] edited by Tanba Mototane in 1819. See *Zhongguo yijikao* (rpt. Beijing: Renmin weisheng chubanshe, 1983), pp.1043 and 1048-1049. Plagiarisms of smallpox treatises and the disclosure of allegedly most secret prescriptions were commonplace in the 16th century. See my article on “The Physician and the Plagiarists”, *The East Asian Library Journal* IX.1 (2000), pp.1-77.

²² See the prefaces of the most suspect healers such as Huang Lian 黃廉, Ding Feng 丁鳳, Weng Zhongren 翁仲仁, which are mostly reprinted in the *Zhongguo yijikao*. Also cf. Volkmar 2000, pp. 1-77.

²³ On this subject see the important paper presented by Hal Cook to this conference “Medical Communication in the First Global Age”, referring to a time of roughly hundred years later. I would argue that the “information age” in the realm of medicine began around 1520 in China and was encouraged by the rapid growth of the economy and the commercialization of the printing culture. The exchange of medical concepts, ideas, and prescriptions first concentrated on the different provinces of the Chinese empire. It then quickly spread and reached places like Japan and Korea. The influence of Chinese Ming medicine (especially smallpox medicine) in Japan and Korea, was considerable. See note 21.

²⁴ In his interesting preface of 1727, translated by Needham/Lu/Sivin 2000, p.136, the smallpox inoculator Zhang Yan 張琰 refers back to Nie Shangheng 聶尚恆 (fl. 1616). The fact that Nie Shangheng's books do not show a single reference to inoculation is taken by Needham and Lu 2000, p.135 as evidence that Nie Shangheng was an active, but secret, inoculator.

smallpox inoculation was meant to artificially encourage the releasing of the embryonic poison and to cause an outbreak of the disease, at a “lucky” date. The technique was dangerous. Nobody would have entrusted their children to a mere amateur. It is therefore most probable that the smallpox specialist used the common *topos* that three generations of his teacher’s family had already practiced the inoculation technique so as to reassure people of his own competence.²⁵ Given the social context of Ming medicine, a common practice of smallpox inoculation around 1600 or even earlier is not conceivable.

At the end of the 16th century, it seems that smallpox epidemics grew worse. If the medical books can be believed, they could kill more than half of the affected children. Wan Quan, for instance, notes in the year 1572, when he retired from his practice: “There emerge more and more difficult cases”. One gets the same impression from the writings of other authors who practiced a generation later, such as Sun Yikui 孫一奎 (1530?-1620?), Gong Tingxian 龔廷賢 (fl. 1581-1604), and Wang Kentang 王肯堂 (1549-1613).²⁶ Of course, this impression could also be also due to the fact that people in the Ming dynasty were less willing to accept smallpox as their fate.

Unfortunately, we have no reliable sources on who invented the ingenious technique of smallpox inoculation and what theoretical ideas the first inoculator referred to. We can only draw our conclusions from later sources. Early Chinese smallpox inoculation as described in specialized treatises of the second half of the 17th century relied on the hypothesis that smallpox was a stage in everybody’s life, which could in no way be avoided. The theoretical model of smallpox inoculation was simple and in fact could also be easily understood by someone not familiar with Chinese medicine. It was, however, at the same time so

²⁵ See Chao Yuan-ling 2000, “The Ideal Physician in Late Imperial China: The Question of Sanshi 三世”, *East Asian Science, Technology and Medicine (EAST)* 17, pp.66-93.

²⁶ Cf. the chart of smallpox epidemics presented in Chang Chia-feng 1996, pp.24-25. Impressive examples for the ferocity of the disease between the year 1618 and the year 1669 are also given by Leung, Angela Ki-che 梁其姿 1987, p. 239.

complicated and sophisticated that it is hardly credible that any simple healer could have created the technique of inoculating healthy children with smallpox, without at least having considered the theoretical concepts of his time.

