MEDICINE, THEN AND NOW:
THE PROBLEM OF USING PERSISTENCE AS A MEASURE FOR MEDICAL
EFFICACY

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Abstract

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Modern Western biomedicine is in need of new drugs, and ethnopharmacologists are turning to premodern medical texts, such as the Anglo-Saxon *Leechbooks*, for remedies. To determine which premodern remedies to test in laboratory settings, historians must be more than translators, they must also determine which remedies are likely to be efficacious. In previous studies, historians have associated persistence of remedies in *materia medica* throughout the centuries with biomedical efficacy, but this association is problematic for two reasons. First, it is not clear that people, without the aid of controlled trials and statistical tests, can determine the effectiveness of drugs. Second, biomedical efficacy may not be the reason for a remedy’s persistence since theory or tradition can also be influential. Historians, therefore, should use different criteria to
determine efficacy. Historians can instead identify remedies that would have immediate effects or remedies for chronic or non-self-limiting diseases.
INTRODUCTION

In the tenth and eleventh centuries, the Anglo-Saxons in England recorded the remedies of their physicians, or læcas, in codices now known as Bald’s *Leechbooks I and II, Leechbook III*, and the *Lacnunga*, preserving remedies for everything from head lice to infertility. Also around this time, the Anglo-Saxons translated the fifth-century Latin text the *Herbarium of Pseudo-Apuleius* into their vernacular, allowing them to use its medicinal herbal recipes.

The modern world at first treated these remedies as useless superstition. The philologist T. Oswald Cockayne introduced the *Leechbooks* to a modern audience in his 1864 book *Leechdoms, Wortcunning, and Starcraft of Early England*. Cockayne claims that the *Leechbooks* do not “really advance mans [sic] knowledge of disease or of cures. It may have seemed by the solemn elaboration of its diagnoses to do so, but I dare not assert there is real substance in it.”¹ Cockayne’s dismissive view reigned through the 1950s and -60s. In 1952, the historian Charles Singer dismissed Anglo-Saxon remedies as

¹ Cockayne, p. xxiii
a “mass of folly and credulity”\textsuperscript{2} and “a final pathological disintegration of the great system of Greek medical thought.”\textsuperscript{3}

This attitude toward Anglo-Saxon medicine began to erode when Anglo-Saxonists turned to and embraced the work of scholars such as John M. Riddle, a historian of premodern medicine. Riddle, though he has not written on Anglo-Saxon medicine in particular, inspired historians of Anglo-Saxon medicine to abandon the view of the ignorant læce blindly treating disease to a more nuanced view of a læce prescribing remedies based on experience and observation. The læce of Riddle’s view not only treated his patients but may have even cured them with the use of efficacious herbal remedies.\textsuperscript{4}

Riddle’s pioneering work led historians to not only view læcas in a new, more-appreciative light, but it also led to partnerships between historians and ethnopharmacologists. Today, numerous pathogens and parasites, from bacteria to lice, are developing resistance to the chemicals physicians use to eradicate them; today’s physicians, therefore, desperately need new drugs.\textsuperscript{5} Ethnopharmacologists attempt to find new, efficacious remedies in medical traditions outside of Western-style biomedicine. Riddle’s work opened the door to collaborations between ethnopharmacologists and

\textsuperscript{2} Grattan and Singer, p. 92.

\textsuperscript{3} Ibid., p. 94.

\textsuperscript{4} See Riddle, “Methodology of Historical Drug Research.”

\textsuperscript{5} See Burgess, “Human Lice and Their Control.”
historians to mine premodern medical texts, including the Anglo-Saxon medical corpus, for “new” drugs.

