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What is past is prologue: The challenges of integrating a historical perspective of Chinese medicine and the treatment of recurrent urinary tract infections

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ABSTRACT

Ethnopharmacological relevance: Chinese herbal medicine (CHM) has a recorded history of over 2000 years that may be used to authenticate and guide modern treatments for disease, and also identify neglected but potentially useful treatment strategies. However this process is often based on over-simplistic conceptions of tradition and history that fail to take into account the dynamic nature of these 'traditions' and underestimate the importance of contextual factors in their interpretation.

Materials and methods: As part of a process of defining good practice for a clinical trial of CHM for recurrent urinary tract infections, a selective review of classical Chinese medical texts was undertaken to investigate the historical treatment of urinary diseases specified by the traditional category of Lin diseases.

Results: The historical review provided interesting insights into the evolution and meaning of Lin diseases and how pertinent data may be found, precisely, outside the boundaries of the categories on which the original investigation was premised. Although there were interesting parallels and continuities in the classical and modern understandings of the aetiology, pathophysiology and treatment of urinary diseases, there were also important divergences.

Conclusions: It became apparent, in the search for 'traditional' herbs to treat a particular modern syndrome it is essential to contextualise remedies, including as far as possible the intertextual, social, cultural, and gender context, and conditions of practice. Historical ethnopharmacology adds a level of subtlety and complexity to over-simplistic attempts at bioprospecting. Some insights that emerged from this historical review could inform the proposed clinical trial but these had to be filtered through the constraints of modern regulatory procedures. Further research is required on how best to integrate the wealth of data that exists in historical texts with the desire to produce effective herbal products for the modern world.

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1. Introduction

One of the assumptions of any 'traditional' medicine is that it has a long history. That history is often conceived as unchanging over the millennia. In contraposition, modern attention to the history of both 'medicine' and 'tradition' shows us that both are constantly transforming, making and remaking themselves in order to survive and be successful in a changing world (Lo and Renton, 2011; Taylor, 2005). This fact potentially presents a challenge to any modern randomised controlled trial that assumes a traditional medicine to be a static

entity, carrying with it thousands of years of empirical knowledge (Heinrich et al., 2006). Thus in tailoring traditions to modern clinical research, it is essential first to interrogate the imagined long history of the therapeutic use of any particular substance.

Equally essential is to understand the relationship between modern disease terminology and the ancient naming of diseases. We must be extremely wary of the presumption that pre-modern people were treating the same signs and symptoms of disease that we treat today, even if the diseases share the same name. Ancient physiological theories, inasmuch as they mediated disease and therapy, may now be lost in contemporary traditional medicines (intentionally or not). Equally, modern treatment protocols may be very different from those in the past and be delivered in vastly different ways.

Conversely, there may be strong parallels between ancient and modern practices. To a modern clinician, an historical investigation

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like the present study not only serves to train the eye on the nature and value of a tradition and relevant aspects of its authenticity, but also has the potential to identify innovations of the past that have been lost along the way and to underline the creative nature of productive traditions (Hsu, 2001).

This complex interplay of past and present has become apparent in the project described in this paper where medical historians were commissioned by clinical researchers investigating the possible role of Chinese herbal medicine (CHM) in the treatment of recurrent urinary tract infections (RUTIs) to explore historical treatments of disorders related to the term *lin* 淋, a key term in the classical Chinese conceptualisation of urinary disorders. The aim of this collaboration was to provide an account of good practices that could be important in optimising clinical effectiveness for a clinical trial.

As has been noted, in exploring ethnobotany and ethnopharmacology as tools for drug discovery, 'surprisingly little attention has been paid to the historical development of... orally transmitted, indigenous knowledge systems' (Heinrich et al., 2006). This paper aims to make a small contribution to redress this deficit. We hope that the findings of this interdisciplinary project will be of significance to the design of future initiatives in clinical research, bioprospecting and bioinformatics. With regard to the themes of this special issue, the present article is obviously concerned with new uses for old traditions. It also encounters regulatory issues that come to bear on the food-herbs-minerals continuum, and the ownership and authenticity of medical knowledge. Foods and medicines are not substances for which we can assume stable qualities, but are, rather, the outcome and nexus of processes of trade, transformation, appropriation, and use, which require careful and, above all, locally situated historical and cultural studies, especially when being translated into modern scientific protocols.

2. Material and methods

The Recurrent Urinary Tract Infection (RUTI) trial is part of a 5-year study funded by the UK's National Institute of Health Research to explore the possible role of Chinese herbal medicine for the treatment of this common and troublesome condition. Approximately 50% of women will experience a UTI in their lives, and around three out of every hundred women will develop recurrent infections, defined as three infectious episodes within a 12-month period. Symptoms include the classic presentations of dysuria, frequency, urgency, abdominal pain, and smelly discoloured urine (pyuria) but RUTIs can have a major impact on various aspects of the quality of life, including the ability to sustain intimate relationships and function properly in the workplace. Antibiotic prophylaxis can prevent RUTIs but reinfection is common post treatment and there is increasing concern about microbial resistance to antibiotics and the potential long-term adverse effects of these medicines. Consequently, alternative approaches to managing these infections are being considered, including Chinese herbal medicine (CHM).

The proposed trial is a double blind, randomised, placebo controlled feasibility study involving 80 women, aged between 18 and 65, taking Chinese herbs over a 16-week period. There are four arms to this trial. Standardised remedies to treat acute infection and to help prevent recurrence will be administered by nurses working from GP practices. Individualised remedies, involving more complex formulations that will change over time, will be administered by a CHM practitioner operating out of a typical complementary medicine clinic. Both of these approaches will be matched by placebo controls. The primary aims of the trial are to gain a preliminary idea of the effect size of individualised, standardised and placebo treatments in reducing the frequency

and severity of recurrent UTIs and to establish the feasibility of administering CHM via GP practices.

An essential prelude to this kind of trial is a process of trying to establish what constitutes 'good' practice of CHM. We define 'good practice' as being logical within the framework of CHM, consistent with at least one thread of traditional practice, having some evidence of clinical effectiveness, being biologically plausible, and perceived as a reasonable approach by a peer group of experienced practitioners. The practitioner-researcher (AF) who is co-ordinating this trial contacted two experienced Chinese medicine historians (VL and PB) with the aim of investigating traditional practices that may have been used to treat RUTIs.

The initial purpose of this historical review was to provide material on the treatment of urinary disorders in the past, specified by the key term '*lin*' 淋, and thereby identify a range of substances relevant to the symptoms and problems suffered by the women in this trial. During the preparatory research, it became evident that there was much more to be learned from this process regarding underlying assumptions about the potencies of foods-herbs-medicines and about disease categories.

In conducting the review, we set out to trace the disease categories, the substances, and their linkages both back from current categories and forward from the earliest relevant historical texts.