Early Chinese inoculation theory corresponded to a functional model involving not more than three hypothetical categories, of which the only new one (see table 1) was the concept of *miao* 苗 (“offshoot”).²⁷ The “offshoot of smallpox” became the technical term for the inoculum which was taken from the ripe pustules of a patient with a favorable course of smallpox and was thought to contain all information about the (mild) form of the disease.

The three categories of the model underlying smallpox inoculation were more or less perceived as follows:

1. The embryonic poison (*taidu* 胎毒), which everybody carried in her/his body and dictated that everybody had to experience the disease, had to be released artificially. It had to be made to come to the surface of the body and be discharged without contaminating the organ systems. (According to most theories it was considered that after birth it “hid” in the very depths of the body -- at the gate of life (*mingmen* 命門))
2. The epidemic seasonal *Qi* (*shiqi* 時氣), seen as an important influential factor in the virulence of smallpox, was to be avoided at any cost. Smallpox inoculation should therefore be applied on a day when all the climatic conditions and all qualities of star, day and hour constellations were favorable. The specific time had to be carefully calculated by calendar specialists and/or astrologers.
3. The smallpox offshoot (*doumiao* 痘苗) was taken from the ripe pustules of a patient with a good constitution who had passed a mild form of smallpox. It had to be inoculated -- or to use the Chinese term -- “planted” (after adequate conservation,

²⁷ *Miao* has also the meaning of “sprout” or in a figurative sense: “descendant”, “offspring”. In Chinese smallpox medicine it is a technical term mainly deriving from botanical concepts. Smallpox were also called heavenly flowers (*tianhua* 天花) I therefore translate *miao* as “offshoot”. The translation of *miao* as “germ” and the subsequent comparison of the concept with the germ theory of modern medicine is inappropriate and does not reflect the immanent idea in the Chinese approach. See Needham/Lu 2000, p.130.

preparation and attenuation) in another person who did not yet have the disease. The planting of the “smallpox offshoot” in or on the human body should make the embryonic poison come to the surface before the onset of an epidemic cycle and thus provoke a mild course of smallpox.

Although the hypotheses for explaining the mechanism of the disease were not correct -- at least from a modern point of view -- the way in which conclusions were drawn from a certain functional model for experimental tests (on a large number of patients) can be called scientific in the relevant respects. Whoever the person was who first developed smallpox inoculation she/he abandoned the common interpretative logic of Chinese medicine in favor of a functional model that could be falsified. To be sure, it was the confidence in one’s medical ability to deal with and control the “favorable” courses of smallpox that encouraged the idea of artificially planting an “offshoot” of the disease and make the poison come out in a mild form. The inoculation and treatment schools of the Qing period therefore did not exclude each other.²⁸

Smallpox inoculation was thus not meant to avoid the disease but rather to encourage its appearance at a favorable time. From medical books and gazetteers we know that up to a thousand children in a county received an “offshoot” of smallpox at once, either by cotton balls put in the nose, or by being covered with a quilt taken from children who had already safely experienced the disease, or by wearing their clothes etc.²⁹ Given the low status of physicians and healers during the Ming dynasty and the risk these inoculators

²⁸Traditional 16th century diagnostic and therapeutic schemes for smallpox were still in use at the imperial court in 1874. See the case of the Tongzhi emperor described in Chang Che-chia’s excellent thesis of 1998, *The Therapeutic Tug of War -- The Imperial Physician-Patient Relationship in the Era of Empress Dowager Cixi (1874-1908)*. Ph.D. thesis (University of Pennsylvania), pp.85-122. Although the symptoms are not very well described in the diaries of the different imperial physicians, their prescriptions and terminology show that the enigmatic disease of the emperor must have been smallpox, (and not syphilis). The treatment program to “turn a risky situation into a secure one” clearly refers to the traditional differentiations of regular, risky and unfavorable courses of smallpox. The emperor was therefore advised to refrain from sexual activity. The same is valid for the later explanation that his relapse was due to “remaining poison” (*yudu* 餘毒). See table 4.