How should historians and ethnopharmacologists choose which recipes to test in the laboratory? The answer is unclear in the literature. Laboratory testing of all premodern remedies, or even all Anglo-Saxon remedies, would require an enormous, unfeasible amount of time and money. Instead, historians must be more than translators and use their knowledge of premodern medical cultures, theories, and norms to choose potentially efficacious remedies for testing. Previously, historians have determined a recipe’s potential biomedical activity by examining its persistence in materia medica throughout the centuries, but this method does not find efficacious remedies. To help ethnopharmacologists find new drugs, historians must employ other methods. They must eliminate remedies whose retention in medical texts was due to concordance with premodern medical theory to which modern biomedicine no longer subscribes, and they must instead select remedies with readily visible effects, effects which a person could elucidate without the use of statistical tests, and remedies for chronic or non-self-limiting diseases, diseases which would endure without medical intervention.
Historians, scientists, and ethnopharmacologists have delineated methodologies for the examination of premodern medical texts containing biomedically efficacious remedies. In 2004, a team of scientists and historians, including Riddle, published the article “Techniques: Bioprospecting historical herbal texts by hunting for new leads in old tomes” in which they explicitly described their methodology. First, historians extract information from the texts regarding the plant names and the diseases or disorders the plants are meant to treat. Historians and scientists then update these plant names, diseases, and disorders to modern terminology and compare these data to known actions of plants. Specifically, the authors of the paper want to find texts that indicate a plant has a pharmacological action not previously ascribed to it. Scientists can then test the supposed pharmacological action of this plant in the laboratory. The authors’ main goal in their methodology is to eliminate plants whose actions have already been identified.6

In the ethnopharmacological teams, the scientists have focused on the elimination of already known remedies, the extraction and laboratory testing of secondary

6 Buenz et al.
metabolites, and clinical trials of prospective drugs, while the historians have focused largely on translation and the difficulties inherent in matching premodern plant names with modern scientific nomenclature. In the 2010 article “History of Botany as Ethnobotany? Proposals toward a new approach to the ancient legacy,” Alain Touwaide describes his historical methodology in detail, writing:

The task of historians of botany and pharmacology who absorb the objectives and methods of ethnobotany and ethnopharmacology into their work (let’s call them ethno-historians of botany and pharmacology) changes its nature: it no longer is an archaeology of texts (as is the case with philological work), but becomes an archaeology of the knowledge transmitted through the texts. Like archaeologists, ethno-historians distinguish indeed layers of accretions, describe and identify each of them, inventory and catalogue their content, and try to understand their interrelations, which they interpret as a dynamic process.

Touwaide’s methodology involves the accretion of large amounts of data, not only including different texts, but different manuscripts of the same text, and analyzing the differences to help identify the plants and diseases described and gain insight on the plants’ actions.

A group comprising scientists and Anglo-Saxonists at the University of Nottingham that recently tested a remedy from the Old English Bald’s Leechbook argues that scientists should not only test plants, but the full remedies, including all of the herbaceous and mineral constituents, writing, “[E]xperiments that test the antibiotic

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7 Hunt, “From Plant Lore to Pharmacy: A Prototype of the Process.” Holland, “How Shall We Determine Whether a Treatment Works?”

8 See Reveal, “What’s in a Name: Identifying Plants in Pre-Linnaean Botanical Literature” and Riddle, “Research Procedures in Evaluating Medieval Medicine.”

9 Touwaide, p. 59.
activities of entire historical remedies are few and far between. This is an important omission, because the efficacy of these ‘ancientbiotics’ could rely on the combined activity of their various ingredients. This would lead us to underestimate their efficacy…”¹⁰ The authors of this study, Harrison et al., chose a single remedy from Bald’s Leechbook, and found that the remedy had antimicrobial capabilities beyond that of its ingredients individually, which bolsters their argument for testing composite remedies as well as the constituent plants.

All of the methodologies described above, however, assume that the majority of the remedies described in historical texts are biomedically efficacious and worthy of laboratory testing. Thus, Harrison et al. had no qualms with testing a single remedy. It is not clear, however, that this is a valid assumption. Additionally, the Old English medical texts, Bald’s Leechbook I and II, Leechbook III,¹¹ the Lacnunga,¹² and the Herbarium,¹³ include over 500 recipes.¹⁴ Testing all of the remedies would be time- and cost-prohibitive. In order to better spend time and money, historians should not only translate

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¹⁰ Harrison et al., p. 1.
¹³ See Van Arsdall, Medieval herbal remedies: the Old English Herbarium and Anglo-Saxon medicine.
¹⁴ The recipes in each of the books are numbered. Summing the numbers of the final recipes results in 604 total recipes (Bald’s Leechbook I final recipe: LXXXVIII, Bald’s Leechbook II final recipe: LXVII, Leechbook III final recipe: LXXIII, Lacnunga final recipe: CXCI, Herbarium final recipe: CLXXXV). Due to lacunae in the texts, however, not all 604 recipes are legible.
the premodern medical texts for ethnopharmacologists but also identify which remedies are most likely to provide some biomedical action.