Any historical enquiry into Chinese medicine presents unique opportunities and challenges inasmuch as there is an unparalleled written tradition to prospect. The library of China Academy of Chinese Medical Sciences alone holds more than 5000 ancient medical texts, containing hundreds of thousands of prescriptions (IITCM: www.cintcm.ac.cn/opencms/opencms/xxfw/dzzn/intro.html, accessed 10/07/2014). Most of that material survives in printed books dating to the Song period (960–1279) and after. However, in the last 30 years or so, large quantities of silk and bamboo manuscripts discovered along the Yangzi River and in the far northwest of China have revolutionised the history of early Chinese medicine. For example, the high proportion of texts about the body excavated at Mawangdui 馬王堆 tomb 3 (Changsha, present-day Hunan, closed 168 BC) and Zhangjiashan 張家山 tomb 247 (at Nanjun, present-day Hubei, closed 186 BCE) from the burial sites of Han period (206 BCE–220 CE) nobles demonstrates that the healing arts were at the heart of scholarly attention at the dawn of the empire.¹

Until relatively recently, popular histories of Chinese medicine customarily began with a reference to the 'long tradition of Chinese medicine', dated back to the mythical reign of the Yellow Emperor in the third millennium BCE. However, the new tomb finds provide us with an unparalleled insight into a multiplicity of healing traditions in rapid transformation and underwrite the nature and importance of innovation in Chinese medicine.

The initial premise was that we should look for the Chinese category of *lin* diseases (a generic term which maps on to urinary disorders in contemporary traditional Chinese Medicine [TCM]) and their remedies. However, we soon found that in the earliest texts the terminology was different and that we had to change our initial assumptions. This necessitated looking for definitions of the disease terminology which we provide below.

Gender analysis also presented an immediate problem. While it was relatively easy to determine remedies for urinary disorders from the signs and symptoms elaborated in early remedy collections, it soon became clear that these were primarily remedies for men. The texts juxtapose urinary pain with bleeding, discharges and impotence in such a way as to suggest what we would now

¹ Seven of the 30 or so manuscripts buried in Mawangdui M 3 are devoted to the healing arts. There are 36 titles listed in the abbreviated catalogue of the imperial library *Han shu* 漢書 [Book of the Han] (HS 30.1776–80) under '*Fang ji*' 方技 (Remedies and Techniques), a classification that included medical writing among many other practices.

call prostatitis or sexually transmitted diseases. This should come as no surprise since the relevant texts were written by and about men and designed for a male readership, up until the seventh century (Furth, 1999; Wu, 2010).

One of the biggest challenges that pertains to the study of Chinese remedy collections is that of polypharmacy and how to trace what combinations of substances were used in the past and how they were modified over the millennia. This is pertinent to thinking about what other herbs might be considered and how they should be combined. However, while the remedy collections are primarily combination treatments, from medieval times a genre of 'simples' provides us with individual substances that are identified as specific for treating urinary disorders. Since the ingredients for complex remedies may be difficult to obtain, and combining remedies is a highly skilled art in itself, associated with professional expertise and authority, it is likely that many substances, both foodstuffs and potent medicines, were used as simples in common household practice.

Returning to the huge quantity of pre-modern remedy texts, we have to emphasise that for this preliminary project, we surveyed a limited sample of the literature. In this we were guided in part by the availability of complete texts, and of good scholarly editions and translations. The pre-modern texts that appear most closely relevant to the project are listed in Appendix A. To refine our gaze we obviously focused on matching the signs and symptoms of urinary disorder as closely as possible to the specifications of the clinical trial.

3. Theory and calculation

3.1. Terminology and definitions

One cannot assume that terminology in the most ancient of records in China refers to the same set of symptoms, physiological interactions or discomforts denoted by the same terms today. It existed in vastly different contexts, within ancient, medieval and early modern worlds which may, themselves, have been mutually unrecognisable to people living at the same time, and even in the same geographical location. We will begin, therefore, with a consideration of the term *lin* 淋 (root meaning: make wet, pour, drip). This is the principal term that we find matched to UTIs (*biniao xitong jibing* 泌尿系統疾病, *biniao xitong ganran* 泌尿系統感染) in contemporary traditional Chinese Medicine. According to the *Great Dictionary of Chinese Medicine*, *lin* 'refers to difficult, painful, dribbling urination, often with urgency and frequent, scanty urination', and is found in 'urinary tract infections, tuberculosis, stones, tumours, prostatitis, prostatic hypertrophy, chyluria, etc.' (Li, 2006).

Another key term that will become important in relation to our historical survey is *long* 癰. The *Great Dictionary of Chinese Medicine* tells us that *long* 'refers to inhibited urination' (Li, 2006). Even in the context of modern TCM, the semantic field of *lin* embraces a range of modern diseases constellated around different signs of urinary tract infection, and including sexually transmitted diseases and prostate conditions with analogous manifestations (Li, 2006). It should be noted that in the modern Chinese vocabulary of biomedicine, and in common parlance, *linbing* 淋病 (*lin* disease) is the accepted term for gonorrhoea, and the name for *Neisseria gonorrhoeae* or *gonococcus*, the bacterium responsible for gonorrhoea, is *linbing qiujun* 淋病球菌 (lit. *lin* disease coccus).

Associated with the category of *lin* is a set of sub-categories that indeed has an ancient history – the Five *Lin*. For current TCM, these are Stone *lin*, Paste (or Sticky) *lin*, Qi *lin*, Blood *lin*, and Heat *lin* (Li, 2006). This fivefold division of urinary disorders is so deeply embedded in the discourse of Chinese medicine that *wulin* – 'the Five *Lin*' – is still used as a synonym for the superordinate term

linzheng (*lin* syndromes). By syndrome we mean the gathering together of individual signs and symptoms of illness into a disease category. However, as we shall see, the identity of the five sub-syndromes has varied over time and among authors.

We therefore set out to trace the Five *Lin* in history. The Five *Lin*, it turned out was a very broad category indeed, which included many symptoms that do not come under our modern category of UTI, and the first task of this paper is therefore to provide a brief diachronic historical structure. In order to do this we have selected examples that we consider representative of the various era and genres and that will serve to focus the mind on critical issues for the present study. With such an ocean of material we are, however, always at risk of being corrected by future research.

3.2. Early history – *Lin* 淋 and *long* 癰

In fact as our preliminary survey showed, the most commonly encountered term for disorders involving problems with urination is not *lin* 淋 but *long* 癰.²

The medical manuscripts from the grave caches at Mawangdui (before 168 BCE) and Wuwei 武威 (first century CE) contain various references to *long*³ but apparently no instances of *lin* at all. Slips 9–10 from Wuwei give a prescription for *long* conditions, prefaced by a brief account of the 'Five *Long*' that echoes down the centuries in successive definitions of the Five *Lin*:

With *shi long* 石癰 (Stone *long*), stones are discharged; with *xue long* 血癰 (Blood *long*), blood is discharged; with *gao long* 膏癰 (Paste/Sticky *long*), paste is discharged; with *gan long* 汙癰 (Dirty water, Rice-washing water *long*), dirty water is discharged. The five *long* are all treated with the same medication. (Zhang and Zhu, 1996)

The modern editors of the Wuwei manuscripts state that the terms *lin* and *long* were used interchangeably in antiquity, and give modern equivalents for the four types of *long* listed, i.e.

shi long 石癰 (Stone *long*) = *shi lin* 石淋 (Stone *lin*)
xue long 血癰 (blood *long*) = *lin* syndromes with discharge of blood;
gao long 膏癰 (Paste *long*) = *gao lin* 膏淋 (Paste *lin*);
gan long 汙癰 (Dirty water, Rice-washing water *long*) = *re lin* 熱淋 (Heat *lin*)
 (Zhang and Zhu, 1996).

The 12th-century medical author Chen Yan 陳言 came to a similar conclusion. He writes: '*Lin* was anciently known as *long*. This is a terminological difference' (Chen, 2007, 1174).