²⁹Four different methods of variolation are mentioned in the *Zhongdou xinfa* 種痘心法 [*Essential Methods of “Planting Smallpox”*] which was included in the *Yizong jinjian* 醫宗金鑑 (1742). Further methods are described in Chang Chia-feng 1996, pp.136-142.

took personally, the first experimental practices of inoculation must have been highly successful.³⁰

Discussion

Thus far I have tried to reconstruct logically the historical development and the internal logic of theories and practices regarding smallpox by more or less ignoring many details for lack of space and also because the historical material is insufficient to make a deeper understanding possible. As is evident, I silently postponed the date for the “invention” of smallpox inoculation to the beginning of the 17th century, roughly about 1610-1620. This is the earliest date at which I deem it possible that this most ingenious medical practice was used in China. Such a technique could hardly have been developed without a theoretical background and then kept secret for hundreds of years. If we can trust the source material of the 17th century, the news of successful inoculations immediately spread like wildfire within the Chinese empire -- from county to county, province to province -- and, as it very soon got the blessing of the Manchu imperial court -- from China across the border via Persia to the Arabic countries, the Osmanic empire and the African continent, and then with a certain delay to the Western European/American world.³¹

I shall now discuss some alternative interpretations of the development of smallpox theories in China and analyze their underlying hypotheses.

³⁰ The trade with smallpox offshoots, which was in the hand of healers who called themselves inoculators (*zhongdoushi* 種痘師), began to flourish all over the country. Commonly used expressions for the ideal offshoot, such as “fortunate offshoot” (*jimiao* 吉苗) or “favorable offshoot” (*shunmiao* 順苗) still point to the original idea that the offshoot should induce a mild course of smallpox.

³¹ The “buying off” of smallpox was obviously very common along the East coast of Africa (which might indicate a Chinese influence via the Arabic countries), but also in some areas in the Western parts and the inland. However, as Watts 1997, p.114 puts it: “the better sort in England at that time still disdained to be taught anything by the colonials”. (Watts, Sheldon J., *Epidemics and history: disease, power and imperialism*. New Haven: Yale Univ. Press, 1997, pp.109-121.) The role of Lady Mary Wortley Montagu has therefore also to be seen in relative terms. The inoculation of her son and daughter in 1718 and 1721 in Constantinople, accompanied by great literary engagement was only a final, but probably indeed decisive impulse in an already long running discussion. See Barrett, John T. 1942, “The Inoculation Controversy in Puritan New England”, *Bulletin of the History of Medicine* XII, p.171, Miller, Geneviève 1981, “Putting Lady Mary in her Place: A Discussion of Historical Causation”, *Bulletin of the History of Medicine* LV (1981), pp.2-16.

1. The explanation of secret transmission

This explanation relies on legends created during around the mid 17th century, according to which a “divine physician”³² of Emeishan 峨嵋山 inoculated the son of the Song dynasty prime minister Wang Dan 王旦 (957-1017)³³ in the capital during the Renzong era (1022-1063).³⁴ Although the legend contains a few historical facts, there are many mistakes and contradictions. If it were true that smallpox inoculation did indeed occur at the Imperial court in the 11th century, it would be surprising that the event did not have a resonant effect throughout the empire. Needham and other Chinese medical historians have attributed the long silence between the alleged first appearance of smallpox inoculation in Chinese history and its actual first appearance in written texts to the tradition of secret recipes (*jinfang* 禁方).³⁵ Of course, many prescriptions in Chinese medicine were transmitted in secret. However, as shown above the underlying theoretical model of smallpox inoculation was very sophisticated. It involved complex theoretical categories and category relations, which had to be created first and then brought together in different conceptual schemes. It was therefore not comparable to a simple recipe for which the main problem is to combine different ingredients in different doses.

The underlying hypothesis of this approach, which I would call empiristic, and which is still very common among Chinese and Western medical historians is that after a certain

³² According to anecdotes of the 18th century it was a Daoist “true man” (*zhenren* 真人), a “heavenly matron” (*tianlao* 天姥), the Buddhist Goddess of Mercy, Guanyin 觀音, or a “ghostwriting medium” (*jixian* 乩仙), who revealed the technique of inoculation. In all of these anecdotes the religious flavor is very strong. The interpretation of the invention of inoculation as a heavenly revelation seems very much to serve as an authorization for its practice.