In the study of premodern and particularly Anglo-Saxon medicine, some historians have identified potentially curative remedies through the remedies’ persistence in *materia medica* through the centuries. The argument is this: for a remedy to persist, it must be recognizably effective in treating disease. This argument is flawed in two ways. First, it is not clear that people, without the aid of controlled trials and statistical tests, are easily able to determine the effectiveness of drugs. Second, biomedical efficacy, especially if it is indeterminable, may not be the reason for a remedy’s persistence. Other factors, such as theory and tradition, could be playing a role. Instead of persistence, then, historians must determine other methods of identifying potentially biomedically useful remedies, such as identifying remedies whose actions would have been readily discernable and remedies for diseases in which the confounding factor of immune responses would play a minor role.
Claims about biomedical efficacy are rife in the scholarship of Anglo-Saxon medicine. Previous scholars, such as Charles Singer and Wilfrid Bonser in the 1950s and 1960s, argued that Anglo-Saxon medicine was generally ineffective, little more than placebos and perhaps doing more harm than good. In recent years, however, the tide has turned. Instead of assuming Anglo-Saxon medicine was generally ineffective, recent scholars have assumed that Anglo-Saxon medicine was generally effective, successfully treating the medical conditions for which they were prescribed. The scholar of Anglo-Saxon medicine Anne Van Arsdall writes, “…it is possible to understand and appreciate better what the medieval tradition really was, and to realize that many of the remedies in those old manuscripts actually help in preventing and treating illness.”

Much of this current trend derives from the work of M. L. Cameron, an ecologist who turned to the study Anglo-Saxon medicine late in his scientific career. In his 1993 book *Anglo-Saxon Medicine*, Cameron asks “What was the therapeutic value of these

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substances [mentioned in the Anglo-Saxon medical recipes]; could they be expected to have beneficial effects on the ailments for which they were prescribed?” Cameron emphatically argues against the views of Charles Singer and Wilfrid Bonser, both of whom would have answered “No.” Cameron examines ingredient after ingredient, describing their antibacterial constituents, cytotoxic properties, or other medically relevant aspects. From the examination of selected remedies, Cameron concludes that the remedies were developed and perpetuated based on real biomedical capabilities and were thus “rationally conceived.” Cameron writes, “Considering how little was known about the physiological behavior of the human body and that there was no understanding of viral and bacterial infections, of immune reactions and allergies, it is surprising how often a treatment seems to have been designed to take into consideration just these unknown factors. The only explanation I can find is that treatments were in most cases based on careful observation of patients, and evaluation of remedies was done on the basis of these observations. There is no evidence that in general formulas were sterile or applied with no exercise of reasoning” Cameron asserts that medicine in Anglo-Saxon England was generally effective, healing beyond the curative abilities of the placebo effect.

3.1 In vitro

Cameron’s book is paramount in the historiography, marking a shift in the perceived effectiveness of Anglo-Saxon medicine. The book *Anglo-Saxon Medicine* led

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17 Cameron, p. 117.

18 Cameron, p. 186.
to the 2005 study in which Barbara Brennessel, Michael D. C. Drout, and Robyn Gravel tested Cameron’s hypotheses in the laboratory in order to determine if the Anglo-Saxon physician, or læce, used “trial and error and observational approaches to medicine.”¹⁹ Specifically, Brennessel et al. tested the antimicrobial activity of an eyesalve (eagsealf) used to treat a stye (wænn) which, due to the known antimicrobial activities of its ingredients individually, Cameron hypothesized might be effective. After carefully constructing the eyesalve, Brennessel et al. used disc diffusion assays to determine if the salve had any antimicrobial activity against Gram-positive bacterial species, Gram-negative bacterial species, and mycobacterial species. Disc diffusion assays involve placing a disc of filter paper soaked with the antimicrobial solution in the center of a bacterial lawn. A zone of inhibition, the area around the disc in which bacterial growth is inhibited, is then measured to determine the solution’s antimicrobial capabilities. Three types of bacteria were tested because certain kinds of antimicrobials can be effective against certain types of bacteria but ineffective against others. The authors found that “none of the remedies that [they] created showed significant anti-microbial activity. In fact, single ingredients that showed some slight anti-microbial activity on their own (such as oxgall), lost their effectiveness when combined in the recipe.”²⁰ They tried other recipes, and found little to no antimicrobial effect for those as well. Brennessel et al. concluded, “The Anglo-Saxon læce was certainly learned, and he, like most physicians

¹⁹ Brennessel et al., p. 184.