Three manuscripts from the cache excavated at Mawangdui tomb 3 are crucial for our investigation of urinary disorders: the two treatises on moxibustion given the modern titles *Zubi 11 mai jiujiing* 足臂十一脈灸經 (Moxibustion Classic of the 11 Channels of the Arms and Legs) and *Yinyang 11 mai jiujiing* 陰陽十一脈灸經 (Moxibustion Classic of the 11 Yin and Yang Channels), and 52 *bingfang* 五十二病方 (Fifty-Two Medical Recipes), a remedy text organised under disease terms, which includes a section on urinary

² To complicate the situation further, recent research has shown that *long* in ancient times had at least five different meanings in addition to its medical designation of urinary problems. Riegel (2013), for example describes what appears to be a moral category where disease is caused by internal heat related to sexual excess. It also emerges as a general category for serious and incurable diseases, particularly cited in bureaucratic and legal contexts when it was used as grounds for claiming welfare (Wang, 2014; Riegel, 2013).

³ The character is written somewhat differently in these excavated texts from the modern form of *long*; however the reading 'long' is uncontroversial; it is accepted by (among others) both the Mawangdui Han tombs editorial team and US specialist Donald Harper. See Harper, 1998; Mawangdui, 1979.

disorders with the title *long* (Harper, 1998; Lo, 2010). *Fifty-Two Medical Recipes* gives remedies for *xue long* 血癰 (blood long), *shi long* 石癰 (Stone long) and *gao long* 膏癰 (Paste/Sticky long), which correspond in their descriptors to later sub-categories of *lin*, as well as two remedies for *nüzi long* 女子癰 (women's long) which is not consistently reflected in later texts (Mawangdui, 1979). As the beginning of this section is missing in the manuscript, it is plausible that other sub-categories were also instantiated. Although none of these three texts provides an explicit definition, they clearly show that *long* was a generic term or an over-arching category. They confirm moreover that a typology of *long* existed, which paralleled later typologies of the Five *Lin*.

The terms *lin* and *long* are both found in *Huangdi neijing suwen* 黃帝內經 (The Yellow Emperor's Inner Canon: Basic Questions), a foundational medical classic that was long considered to be the most ancient extant medical compilation in Chinese, before the discovery of the recently excavated texts (it is now thought to have been compiled around the turn of the millennia BCE/CE). However, *long* 癰 occurs 10 times throughout *Suwen*, whereas *lin* 淋 occurs just five times and in only two fascicles, one of which (Fascicle 73, 'Ben bing lun' 本病論 [Aetiology of diseases]) is generally considered 'apocryphal' (Unschuld, Tessenow and Jinsheng, 2011). As the text contains no definition of *lin* or *long*, it is hard to say whether, or to what extent, the terms refer to syndromes or to symptoms. Moreover, it is not clear to what to what extent they are semantically distinct (for example, both occur in a compound with *bi* 閉 [blockage], suggesting urinary retention). In Fascicle 47, 'Qi bing lun' (Anomalous diseases), we find the statement 'There are those suffering from *long* who urinate several dozen times a day', implying that *long* does not refer only or primarily to inhibited urination.

However, after these very early texts, the term '*long*' seems to disappear from the lexicon of urinary disorders for around 1000 years – in the written literature at least, where it is replaced by *lin* as the superordinate term. The story of this ostensibly radical disruption of medical categories may serve as a cautionary tale for scholars of historical ethnopharmacology.

The reason for the sudden disappearance of *long* from Chinese medical literature turns out to be entirely extraneous to the theory or practice of medicine. Instead, it was prompted by an imperial naming prohibition. When a Chinese emperor died, the graphs composing his personal name became taboo, and had to be replaced by alternative characters or entirely different words. So on the death of the infant emperor Han Shangdi 漢殤帝, fifth emperor of the Eastern Han (lived and 105–106 CE), the character *long* was prohibited because of its close similarity to his personal name – Liu Long 劉隆. Thus China's shortest-lived emperor, who never reigned in his own right, was to have – quite fortuitously – an enduring influence on the written history of Chinese medicine. The term *long* only begins to re-surface in the Song alongside *lin*, and from the Ming onwards, *lin* and *long* are, increasingly, discussed as separate categories.

The monumental Ming encyclopaedia of pharmacology and natural history, Li Shizhen's 李時珍 (1518–1593) *Bencao gangmu* 本草綱目, illustrates the gradual re-emergence of *long* and its differentiation from *lin*. A preliminary search found approximately 700 instances of the character *lin*, with several instances in almost every fascicle – and only about 50 instances of *long* in fewer than half of the fascicles, so it is clear that *long* was no longer, by Ming times, an overarching designation for urinary disorders. Li Shizhen explicitly groups *long* and *lin* together in a section entitled '*Long-lin*' (*Bencao gangmu* 3 – '*Bai bing zhu zhi yao*' 百病主治藥 [Indications of drugs]). He deals with further signs and symptoms of urinary disorder in two separate sections following this: '*Sou shi yiniao*' 溲數遺尿 (Frequency and incontinence) and '*Xiaobian xue*' 小便血 (Blood in the urine), which suggests that *long* and *lin* are in an intermediary category between signs and symptoms and formal syndromes (Li, 1998).

It would be interesting to explore in detail the disorders and remedies associated with the term *long* before its disappearance and after its reappearance, to see whether there is any evidence of continuity indicating oral or non-canonical strands of tradition. Unfortunately, this is not feasible within the scope of the current project. It might, however, prove to be a very valuable case study for the interaction of orality and literacy in medical traditions.

3.3. Sub-categories of *lin*

We have already noted a fivefold categorisation of *long* and subsequently *lin*. In the excavated medical texts, various signs and symptoms are detailed in relation to *long* syndromes or in relation to disorders of the channels. Examples include *niao buli* 尿不利 (dysuria) and *duo niao* 多尿 (copious urination) (in *Moxibustion Classic of the 11 Channels of the Arms and Legs* [modern title]). Thus, based on the evidence of the small number of excavated texts from the Han dynasty, we can safely say that the categories of disorders associated with urinary problems had just begun to emerge at the outset of empire.

The earliest explicit definition of *lin* sub-categories is to be found in the 610 CE *Zhubing yuanhou lun* 諸病源候論 (Treatise on the Aetiology and Symptoms of Diseases), by Chao Yuanfang 巢元方, imperial physician of the Sui dynasty emperor Yangdi 楊帝 (Chao, 1996, 610). This is the first medical compendium to set out a systematic aetiology of diseases, with 1739 entries. Chapter 14 describes the Five *Lin*. It begins with a standard account of the normal physiological relationship of the bladder and kidney, and its breakdown, within the Chinese micro-macrocosmic theory of the body. *Lin* disorders are attributed to a 'vacuity' of the Kidney organ function which causes 'frequent urination', and to heat in the Bladder, which causes 'painful urination'. *Lin* manifestations are 'frequent, scanty urination, tense abdomen, and pain localised at the navel'. Here we have a clear connection with the clinical trial presentations: dysuria, frequency, urgency, abdominal pain, and smelly discoloured urine.

Text Box 1 Chao then lists five types of *lin*: *shi lin* (Stone *lin*), *lao lin* (Exertion *lin*), *xue lin* (Blood *lin*), *qi lin* (Qi *lin*), *gao lin* (Paste/Sticky *lin*), stating that 'they are all treated with the same remedy, which is why they are called the various '*lins*'. He goes on to give detail accounts of seven types (adding 'Heat *lin*' and 'Cold *lin*', to the five on his original list). See **Text Box 2**:

Like the compilers of the Wuwei medical manuscript 600 years earlier, Chao states that all the *lin* syndromes are treated with the same drug remedy (although his book does not give drug recipes).