³³ A biography of Wan Dan can be found in Franke, Herbert 1976, *Song Biographies*, in *Münchener Ostasiatische Studien* 16, 1-4. Wiesbaden, Franz Steiner Verlag, Vol. 3, pp.1147-1153.

³⁴ As Chang Chia-feng 1996, p.127 has pointed out, the legend only makes sense, if we take the Song era Zhenzong (998-1021) instead of Renzong (1022-1063).

³⁵ For the role of *jinfang* 禁方 in early Chinese literature see the study of Li Jianmin 李建民 1997, “Zhongguo gudai ‘jinfang’ kaolun” 中國古代「禁方」考 [The transmission of secret techniques in ancient China], *Zhongyang yanjiu yuanlishi yuyan yanjiusuo jikan* 中央研究院歷史語言研究所集刊 [Bulletin of the institute of History and Philology, Academia Sinica] 68.1, pp.117-166.

amount of observation in nature, the mechanisms and immanent logic of processes will become evident -- by themselves -- without any preceding theoretical reflection. According to this idea, certain innovations are discoveries that happen more or less coincidentally. Accumulating experience would inevitably lead to progress. Necessary theoretical -- including incorrect -- ideas and concepts which might have preceded or actually caused a finding are described only in order to argue for the historical date. In this context of research the theories or religious ideas of the past underlying a certain practice are at best classified as proto-theories to a corresponding modern theory, or disqualified as nonsense.

2. The postulation of an old medical concept

Another continuing argument for an earlier date of invention is the postulation of the existence of an old quasi homeopathic concept in Chinese medicine -- the concept of *yidu gongdu* 以毒攻毒 (“combating the poison with poison”).³⁶ As far as I know, this concept is a very old one indeed, but not used in Chinese smallpox literature before the Qing dynasty.³⁷ In order to follow the internal logic of a theory or a technique we should follow its own special development and not look for any possible quotation or concept in the wider field of Chinese medicine, which could fit our approach or explain the historical facts. From the very beginning, there were many specialized fields in Chinese medicine, every one of which had its own theoretical concepts different from those in every other field in medicine. As in the case of smallpox, a single disease was dealt with in its own specialized literature. The concept of *yidu gongdu* 以毒攻毒 (“combating the poison with poison”), however, was not used to explain smallpox inoculation, at least not in the early specialized treatises.

³⁶ This argument was first brought forward by Fan Xingzhun 1953, p. 156.

³⁷ To my knowledge, it was Xu Dachun 徐大椿 (1693-1771) who first referred to the concept of “attacking poison with poison” in the context of smallpox medicine. Xu, however, referred to the treatment with toxic drugs, and not to smallpox inoculation. See *Yixue yuan liulun* 醫學源流論, chapter “*Doukelun* 痘科論”, translated by Unschuld 1990, *Forgotten Traditions of Ancient Chinese Medicine: The I-hsüeh Liu Lun (1757) by Hsü Ta Ch'ün. A Chinese view from the Eighteenth Century* (Brookline, Mass.: Paradigm), pp.335-337.

3. The sociological approach

While the two latter positions in medical history would mainly argue for an earlier date for the development of smallpox inoculation, representatives of modern and postmodern medical anthropology and gender theory regard as unimportant an interest in dates, inventions or a comparative chronology with achievements in Western medical history. They more or less rule out the possibility of understanding the intentions of the creators or users of a given theory. Instead of looking for the rational aspect or the explanatory value of a premodern medical theory in relation to a certain state of experience, (which indeed is often impossible to evaluate because of historical and cultural distance), they try to understand the specific social context that would make a certain idea or theory possible and/or plausible: Thus, medical anthropology views premodern theories mainly as a stock of metaphors deriving from the sociological or political realm, revealing social hierarchies, political ideals and utopias, or reflecting plausible forms of arguing current in a certain period.⁶⁸ All efforts in this approach would therefore concentrate on uncovering the strategies of the theories, creators or users (in the jargon of gender theories: the male professional elite) to secure their own power and livelihood.⁶⁹