²⁰ Ibid., p. 192.
before the twentieth century, was probably a keen student of symptoms and a comforting presence, but he was not effective at curing disease.”\textsuperscript{21}

It is difficult to support the broad, sweeping conclusion that the Anglo-Saxon læce “was not effective at curing disease” with Brennessel et al.’s results alone. The authors tested a total of only seven recipes, a small fraction of the hundreds of remedies present in the corpus, and their selection may not be representative of the whole. Their results, therefore, do not discount the efficacy of the remaining untested remedies. Indeed, Cameron identified a remedy whose biomedical potency would be difficult to discount. Cameron writes, “The spleen is affected by the breakdown of red blood cells and consequent loss of iron from haemoglobin and becomes enlarged in consequence… It is interesting that a remedy [from Bald’s Leechbook] for an enlarged spleen was a drink containing iron acetate prepared by plunging a red-hot poker or other iron rod into vinegar or wine.”\textsuperscript{22} Should the efficacy of such a treatment be discounted by Brennessel et al.’s results? The only real conclusion that can be drawn from the results Brennessel et al. presented would be that not all of the læce’s remedies worked. Though it is tempting to make more definitive statements and say that the læce’s remedies usually worked or usually did not, those claims cannot be substantiated in an experimental manner such as that used by Brennessel et al. without testing the corpus as a whole or perhaps a randomly selected sample of the corpus.

\textsuperscript{21} Ibid., pp. 194-5.

\textsuperscript{22} Cameron, p. 18.
Brennessel et al.’s goals were quite different from that of the ethnopharmacologist’s, however. Brennessel et al. wanted to indirectly test whether the Anglo-Saxon laece used “observation, trial and error and logic to compound efficacious remedies.” They chose a remedy that, due to its ingredients, was likely to have antimicrobial capabilities; modern biomedicine, therefore, already knows of the antimicrobial capabilities of this remedy’s constituents. The ethnopharmacologist, however, is looking for new remedies and new plants.

Harrison et al., a team at the University of Nottingham that attempted to recreate the same eyesalve recipe, found that it had significant antimicrobial activity against methicillin-resistant Staphylococcus aureus (MRSA), a Gram-positive species. Importantly, in contrast to Brennessel et al., the authors of the new study found that the individual ingredients alone were ineffective, while the sum of the ingredients showed significant antimicrobial activity. The differing results could be explained by the different methods employed by the different researchers. Harrison et al. did not use disc diffusion assays but instead tested the salve on cultures and biofilms of MRSA grown in synthetic wound fluid. Additionally, Harrison et al. kept their remedy at 4°C, while Brennessel et al. kept theirs at room temperature, and Harrison et al. do not specify the use of organic vegetables. More research will be needed to determine exactly why the studies’ results differed and whether the laece’s eyesalve is truly effective or not.

Due to their results, however, Harrison et al. write:

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23 Brennessel et al., p. 183.
24 Harrison et al.
… our finding that the combination of ingredients used is crucial for bactericidal activity supports the hypothesis that this ‘ancientbiotic’ was systematically constructed based on empirical knowledge… If medieval physicians really did use observation and experience to design effective antimicrobial medicines, then this predates the generally accepted date for the adoption of a rational scientific method (the formation of the Royal Society in the mid-17th century) and the modern age of antibacterial medicine (Lister’s use of carbolic acid in the late 19th century) by several hundred years.25

This conclusion is almost the antithesis of Brennessel et al.’s, in which the Anglo-Saxon læce was “probably a keen student of symptoms and a comforting presence, but he was not effective at curing disease.” The conclusion, however, suffers the same pitfalls as Brennessel et al.’s in that the efficacy of the entirety of Anglo-Saxon medicine and the experimental predilections of the Anglo-Saxons is based on the outcome of a single remedy.