Text Box 1–Summarises the main questions that arose in the process of the historical research:

- How was the proposed treatment used in the past?
- What was it used for?
- How was it delivered?
- Was it a stand-alone treatment or was it part of a treatment regime? A set of life-style recommendations?
- Do current and historical disease names match to the same set of signs and symptoms?
- What changes can we see in relation to disease categories over the millennia?
- How does the treatment relate to a particular world view at any particular time?
- What is the appropriate ground for innovation?
- What should remain historically authentic and what does authenticity mean?

Text box 2

1. Stone *lin*

Stone *lin* is *lin* where stones are produced. The Kidney governs Water; when water coagulates it changes into stone, and sand and stone lodge in the Kidneys. Being vacuous, the Kidney is overwhelmed by heat, and where there is heat, *lin* is generated. The manifestations of the illness are pain in the penis on urination, the urine cannot be voided all at once, pain localised in the lower abdomen, urgency in the Bladder, and sand and stone discharged from the urethra. When it is severe, there is cold pain, and one may faint. Appended below, I now add *daoyin* exercises [buyang xuandao – nourishing and conducting].

2. Manifestations of Qi *lin*

Qi *lin* is the result of swollen Qi when there is Kidney vacuity and heat in the Bladder. The Bladder and Kidney stand in an exterior-interior relationship. When there is heat in the Bladder and the hot Qi flows into the vessel, the heat generates fullness and makes the Qi in the vessel swell up, so that the lower abdomen feels full, while the Kidney, being vacuous, cannot control its urination. Thus *lin* is generated. Its manifestation are: the bladder and lower abdomen both feel full, urination is difficult and painful, and there is often residual dribbling. It is also called Qi *long*. If a frequency of the Lesser Yin Mai pulse is diagnosed, in men this equates with Qi *lin*. Appended below, I now add *daoyin* exercises [buyang xuandao – nourishing and conducting].

3. Paste (sticky) *lin*

Paste *lin* is *lin* where there is a fatty substance like paste/cream [*gao*], hence the name. It is also known as fleshy *lin* [*rou lin*]. Here, the Kidney, being vacuous, is unable to control the fatty secretions, which are therefore discharged with the urine. Appended below, I now add *daoyin* exercises [buyang xuandao – nourishing and conducting].

4. Exertion *lin*

Exertion *lin* is the term used when exertion damages the Kidney Qi, which generates heat giving rise to *li*. The Kidney Qi connects with the Yin (urino-genital parts). Its manifestations are: urine remains in the penis and it often starts but cannot get out, there is pain localised in the lower abdomen, urination is inhibited, and over-strain breaks out.

5. Heat *lin* [hot and cold *lin* are not on the initial list of five]

Organs with Heat *lin*, there is heat in the triple burner, and Qi strikes the Kidney and flows into the bladder, giving rise to *lin*. Its manifestations are ruddy urine and difficult, painful urination. There is also chronic *lin*: today one suffers from heat and it breaks out, but when the heat becomes severe it changes to blood in the urine. There are also cases when, after urination, there is a substance like adzuki bean stew, which accumulates over time.

6. Blood *lin*

Blood *lin* is an extreme form of Heat *lin* but with blood in the urine, hence the name. The Heart governs Blood. The blood travels around the body, passes through all the vessels and circulates through the *zang* and *fu*. When the heat is extreme, the blood is dispersed and escapes from its proper channels, overflowing and seeping into the bladder, and thus blood *lin* arises.

7. Cold *lin*

The manifestation of Cold *lin* is extreme chills and shivering before urination. Because Kidney Qi is weak

and vacuous, the lower burner receives cold Qi, which enters the bladder and conflicts with the upright Qi there. If the cold Qi wins, the chills and shivering give rise to *lin*, but if the upright Qi wins, the chills and shivering clear up, and (normal) urination takes place.

We will come to this point again in the following sections when we consider specific herbs.

In the view of the practitioner researcher (AF), a modern presentation of recurrent UTIs commonly incorporates elements from Qi, Heat, Exertion and on occasions Blood *lin* as described above, with symptoms such as urgency, frequency, burning, and haematuria as well as more systemic symptoms such as fatigue and depression. A generic treatment for these *lin* diseases may also be appropriate as a modern treatment for these inter-related pathological processes.

Interestingly, Chao lists the range of therapies available for treating *lin*, naming decoctions, compresses, needling and the stone, as well as providing detailed descriptions of *daoyin* therapeutic exercises, which empower the patient to become an active protagonist in his or her own health and wellbeing.

3.4. The five (or six or seven or eight) *lin*

The division into Five *Lin* appears to be a constant, reflecting the key importance of fivefold conceptual systems in early Chinese thought. However, the identity of the five sub-syndromes, and varies among authors. There are also a few examples of an Eight *Lin* system (Li et al., 2005). Thus the conceptualisation of urinary disorders and the significant differences between them in pre-modern Chinese medicine may have been far more plastic than the persistence of formal categorical distinctions suggests (Table 1).

3.5. Aetiologies

The definition of *lin* in the seventh-century *Treatise on the Aetiology and Symptoms of Diseases* includes an interesting account of the aetiology of *lin* diseases. As outlined above, Chapter 14 begins with an account of normal physiology according to Chinese medical theory describing how:

The Bladder and Kidney stand in an external-internal relationship; they both govern water. Water enters the small intestine, descends to the Bladder and proceeds to the Yin (urino-genital parts), where it is excreted as urine. Kidney Qi connects with the Yin; and the Yin is the conduit through which the body fluids (*jin ye* 津液) flow down.

The text goes on to provide an account of the aetiology of *lin* diseases that sounds very contemporary in its emphasis on poor diet, emotional stress and over exertion as predisposing factors to the symptoms of a urinary tract infection:

If one eats an improper diet, if happiness and rage are ill timed, if vacuity and fullness are not properly adjusted, the *fu* and *zang* organs fall out of harmony, which then leads to Kidney vacuity and heat in the Bladder. The Bladder is the vessel of the body fluids; if there is heat, the fluids overflow internally and flow into the testes. The water channel is impassable, and the water cannot go up or down, and is retained in the bladder. Kidney vacuity leads to frequent urination; and heat in the Bladder leads to difficult, painful urination.

Addressing these lifestyle factors may be an important component in the treatment of recurrent UTIs. This is something that will be apparent in the individualised arm of the RUTI trial, when all participants will receive lifestyle advice given by a CHM practitioner but half will receive an active treatment and the other half placebo. Some of the contextual benefits that may present in the placebo group may be due to these lifestyle recommendations.

Table 1
Lin categories through the ages.