In the case of Chinese smallpox theories representatives of gender studies seem to have been handed a typical case of oppression on a plate. The concept of embryonic poison which according to some medical texts is thought to result from sexual desire or the improper diet, thought or behavior of the pregnant woman seems to represent a clear metaphor for an unequal relationship where power is held by the male. The interpretation of gender studies would be: The male professional elite virtually creates a medical theory in order to control

⁶⁸ See for instance Unschuld 1995, "Plausibility of Truth? An Essay on Medicine and World View", *Science in Context* 8. 1, pp.9-30, Unschuld 1985, *Medicine in China: A History of Ideas*, and Unschuld 2003, *The Huang Di Nei Jing Su Wen: Nature, Knowledge, Imagery in an Ancient Chinese Medical Text*. The latter books are both published by Berkeley/Los Angeles, Univ. of California Press.

⁶⁹ This approach is exemplified in a radical form by Nathan Sivin and Geoffrey E.R. Lloyd, in their joint publication on *Science and Medicine in Early China and Greece: The Way and the Word* (Yale: Yale University Press, 2000). According the two authors it is the wish of the creators or users of a given theory to "persuade" and thereby to secure their power and livelihood that accounts for the special feature of the theory.

women. By using an abstract technical language medical authors design women as polluting their own children and thereby make them responsible for the illnesses of their children.⁴⁰ I do not want to go too much into the details of this interpretation which to me seems rather simplistic.⁴¹

In conclusion, I should prefer to point to the main problem of such sociological interpretations which, by the way, are quickly exhausted, because ancient medical texts do not offer a multitude of such concepts. The main problem is that we are inclined to underestimate what it meant in premodern times (and still means today) to fabricate a theory: that is to explain a multitude of phenomena in their complicated interweaving by a limited set of categories and category relations.

The ways of assessing the sense or non-sense of premodern theories are the essentials of our work in medical history. Divergences in the evaluation of the historical facts and our interpretation of the old texts refer not only to philological problems or to dates, but often involve basic philosophical positions in the understanding of human thought and behavior in a very broad sense. It is necessary to reflect seriously on the inadequacies of the available methodology in medical history and seek new ways that allow an encompassing understanding of the developmental aspects of human thought in a cross cultural perspective.

⁴⁰ See Furth, Charlotte 1999, *The Flourishing Yin: Gender in China's Medical History, 960-1665* (Berkeley: University of California Press), Furth 1987, "Concepts of Pregnancy, Childbirth, and Infancy in Ch'ing Dynasty China", *Journal of Asian Studies* 46. 1, pp.7-35, and Furth 1986, "Blood, Body and Gender: Medical Images of the Female Condition in China (1600-1850)", *Chinese Science* 7, pp.43-66.

⁴¹ Chang Chia-feng 1996, pp.54-66 has already pointed out that many Chinese medical texts would equally see the passion of men as producing harmful embryonic poison. Referring to this more differentiated view, Furth 1999, p.181 emphasizes that her material (the late Ming and Qing medical literature) would be mainly be characterized by "misogynistic views". While this may be true and also be an interesting observation in the context of the social history in late Imperial China, it does not say anything about the original idea of such an explanation in earlier times. I think, if we are dealing with medical texts, we should always examine, whether a medical author is creatively and seriously searching for explanations of certain clinical phenomena or just arbitrarily choosing any available stereotype. At such a late period we will always be able to find texts filled up with clichés.

* My sincere thanks go to Caroline Tonson-Rye for her kind reading and comments on my paper. This written version of my conference paper was supplemented and enriched in many ways by the very stimulating discussions I had with Che-chia Chang, Pingyi Chu, Hal Cook, Feza Günergün, Don Harper, Sean Hsiang-lin Lei, Jender Lee, Shigehisa Kuriyama, Kanwen Ma, and Hui-fang Wu.

Smallpox books of the 16th century were often illustrated with drawings. These two drawings were to show the normal distribution of spots (right side) and pustules (left side) of a regular course of smallpox.