Additionally and importantly, Harrison et al.’s analysis was ethnopharmacological as well as historical. The researchers argue that, due to the composite remedy having significantly more antimicrobial activity than its constituents alone, ethnopharmacologists should test entire remedies rather than individual plants or purified secondary metabolites. With over 500 recipes in the Anglo-Saxon medical corpus alone, however, it would be time- and cost-prohibitive to test each remedy in the manner of Harrison et al. How does the scientist or historian determine which remedies are likely to provide a useful, biomedical effect? Brennessel et al. would argue that none or very few would be efficacious, while Harrison et al. would argue the opposite.

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25 Ibid., p. 5.
Such diametrically opposed and sweeping generalizations persist in the scholarship on Anglo-Saxon medicine. Marijane Osborn claims that “although far from infallible, traditional herbal medicine had, and continues to have, a considerable degree of validity…” Edward Pettit, translator of the *Lacnunga*, is rather conservative in his estimate, writing that “…an experienced Anglo-Saxon doctor or patient would not have resorted to *Lacn.* entirely in vain – although the vast majority of the remedies in *Lacn.* (where not positively harmful!) appear to be physiologically useless or of minimal and transitory efficacy, by my reckoning at least ten percent of the herbal remedies prescribed may have had some limited physiologically therapeutic effect for minor afflictions.”

Other scholars, such as Peter Dendle, take a more cautious middle ground: “…many Anglo-Saxon medical practices are rational and occasionally effective.” Unfortunately, for the ethnopharmacologist or ethnobotanist searching for effective remedies, broad statements about general effectiveness or ineffectiveness and uncertain estimates are all unhelpful. Assuming that all of the remedies are ineffective leaves the ethnopharmacologist nothing to test. On the other hand, baselessly assuming that all of the remedies are effective and thus testing all of the remedies in the laboratory is time- and cost-prohibitive.

This problem is difficult to redress. Testing all or even a random sample of the Anglo-Saxon medical corpus in a laboratory is expensive. A way of identifying

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26 Osborn, p. 158.

27 Pettit, pp. xlvii-i.

28 Dendle, p. 92.
potentially effective remedies, before resorting to laboratory testing, would pare down the over 500 remedies. One potential method is persistence: examining the ingredients and recipes that continued to be administered for the same illnesses across centuries.

3.2 Persistence as a Measure of Efficacy

John M. Riddle, the pioneering scholar of premodern medicine who argued for the biomedical effectiveness of herbal remedies, attempted to provide a more comprehensive, less cherry-picked approach than the laboratory testing of Brennessel et al. and Harrison et al. In 1987, Riddle published the article “Folk tradition and folk medicine: Recognition of drugs in classical antiquity” in which he analyzed the 257 pharmacological ingredients mentioned in the Hippocratic corpus, comparing them to “modern pharmacy and pharmacognosy guides.”29 In this instance, Riddle’s goal was more historical than ethnopharmacological; he intended to demonstrate the biomedical activity of ingredients by identifying them in modern guides in which efficacy had already been proved. After analyzing the guides, however, it becomes apparent that Riddle only proved persistence of the use of certain herbs, not their effectiveness. His article, therefore, provides a useful example of persistence as a measure of efficacy.

In his analysis, Riddle found that “[o]f the 257 drugs in the HC [Hippocratic Corpus] only twenty-seven or 10.5% are not listed in at least one of the modern guides,” implying, therefore, that the 89.5% listed in the guides contain biomedically active

29 Riddle, “Folk tradition and folk medicine: Recognition of drugs in classical antiquity,” p. 36.
He then concludes, “The correlation between the Hippocratic drugs (HC) and modern ones available in Europe then is quite close; this phenomenon could not be due to random selection of drugs by classical peoples employing only placebos with their magic and superstition. Something more, something much more, is happening here, as evident from this historical data.”