	Hua Shi zhongzang jing (8 Lin) (Anon, Six Dynasties, 220–589)	Zhubing yuanhou lun (Chao, 1996, 610)	Waitai miyao (Wang, 1993, 752)	Bencao gangmu (Li, 1998, first published 1956)
shi lin 石淋 (Stone lin),		*	*	
lao lin 勞淋 (Exertion lin)	*	*	*	
xue lin 血淋 (Blood lin),		*		
qi lin 氣淋 (Qi lin)	*	*	*	*
gao lin 膏淋 (Paste/Sticky lin)	*	*	*	*
re lin 熱淋 (Heat lin)	*	(*)	*	*
leng lin 冷淋 (Cold lin)	*	(*)		
sha lin (Sandy lin)沙淋	*			
xu lin 虛淋 (Vacuity lin)	*			*
shi lin 實淋 (fullness lin)	*			
sha-shi lin 沙石淋 (Stony and Sandy lin)				*

4. Results

4.1. Herbs⁴

In this section we discuss the earliest evidence of herbs used for urinary disorder and consider their continuity through the ages. For the purposes of this initial survey, we have focused on the keywords *lin* and *long*.

In the Mawangdui tomb texts (interred 2nd century BCE), remedies for urinary disorders are concentrated in the 'Long' section of a manuscript that has been given the modern title 52 *bingfang* 五十二病方 (Fifty-Two Medical Recipes) (Mawangdui, 1979; Harper, 1998). Some text is evidently lost from the beginning of this section (the extant portion begins with the common marker 'Another [recipe]'). However, enough remains to give a clear impression of the style and range of therapies in use. As well as recipes for internal remedies, we find external treatments, fumigation (using old straw, fodder or kindling and aromatics) and ritual procedures. There are various combination treatments involving ritual, cautery, and cookery, for example.

The Mawangdui drug treatments are mostly simple decoctions with one or two ingredients, but there are also complex prescriptions, testifying to the existence of well-established techniques for combining ingredients. Honey appears as a binder and flavouring to help the medicine go down. Much use is made of alcohol: we find tinctures of Jing Tian 景天 (stonecrop *sedum*), and alcoholic preparations with evodia, zanthoxylum, jujube and honey locust.

The culinary style of many of the remedies is nowhere more apparent than in the following recipe for *long*, which we quote in full. Incidentally, this remedy details symptoms that are very close to those experienced by women selected for the trial.

Recipe for *long* from *Fifty-Two Medical Recipes*, MSI.E.95 (CC161-5) (Mawangdui manuscript text).

Translation adapted from Harper, 1998.

Another. Long. There is pain in the bladder and the inside. The pain is intense, and when urinating [?] the pain is even more intense. [?]. To treat it boil three sheng of black soybeans in three [?] of fine gruel vinegar. Cook rapidly. When it bubbles, stop the fire. When the bubbling subsides, cook again, stopping after it bubbles for the third time. Sieve to obtain the liquid. Use one portion of oysters and three of smithed Du Jin (hemlock) – altogether two substances – [?]. Take one three-fingered pinch reaching to the knuckles, put it into lukewarm gruel vinegar, [?] drink it. Drink before eating

or after eating as you wish. After drinking it once the ailment responds. Drink it once a day. After three days the ailment desists and a stream of stones like rice slop comes out of the front. There are no prohibitions and no temporal (restrictions). Smith the oysters. Do not dry the Du Jin in the sun. On the day of the summer solstice go to [?] the Du Jin. Dry it in the dark. Smith the leaves and fruits together and store in a leather pouch. When (you need to) use it, cake it (from the pouch). Collect Du Jin again every year. Du Jin [?] Jin leaves are different and smaller. The stalks are red and the leaves have vertical cords. [?] leaves and fruit have a bitter taste. It forms fruit about six or seven days before the summer solstice. [?] by the side of a marsh. Excellent.

Although we suggest that the culinary character of this remedy marks it as something to be prepared in the home, one should note that, from a modern perspective, there are powerful ingredients here such as hemlock. Perhaps the most common ingredient in the Mawangdui *long* recipes is, however, the humble mallow, which appears six times in the extant text. Unfortunately we cannot tell which species it belongs to.

As mentioned above, the extant text of *Fifty-two Medical Recipes* contains two remedies specified for 'women's *long*' (although no details of the condition are given). Both recipes are again culinary in style: one is a draught made by steaming bean leaves, while the other, which may have ritual connotations, involves taking two as yet unidentified (Harper, 1998) herbs on successive days. However, the majority of the recipes are either ungendered or else appear to be aimed at older men.

Whereas in the Mawangdui *Fifty-Two Medical Recipes*, the single disorder of *long* functions as a category that groups many recipes, in the Wuwei tomb manuscript, the multiple categories of the five *long* are united under a single complex remedy: 'there is one prescription for the Five Long' (Zhang and Zhu, 1996):

Wuwei recipe

Atractylodes (Zhu · [術]), 6 parts.
Ginger (Jiang 薑), 6 parts.
Dianthus (Qu Mai 瞿麥), 6 parts.
Dodder (Ciscuta sinensis, Tu Si Shi 兔糸[絲實]), 7 parts.
Talc (Hua Shi 滑石), 7 parts.
Cassia (Gui 桂), ½ part.

Mix all six ingredients together, [measure?] with a square-*cun* spoon.⁵ Take with liquor 6–7 times per day. As soon as the illness gets better, stones will be expelled.

⁴ In modern Chinese Herbal Medicine (CHM), the term 'herb' does not solely denote plant-based remedies but also includes mineral and animal substances.

⁵ A standard measure. 1 *cun* 寸 [Chinese inch]=approx. 3.3 cm.

Suffice it to note, for the moment, that, in contrast with the *Fifty-two Medical Recipes*, there seems to be no mention of any differentiation of treatment strategies for *lin* in what remains extant of the Wuwei text. From this point on, *long/lin* is increasingly seen as a monolithic syndrome rather than a series of symptoms.

While we can identify a complex recipe, used for a range of *long* disorders, as early as the first century CE, a tradition of simples such as those found in the Mawangdui medical texts also flourished, and was canonised in the latter part of the Han dynasty in the classic work *The Divine Farmer's Canon of Materia Medica* (see Appendix B).

In subsequent texts, the substances indicated as specific for urinary symptoms in *The Divine Farmer's Canon of Materia Medica*, as well as all six of the ingredients in the Wuwei recipe, are found, in various combinations, in treatments for *lin* and urinary tract disorders in general. For instance, here is a recipe to treat the Five *Lin* in women, from the 13th-century *Compendium of Efficacious Prescriptions for Women* (Chen, 1237), which uses two of the six Wuwei ingredients (dianthus and talc), plus others from the *Divine Farmer's Canon of Materia Medica* repertoire including the ubiquitous mallow.

Trifoliate akebia powder (*Mutong san* 木通散)

Trifoliate akebia (Mu Tong 木通), 1 *liang*⁶
 Dianthus flower (Qu Mai Sui 瞿麥穗), 1 *liang*
 Cannabis fruit (Da Ma Ren 大麻仁) 1 *liang*
 Talc (Hua Shi 滑石) 1 *liang*
 Cowrie shell (Bei Chi 貝齒) 2 *liang*
 Mallow seed (Kui Zi 葵子) 2 *liang*
 Imperata root (Bai Mao Gen 白茅根) 2 *liang*
 Liquorice (Gan Cao 甘草) ½ *liang*
 Grind the above substances coarsely; use 5 *qian* for each dose.
 Decoct in water and administer warm on an empty stomach.

Similarly, all the Wuwei and *Divine Farmer's Canon of Materia Medica* substances are found in recipes in the 'Long-lin' section of Li Shizhen's late 16-century compendium *Bencao gangmu* (Li, 1998).