(Source: *Michuan douzhen yusui* 秘傳痘疹玉碎 [*Essentials to Smallpox in Secret Tradition*], single manuscript copy of the 1599 edition, Library of the China Academy of Traditional Chinese Medicine, Beijing. This book contains different sample texts of allegedly secret tradition on the subject of smallpox. It was arranged by the publishing house Yiqingtang 怡慶堂 in Jianyang 建陽 (Fujian province), one of the great publishing centers during the Yuan, Ming, and Qing dynasties.

Concept	Explanatory Value
Embryonic poison (胎毒)	Single occurrence in life
Seasonal Qi (時氣)	Epidemic character of smallpox, contagious nature of the disease, prevalent during a specific season
Theory of the five periods and six Qi (五運六氣)	Cyclical occurrences of the epidemic
Five organs system (五臟)	Explanation of concomitant symptoms
The concept of smallpox offshoot (痘苗)	Material substance in the ripe pustules, corresponding to the disease information

Table 1: Concept and explanatory value of the main concepts created between the 11th and 17th century.

Prognosis	Fortunate 吉	Fate yet undetermined 吉凶未定	Unfortunate 凶
Course	avorable 順	critical, dangerous 危, 險	unfavorable 逆
Medical therapy	not necessary	required	too risky
Symptoms (and concomitant complaints)	light	light to severe	Serious In addition: permanently without appetite, lower back pains, nightmares, delusional images
Season	spring, summer	autumn, winter	autumn, winter
Fever	only three days		longer than three days
Color of spots	red		black
Becoming visible of spots	prompt	hesitating	hardly any spots on the skin
Distribution	dense 密		solitary 疏
Localization	head		palm of the hand, sole of the foot
Color	red		black
Formation of pus	enough		not enough
Segregation of pustules	in time	irregular	no segregation of pustules, sinking in of the pustules, repulsion of the poison

Table 2: Prognostic scheme of 16th century smallpox medicine. Only the critical and yet undetermined courses of smallpox (in the middle column) could be treated, and should be treated by the physician.

Stage	Regular Signs of Smallpox	Duration
1	Fever 發熱	three days
2	Becoming visible (of the first spots) 初見	three days
3	Pustulation 起發	three days
4	Formation of secretions and pus 成漿養膿 Segregation and induration (of pustules) 收靨	three days
5	Bursting (of pustules) 潰爛 Incrustation 結痂 Dropping of the crust 落痂, 倒靨	three days

Table 3: The five stages of a normal smallpox course

Organ	Spleen	Liver	Heart	Lung	Kidneys
Phase	soil	wood	fire	metal	water
Concomitant Symptoms	anorexia	convulsions	mental confusion, nightmare	cough	low back pain

Table 4: Differentiation of five patterns of so-called “remaining poison” (*yudu* 餘毒) according to the locality, where the embryonic poison (*taidu* 胎毒) gets stuck after inadequately treated disease.

Periods of Theory Formation

11th to 15th century

Formation of hypotheses on the thermic nature of smallpox

Development of therapeutic schemes

Establishment of the concept of embryonic poison (胎毒)

Speculation on cyclical processes for the occurrence of smallpox epidemic

Speculation on the main influential climatic factor

Development of a specialized literature on smallpox

16th century

Formation of descriptive categories for the clinical symptoms and the different efflorescences on the skin

Integration of Qian Yi's notation system of five organs (五臟) for the differentiation of different smallpox patterns

Definition of three different courses of smallpox (favorable, critical, unfavorable順,危,逆)

Definition of five disease stages and a corresponding therapeutic scheme

The development of the concept of so-called remaining poison (餘毒) for smallpox complications

Health Politics

1572: Formation of a specialty of smallpox medicine at the Imperial Academy of Medicine

1610 -1620: The Introduction of Smallpox Inoculation

The term of "smallpox offshoot" (痘苗) appears

First experiments with smallpox inoculation

Health Politics

The introduction of a profession of smallpox inoculators