The guides Riddle consulted are Walter H. Lewis and Memory P. F. Elvin-Lewis’s *Medical Botany*; George Edward Trease and William Charles Evans’s *Pharmacognosy*; the eighth edition of Varro E. Tyler, Lynn R. Brady, James E. Robbers’s similarly titled *Pharmacognosy*; and the twenty-fifth edition of *The Dispensatory of the United States of America*. For the first book, *Medical Botany*, the authors explicitly state that the mention of an herb does not imply efficacy: “… most chapters contain a section on herbology that describes the plants employed in domestic or indigenous medicine. Usually this is a random sample from the vast array of plants being used domestically around the world, in addition to our emphasis on those utilized by North American Indians. However, *this selection in no way implies any particular efficacy.*” Any medical ingredients whose claim of biomedical activity relies on inclusion in Lewis and Elvin-Lewis’s book, therefore, should be questioned.

Inclusion in the next book, Trease and Evans’s *Pharmacognosy*, again does not imply efficacy. Trease and Evans provide an overwhelming amount of basic information

30 Ibid., p. 37.
31 Ibid., p. 38.
32 Lewis and Elvin-Lewis, p. ix, emphasis added.
about different kinds of plant species, and many species are mentioned without any indication of medical uses. For example, for *batos*, which Riddle identifies as bramble or *Rubus ulmifolius* L. and other *Rubus* species, Riddle cites pages 103 and 105 in Trease and Evans’s book; the corresponding passages are: “Genera [in the family Rosaceae] include… *Rubus* (250 spp.)…” and “83 *Rubus idaeus* (phytochemistry of raspberry leaves) 4960 [Chemical Abstracts citation].” Neither passage implies the efficacy of bramble as a medical ingredient.

Tyler et al.’s *Pharmacognosy* is also unhelpful for Riddle’s argument. The authors mention herbs that used to be employed in medicine but whose efficacy is unproved. For example, Riddle identifies *glēchōn* as pennyroyal, for which the authors write, “Formal therapeutic use of the plant material and its volatile oil has been abandoned. *No substantive evidence supports any claims for the use of pennyroyal as an emmenagogue or as a headache remedy.*”

The final guide Riddle consulted, *The Dispensatory*, also includes information on herbs that have been used for medicinal purposes but does not require efficacy for inclusion. For instance, Riddle identifies *kraneia* as dogwood. The corresponding entry in *The Dispensatory* on dogwood writes, “Dogwood bark was used many years ago as an antiperiodic in intermittent fever, but it is only a feeble, astringent bitter.” Each of the guides Riddle used only requires use of the herbs by humans for inclusion in the guide.

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33 Trease and Evans, pp. 103 and 105.

34 Tyler et al., p. 493, emphasis added.

35 *The Dispensatory of the United States of America*, p. 1647.
Riddle, therefore, has only established the persistence of certain herbs in *materia medica*, not their efficacy.

Does persistence equate with efficacy? Riddle and other scholars certainly seem to use persistence as a measure for biomedical activity. In his 2002 paper “History as a Tool in Identifying ‘New’ Old Drugs,” Riddle quotes M. Grieve’s *A Modern Herbal*, originally published in 1931. Riddle writes, “…from Hippocrates to modern times, folk medicine employed nettle to promote the growth of hair. Grieve's Herbal reports that an ‘efficient Hair Tonic can be prepared from Nettle…”

The Anglo-Saxonist Cameron also used the argument from persistence extensively in his book *Anglo-Saxon Medicine*, consistently citing Grieve as an authority. Cameron writes, “The greater part of the identifiable ingredients of the Anglo-Saxon pharmacopoeia are still to be found in herbal collections and are used for the same purposes, so that we may say that Anglo-Saxon remedies were probably as good as those recommended by herbalists today.”

Later Cameron asserts, “It is clear that the Anglo-Saxons prescribed ingredients which should have been of benefit and are still recommended for the same ailments.”

The argument from persistence appears to refer to a Darwinian-like selection of remedies. Remedies that are efficacious are maintained in corpora throughout the centuries, while ineffective remedies are not included in subsequent manuscripts and

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37 Cameron, p. 118.

38 Ibid., p. 129.
editions. Such a natural selection of remedies relies on two assumptions: (1) that people, without statistical analyses or controlled trials, are able to effectively determine whether remedies are biomedically effective, and (2) that the only selective pressure acting upon the preservation of remedies is their biomedical efficacy. Both of these assumptions are problematic.
4.