In later *materia medica* literature, especially from the Ming (1368–1644) onwards, such commonalities can easily be obscured by a proliferation of substances. Writers like Li Shizhen displayed their virtuosity and encyclopaedic knowledge by recording numerous, complex prescriptions and rare or little-known ingredients; in the 'Long-lin' section of *Bencao gangmu* alone, he mentions – at a rough preliminary count – over 300 distinct substances in multiple different combinations. Close, critical analysis would be necessary to interpret patterns of usage accurately amid all these riches. However, even at a preliminary glance, certain continuities emerge.

We can particularly point to the herbs dianthus (Qu Mai) and mallow (Kui Zi) which recur with great frequency, as does talc (Hua Shi).

Some other continuities, that seem evident from living tradition, are harder to trace in the canonical literature. This is the case with Jin Qian Cao (*Lysimachia*), a herb that proved particularly important for this trial. Jin Qian Cao is highly prized in Sichuan and south China as a treatment for women's urinary tract disorders (see for example Sichuan zhongyao zhi Editorial Team, 1979), and it is now processed and marketed in China as a mainstream medication for that purpose. Nonetheless, our initial historical survey did not yield any descriptions of Jin Qian Cao as a specific for urinary problems with the exception of the 18th-century

Supplement to Bencao gangmu (Zhao, 2007, 1765). This probably reflects the unavoidable limitations of a study based on a curated selection of well-regarded texts. Ideally, future research should embrace local herbals and prescription collections.

4.2. Lin and women's medicine

'In men one regulates Qi; in women one regulates Blood' (Chen, 1237) Although, as we have seen in the preceding section, the earliest Chinese medical literature does contain prescriptions for women, on the whole it is either oriented towards men's health and wellbeing or constructed as gender-free. The foundational theoretical texts focus not on difference, but on a universal paradigm of the human body as microcosm. This emphasis shifted between the seventh and thirteenth centuries, when a new, literate genre of women's medicine arose. The female body was reconfigured in terms of difference – as a gathering place for Yin, with a tendency to depletion, a special susceptibility to emotion, permeable boundaries that could easily be breached by pathogenic forces, and distinctive pathologies related to blood (see, e.g., Furth, 1999; Leung, Wilms and Yates in Leung, 2006; Wu, 2010).

In our historical survey, we were interested to see whether this new discourse of difference and Blood might provide an alternative lens for looking at *lin* syndromes in women. Our initial findings were inconclusive. The account of the Five *Lin* in *Furen daquan liangfang* 婦人大全良方 (Compendium of Efficacious Prescriptions for Women) (Chen, 1237) – Chen Ziming's 'seminal compendium on the special ailments of women' (Wu, 2010) – conforms closely to the standard, non-gendered accounts in general medical treatises, like the one in *Treatise on the Aetiology and Symptoms of Diseases* summarised above. We did, however, find one distinctive *lin* syndrome, which is categorised separately from the Five *Lin*, and has a specific, gendered aetiology. This is *zi lin* 淋 (child *lin*), a condition that is said to affect pregnant women **because the womb is connected with the Kidney** (see, for example, Chen, 1237). We are not yet in a position to gauge whether any significant discrepancies exist between the prescriptions for these conditions and those for non-gendered varieties of *lin*. Nevertheless, it seems well worth noting that four of the eight prescriptions in the 'Zi lin' section of Chen (1237) contain peony, a herb that was particularly indicated for women because of its Blood-nourishing properties (Furth, 1999), and which is entirely absent from the generic 'Lin' section of the same text.

Beyond the immediate purposes of the clinical trial, recipes for *lin* and cognate disorders serve to illustrate the gradual assimilation of women's medicine into the medical literary mainstream. For instance, the 'Prescriptions for Women' in Sun Simiao's 孫思邈 seventh-century classic *Beiji qianjin yaofang* 備急千金要方 (Emergency Prescriptions Worth a Thousand Gold Pieces) (Sun, 2007, 652), at the beginning of this assimilation process, exhibit a pronounced domestic and popular character. They include a high proportion of simple recipes, such as a mallow seed decoction for *zi lin*, as well as some ritual procedures, and 'Dreckapotheke' substances like nail clippings and excrement, strongly recalling the style and tone of the Mawangdui recipes. Six centuries later, the prescriptions for *lin* diseases in Chen (1237) are on the whole complex recipes involving mainstream herbal drugs. Just one of Chen's recipes for *zi lin* – burnt chicken feathers, ground up and mixed with strong liquor – seems to have popular resonances, suggesting an ongoing counterpoint between written and oral tradition.

With regard to the keywords *lin* and *long*, it should be emphasised here that the texts on women's medicine also contain various symptomatic descriptions of urinary problems such as pain, frequency, incontinence and urine retention, mostly in the context of pregnancy and childbirth, that are not explicitly identified as *lin* or

⁶ Today, 1 *liang* 兩=50 g; in the Han period, according to Twitchett, and Fairbank (2008), it was 15.36 g. Then as now, there were 10 *qian* 錢 in 1 *liang*.

long syndromes. It also needs to be said that the keyword *lin*, in pre-modern texts on women's medicine, does not necessarily refer to urine at all; it also occurs with its root meaning of 'make wet', 'flow' in descriptions of vaginal discharge and menstrual problems.

For future research into specific treatments for women's urinary tract disorders, it may be fruitful to extend this enquiry to material that was not accommodated within the canonical categories. This obviously includes the various disorders and treatments that are not identified with *lin* or *long*. But also, it would be interesting and valuable to look beyond the medical literature, and specifically at daily-use compendia (*riyong leishu* 日用類書).

This section has emphasised the culinary quality of home remedies, where the food-medicine continuum can exist without the boundaries imposed by national regulation. In the pre-modern world where safety was not vested in the hands of governments and professionals, and where women were undoubtedly an intrinsic yet mostly unrecorded part of the process of medical care, one can easily argue that the ground was more fertile for observation and experiential innovation. Equally, while the dangers inherent in this pre-modern world need to be acknowledged, the benefits of participating in one's own process of recovery are well known today.

5. Discussion

This process of historical review and reflection was initiated as part of a multifaceted approach to defining good practice of CHM for the treatment of recurrent UTIs (RUTIs) that also included reflective practice, reference to contemporary CHM textbooks, professional consensus, and a systematic review of modern Chinese clinical trials. It is an eclectic approach that seeks to integrate diverse and sometimes contradictory material, and could be charged with being reductive and impractical. So what if anything is the value of this approach and what does a historical perspective in particular contribute to this process?

From the perspective of the practitioner-researcher involved in trying to define good practice and develop CHMs to be used in a clinical trial, the historical perspective provided a more complete understanding of the evolution and practices of the Chinese medical system. Despite the complexity and diversity of many of the historical accounts of *lin/long* disease there is also a consistency in many elements of the account of *lin* diseases that have stood the test of time. In particular the description of the different forms of *lin* disease and the account of their pathophysiology correlate well with contemporary CHM understanding and can be used to inform the analysis and treatment of clinical presentations in a 21st century English clinic. One fascinating example is the seventh-century account of the importance of improper diet, emotional stress and over exertion as key predisposing factors to developing a *lin* disease. These are three of the most common lifestyle factors that contribute towards an increased susceptibility to UTIs and are associated with the diagnostic patterns that were identified by reflective practice, peer review, and a small prospective observational study (Flower and Lewith, 2012) which informed the development of the standardised remedies to be used in the RUTI trial. Chao Yuanfang's lifestyle recommendations and exercise regimes also provide a model for empowering 21st-century patients to take charge of their own health.

Referencing the classical literature has also had an important bearing on the delivery of treatment in the RUTI trial. First of all it positively sanctions the use of a single standardised formula to treat all of the various *lin* disorders. This is an important precedent for the trial that legitimises a standardised CHM approach to treatment. Secondly treatment is described as a complex intervention that combines herbs, *daoyin* exercises, and lifestyle changes as important

components. Finally particular herbs and formulae have been identified that provide a kind of historical endorsement for some contemporary selections or practices. In some instances herbs such as Dong Kui Zi are relatively rarely used today whilst other herbs such as Hua Shi, Qu Mai and Jin Qian Cao are still mainstays of modern treatments and are frequently found in clinical trial reports from China.

Those herbs that were highlighted in the historical review as being suitable for all five *lin* or *long* were serious contenders to be included in the standardised formulae to be used in the RUTI trial. In practice, however, three of these herbs could not be selected for these formulae. Hua Shi (Talc) is a mineral and as such cannot be used under current EU legislation as a herbal remedy. Qu Mai (Dianthus) is a useful herb that is considered to drain damp, clear heat from the Bladder and the Heart, and also move the Blood, which can be important in reducing painful cystitis. However there is some animal research suggesting that it may have an inhibitory effect on cardiac function (Zhu, 1998) and it was considered that this would cause problems when trying to get regulatory approval for the herbal product from the MHRA. Dong Kui Zi (mallow seed) is a herb that is not commonly used and is difficult to obtain as herbal granule that could be encapsulated. There is also little pharmacological and toxicological data on this herb that could inform the Investigator's Brochure, which is necessary for clinical trial authorisation. Jin Qian Cao has been included as one of the three herbs used to treat the symptoms of acute infection.

The development of the standardised protocols has been an involved process. In the prospective observation study involving 15 women, a set formula for acute infections was used with very positive preliminary results (Flower and Lewith, 2012). This is the formula identified in Table 2. Six of the 14 herbs in this formula have already been mentioned in classical texts described earlier in this paper. However, discussions with the Medicines and Healthcare Products Regulatory Authority (MHRA), which regulates clinical trials and prepared herbal remedies, indicated that it would be highly unlikely for them to approve the use of a herbal formula involving 14 different herbs without complex and

Table 2
14-Herb formula for acute infections.

Herb	Common English name	Latin botanical name
Tu Fu Ling 土茯苓 30	Smooth greenbrier [root]	Rhizoma Smilax glabra ROXB.
Bai Jiang Cao 敗醬草 15	Patrinia	Herba Patrinia scabiosaefolia FISCH. EX. TREV.
Pu Gong Ying 蒲公英 15	Dandelion	Herba Taraxacum mongolicum HAND.-MAZZ.
Zao Xiu 蚤休 15	Paris root	Rhizoma Paris polyphylla SMITH var. yunnanensis
Huang Bai 黃柏 12	Phellodendron [bark]	Cortex Anemarrhena aspheloides BGE
Ku Shen 苦參 9	Sophora root	Radix Sophora flavescens AIT.
Shi Wei 石韋 15	Pyrrrosia leaf	Folium Pyrrosia lingua (THUNB.) FARWELL
Che Qian Cao 車前草 15	Plantain	Herba Plantago asiatica L.
Ze Xie 澤瀉 12	Alisma [tuber]	Alisma orientalis (SAM) JUZEP
Tong Cao 通草 6	Rice-paper plant pith	Medulla Tetrapanax payferus (HOOK.) K. KOCH
Yi Mu Cao 益母草 15	Leonurus	Herba Leonurus heterophyllus (SWEET)
Chuan Lian Zi 川楝子 9	Toosendan fruit	Melia toosendan Siebold and Zucc.
Wu Yao 烏藥 9	Lindera [root]	Radix Lindera aggregata (SIMS) KOSTERM.
Gan Cao 甘草 6	Liquorice	Radix Glycyrrhiza uralensis FISCH.

prohibitively expensive stability testing of the finished product. Consequently, two herbal formulae, both comprising three herbs each, were developed to address acute infection (RUTI-a) and to help prevent recurrent episodes (RUTI-p).

● **RUTI-a:**

- Bai Hua She Cao 白花蛇舌草 (*Herba Hedyotis Diffusae*) (40% of Formulation).
 - Huang Bai 黃柏 (*Cortex Phellodendri Amurensis*) (20% of Formulation).
 - Jin Qian Cao 金錢草 (*Herba Lysimachiae Christinae*) (40% of Formulation).
- **RUTI-p:**
- Huang Qi 黃耆 (*Radix Astragali Membranacei*) (50% of Formulation).
 - Wu Yao 烏藥 (*Radix Linderae Strychnifoliae*) (25% of Formulation).
 - Ku Shen 苦參 (*Radix Sophorae Flavescentis*) (25% of Formulation).

This is an interesting example of how the eclectic, integrative process of defining good practice adopted for this trial has also to pass through the restrictive filter of regulatory concerns before being incorporated into a clinical trial.

6. Conclusion and future directions

In this paper we have looked at a range of types of historical medical literature in order to identify herbal medicines which have been used in the past for urinary disorders. Our investigation has highlighted that, in the search for 'traditional' herbs to treat a particular modern syndrome, it is crucial to define ancient disease categories and their transformations through time. We have made it quite clear that, in the search for 'traditional' herbs to treat a particular modern syndrome it is essential to contextualise remedies, including as far as possible the intertextual, social, cultural, and gender context, and conditions of practice, e.g. professional v. household. In the historical survey for this particular trial it has been necessary to revise our understanding of disease categories entirely, and we have seen that pertinent data may be found, precisely, outside the boundaries of the categories on which the original investigation was premised. We have seen how discontinuities (of terminology, of category, and in the literary visibility of herbs like Jin Qian Cao) might suggest directions for future historical investigations.

Other major issues that we have only touched upon here are problems of herb identification over time, as well as the changing potencies of plants due to changes in environment (Buenz and Schnepfle, 2007).

For future trials involving written traditions, we must stress the dangers of flattening diachronic information in bioinformatics and thereby losing sight of both temporary phenomena and real continuities. Historical ethnopharmacology is one area where digital technology can come into its own, especially now that largely quantities of reliable, searchable digitised text are becoming available online. For instance, Shen Huang Technology, in conjunction with the China Academy of Chinese Medical Sciences and other academic and medical bodies, has recently been developing a set of specialist digital tools including a full-text database of pre-modern medical and pharmacological literature, and a database of prescriptions searchable by multiple criteria. However, big data analysis can only be useful if the kinds of contextual factors discussed above can be built into the process.

Finally, to end on a note that strikes at the heart of the current special issue, this historical account of Chinese treatments for

urinary disorders has authenticated continuities in the use of some important household foods like cinnamon, mallows, ginger, and liquorice, as well as other substances that are now less commonly available or considered uncommonly potent. At the same time it has highlighted the way regulatory changes in the pursuit of safety define the boundaries between food and medicine in the modern world as they professionalise and restrict the use of key substances. Nevertheless working within these restraints it has been possible to draw on a range of historical insights to authenticate the 'traditional' in this modern trial of TCM.

Uncited references

Ban (1996), Buenz et al. (2004), Dal Cero et al. (2014), Kufer et al. (2005), Leonti (2012), Leonti (2011), Leung (1999), Li (1998, 2010), Lo (2014), Qi (2012), Scheid and Macpherson (2011), Sima (1959), Sivin (1987), Tanba no Yasuyori (1993), WHO (2007), Wiseman and Feng (1998), Zhang (1999), Xie et al. (1994) and Yang.