THE PROBLEM OF PERSISTENCE

4.1 Assumption 1: Determination of Efficacy

Biomedical efficacy cannot easily be determined for all herbs and remedies. The anthropologist Francis J. Clune, Jr., arguing in favor of people’s ability to measure biomedical effectiveness, cited the fact that “in the Old World and the New World almost every available narcotic with psychogenic properties has been found and experimented with: coffee, tea, tobacco, yerba maté, peyote, marijuana, opium, alcohol, hallucinogenic mushrooms, and several other drugs.” Riddle cites Clune in his paper “Folk tradition and folk medicine” to add plausibility to his argument that 89.5% of the medical ingredients in the Hippocratic corpus had curative capabilities. Clune’s evidence, however, is inappropriate for his and Riddle’s arguments. A psychoactive drug is very unique type of drug; its effects are readily discernable, and few confounding factors exist when testing a psychoactive drug. The placebo effect may be at play, but the patient’s immune system is not. Remedies, such as the eyesalve in Bald’s Leechbook, are very different, however. When testing the biomedical activity of the eyesalve to treat a styte, the patient’s immune system is an incredibly important factor because “most hordeola

39 Clune, p. 7.
[styes] are self-limiting, and do not require aggressive therapy.” Indeed, it is still unclear whether modern topical treatments are efficacious: “Topical antibiotics appear to be equivocal in these cases [in the medical literature], in both recommendation and effect.”

Riddle makes a similar argument in his 1992 article “Methodology of Historical Drug Research,” in which he writes, “Given that most of the plants which the human digestive system is capable of metabolizing into energy, that is to say food plants, were discovered by the time we have written records, it should be no surprise to learn that drugs had a similar evolutionary and distant discovery.” Again, an example without confounding factors is being conflated with remedies which do have confounding factors. It is relatively easy to tell if a plant is edible: a person if either fine after ingestion or the person experiences gastro-intestinal upset. The person would not have such complications without ingesting the indigestible plant, so the action of an outside factor could not be mistaken for the action of the plant. In contrast, when testing remedies the action of the immune system could be mistaken for the action of the remedy.

How does the immune system confound people’s perceptions of drug efficacy? To understand this, we can consider an Anglo-Saxon læce treating a group of ten people, each of whom is infected with a disease that has a mortality rate of 20%. The læce treats each person with the same remedy, a remedy which has absolutely no biomedically active compounds. Even without the placebo effect, there is an 87.5% chance that at least seven

40 Kabat and Sowka, p. 111.
41 Ibid., p. 113.
of the ten people will survive. With such a rate of success, the *laece* may think that the treatment was effective, but the only factors at play were the patients’ immune systems. Similar hypothetical situations can be seen in table 1, which shows the probabilities that, in groups of differing sizes infected with diseases of differing mortalities, at least 70% of the people infected will survive. As the table shows, there is a rather high probability that at least 70% of those infected will survive in each of the scenarios. The lowest probability is about 50%, occurring when a large population is infected with a disease with a 30% mortality rate. Due to the action of immune systems, therefore, a *laece*, whose trials lack controls and statistical rigor, would be rather likely to assume the prescribed treatment was efficacious based on the positive results obtained. This is not to say that a *laece* was unintelligent or did not realize that people could recover from many diseases without medical intervention. Instead, it underlines the fact that determining the potency of a drug is extremely difficult even without the placebo effect confounding results. It should not be assumed, therefore, that biomedical efficacy is a reliable selective pressure on the persistence of remedies in medical corpora.
TABLE 4.1.

PROBABILITY THAT ≥70% OF PEOPLE INFECTED WILL SURVIVE.\textsuperscript{43}

<table>
<thead>
<tr>
<th>Mortality rate</th>
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4.2 Assumption 2: Other Selective Pressures

Aside from the difficulty of determining a drug’s efficacy, other selective pressures can affect an herb’s persistence in \textit{materia medica}. One such pressure is concordance with theory. It may be difficult or impossible to determine if an herb is effective, but if a remedy should work \textit{theoretically}, then it may persist in medical corpora.