Appendix A. Select bibliography of pre-modern Chinese texts for an investigation of *lin* disorders and their remedies

Texts in chronological order

- Shen Nong *bencao jing* 神農本草經石膽 (The Divine Farmer's Canon of *Materia Medica*), reputedly composed c. 2800 BCE; probably compiled 3rd century CE.
- Mawangdui medical manuscripts, tomb site sealed 168 BCE.
- Wuwei medical manuscripts, 1st century CE.
- Huangdi neijing* 黃帝內經, compilation date uncertain, written down 1st century CE.
- Zhang Zhongjing 張仲景, *Jingui yaolue: xiaoke xiaobian buli: linbing maizheng bing zhi* 金匱要略·消渴小便不利·淋病脈證並治 (Essential Prescriptions from the Golden Chamber: section on the diagnosis and treatment of *lin* disease), originally compiled early 3rd century CE.
- Zhang Zhongjing 張仲景, *Shanghan lun* 傷寒論 (Treatise on Cold Damage), originally compiled early 3rd century CE.
- Dunhuang 敦煌medical manuscripts, 5th to 11th century.
- Chao Yuanfang 巢元方, *Zhubing yuanhou lun: linbing zhu hou* 諸病源候論·淋病諸候 (Treatise on the Aetiology and Symptoms of Diseases: Symptoms of *lin* disease), 610.
- Sun Simiao 孫思邈, *Beiji qianjin yaofang* 備急千金要方 (Emergency Prescriptions Worth a Thousand Gold Pieces), c. 652.
- Wang Tao 王燾, *Waitai miyao* 外台秘要 (Arcane Essentials from the Imperial Library, 752).
- Tanba no Yasuyori 丹波康賴, *Ishimpō* 醫心方 (Prescriptions at the Heart of Medicine), 982 [Japanese compilation].
- Wang Huaiyin 王懷隱 (chief ed.), *Taiping sheng hui fang* 太平聖惠方 (Imperial Grace Formulary), 978–992.
- Imperial Academy of Medicine, *Shengji zonglu* 聖濟總錄 (General Record of Imperial Charity), c. 1111–1117.
- Chen Yan 陳言, *San yin ji yi bingzheng fang lun: lin bi xu lun* 三因極一病證方論·淋閉敘論 (Treatise on three Categories of Syndromes: Discussion of *lin* [and] *bi*), 1174.
- Qi Zhongfu 齊仲甫, *Nüke baiwen* 女科百問 (One Hundred Questions on Women's Medicine), 1220.
- Chen Ziming 陳自明, *Furen daquan liangfang* 婦人大全良方 (Compendium of Efficacious Prescriptions for Women), completed 1237.
- Sun Yunxian 孫允賢, *Yi fang dacheng* 醫方大成 (Compendium of Medical Prescriptions), 1321.
- Xu Chunfu 徐春甫, *Gujin yitong daquan* 古今醫統大全 (Complete Compendium of Medical Works, Ancient and Modern), 1556.

1 Li Shizhen 李時珍 *Bencao gangmu* 本草綱目 (Compendium of
2 *Materia Medica*), first published 1596.
3 Heo Jun 許浚, *Dong eui bo gam* [Ch. *Dongyi baojian*] 東醫寶鑑
4 (Precious Mirror of Eastern Medicine), 1613 [Korean compilation].
5 *Xuan Qi jiuzheng lun* 軒岐救正論 (Xuanyuan and Qibo's Treatise
6 on Correcting Errors), 1644
7 Li Yongcui 李用粹 *Zhengzhi huibu: linbing* 論治匯補·淋病 (Col-
8 lected Supplement to Pattern Identifications and Treatments: *lin*
9 Diseases), 1687.
10 Zhao Xuemin 趙學敏, 1796. *Bencao gangmu shiyi* 本草綱目拾遺
11 (Supplement to *Bencao gangmu*).

Appendix B

Simples for urinary disorders in *Shennong bencao jing*

Name (pinyin)	Name (Chinese characters)	Identification	Description of effects
<i>Baixian</i> [Bai Xian]	白鮮	Dictamnus	Specific for dribbling urination (主... 淋瀝)
<i>Banmiao</i> [Ban Miao]	斑苗	Mylabris(?) (a beetle)	Breaks up the Five <i>long</i> (破石癰)
<i>Beimu</i> [Bei Mu]	貝母	Fritillaria bulb	Specific for malignancy of dribbling urine (主.. 淋瀝邪)
<i>Beizi</i> [Bei Zi]	貝子	Cowrie shell	Specific for the Five <i>long</i> (主... 五癰)
<i>Cheqianzi</i> [Che Qian Zi]	車前子	Plantago seed	Specific for Qi <i>long</i> (主氣癰)
<i>Dongkuizi</i> [Dong Kui Zi]	冬葵子	Mallow seed	Treats the Five <i>long</i>
<i>Fabei</i> [Fa Bei]	發髮	Human hair	Specific for the Five <i>long</i> (主五癰)
<i>Heizhi</i> [Hei Zhi]	黑芝麻	Black sesame	Specific for <i>long</i> (主癰)
<i>Huashi</i> [Hua Shi]	滑石	Talc	Treats <i>longbi</i> 癰閉
<i>Madao</i> [Ma Dao]	馬刀	Razor clam shell	Breaks up Stony <i>lin</i> (破石淋)
<i>Muxiang</i> [Mu Xiang]	木香	Aucklandia	Specific for <i>lin lu</i> (主淋瀝)?
<i>Qumai</i> [Qu Mai]	瞿麥	Dianthus	Specific for all types of <i>long</i> (主... 諸癰結)
<i>Sangpiaoxiao</i> [San Piao Xiao]	桑螵蛸	Mantis	Frees up the Five <i>lin</i> (通五淋)
<i>Shican</i> [Shi Can]	石蠶	Betony [caddis worm?]	Specific for the Five <i>long</i> (主五癰); breaks up Stony <i>lin</i> (破石淋); cures the Five <i>lin</i> (治五淋)
<i>Shidan</i> [Shi Dan]	石膽	Chalanthite	Specific for Stony <i>lin</i> (主... 石淋)
<i>Shilongchu</i> [Shi Long Chu]	石龍芻	Lepironia	Specific for difficult urination and <i>linbi</i> (主... 小便不利, 淋閉)
<i>Shilongzi</i> [Shi Long Zi]	石龍子	Lizard	Specific for the malignancy of the Five <i>long</i> ... breaks up Stony <i>lin</i> (破石淋)

<i>Shiwei</i> [Shi Wei]	石韋	<i>Pyrrosia</i> [leaf]	Specific for the Five <i>long</i> , urinary blockage (主... 五癰閉不通)	67 68 69 70
<i>Shufu</i> [Shu Fu]	鼠婦	Woodlouse [or silverfish]	Specific for Qi <i>long</i> and inability to urinate (主氣癰, 不得小便)	71 72 73 74
<i>Tunluan</i> [Tun Luan]	豚卵	Pig's testes	Specific for Five <i>long</i> (主五癰)	75 76
<i>Yanshi</i> [Yan Shi]	燕屎	Swallow's excrement	Breaks up the Five <i>long</i> , is diuretic破五癰, 利小便	77 78 79

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.jep.2014.11.014>.

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