Bloodletting provides a good example of the action of this selective pressure. According to Shigehisa Kuriyama, phlebotomy flourished in the Western world, from ancient Greece through to the nineteenth century, but perished in China. Kuriyama asserts that this difference is due to theory. Bloodletting did exist in ancient China; Kuriyama writes, “Long before the development of acupuncture needles… Chinese healers punctured abscesses and let blood with bladed-stone or bronze scalpels called \textit{bianshi}. So bloodletting wasn’t unknown in ancient China… By the late Han dynasty, however,

\textsuperscript{43} Calculated using the binomial distribution in R version 3.2.0 (2015-04-16).
recourse to the remedy had apparently declined.”⁴⁴ Kuriyama argues that “the transformation of bloodletting from a relatively minor remedy into an indispensable pillar of Greek therapeutics turned… on the fear of plethora. Underlying the devotion to phlebotomy was the dread of excess blood.”⁴⁵ In the Western world, plethora was an overabundance of humors which could putrefy and cause disease. Bloodletting, then, was a way to drain the excess humors. Chinese medicine, however, had a very different theory about disease causation, which resulted in a different trajectory for the practice of bloodletting. While Greek physicians feared excess, Chinese physicians feared emptiness: “Disquiet in China revolved, contrarily, around dissipation and dispersal… Proponents of yangsheng, or the cultivation of life… sensed vitality escaping from all the orifices… [S]ights and sounds drew this spirit outward, emptying the body, inviting affliction.”⁴⁶ In China, excess was paired with emptiness; if a body became too empty, outside influences could fill the emptiness, causing disease. In Chinese medicine, then, loss was dangerous and bloodletting was theoretically unsound. This resulted in the abandonment of bloodletting for other practices more appropriate for Chinese medical theory, such as acupuncture. Concordance with theory, therefore, can have a profound effect on the perpetuation of a medical practice, resulting in the embrace or rejection of a practice outside of curative capabilities.

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⁴⁴ Kuriyama, pp. 197-8.
⁴⁵ Ibid., p. 208.
⁴⁶ Ibid., p. 223.
An additional selective pressure is tradition, indeed persistence itself. As Van Arsdall writes, “…they [the remedies] have the weight of tradition behind them; they have been passed down from one healer to another…” A long pedigree is even used as a measure of efficacy in the Old English *Herbarium*; the text traces the medicinal uses of garlic back to the time of Homer: “This plant is called *temolus* or garlic: Homer said it was the most splendid plant and that Mercury discovered it.” Tradition can ensure the perpetuation of medical recipes and practices as it can for other aspects of culture.

For many remedies biomedical effectiveness is difficult to determine, and thus the selective pressures explicated above are the most influential constraints on persistence. The ethnopharmacologist cannot assume, therefore, that persistence equates with biomedical efficacy.

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47 Van Arsdall, “Reading Medieval Medical Texts with an Open Mind,” p. 17.

If persistence cannot be used as a measure of biomedical potency, is another method appropriate for determining efficacy? Or must the ethnopharmacologist resort to testing the entire corpus? Fortunately, historians can use factors, such as whether the remedy had immediate, visible effects or whether the remedy was used to treat a chronic disease or a disease that is not self-limiting, other than persistence to estimate efficacy.

One method is to first check remedies that would have had immediate or readily visible effects, such as psychoactive drugs or emetics. Remedies such as these would have been intended to induce some kind of bodily response. The bodily response could have been implemented to cure the disease, but whether it did or did not is irrelevant to the ethnopharmacologist; whether the remedy indeed produced the intended bodily response is the main concern, and it seems likely that people would have been able to determine which plants produced visible, rapid responses. As support, one can consider Clune’s evidence, mentioned above, that “in the Old World and the New World almost every available narcotic with psychogenic properties has been found and experimented with…”

49 Emetics, laxatives, abortifacients and other such drugs are similar to Clune’s

49 Clune, p. 7.
example of psychoactive drugs: the results of ingestion are readily apparent. The historian can find remedies with immediately discernable effects in the Anglo-Saxon medical corpus. For example, the corpus contains six different recipes for a *spiw drenc*, an emetic, three in the *Lacnunga* and another three in *Leechbook II*.  

Another method to find potentially efficacious remedies is to analyze the remedies intended to treat chronic diseases and diseases that are not self-limiting the way other conditions, such as styes, are. People with these diseases, therefore, are unlikely to recover quickly without medical intervention. With such a disease, it can then be assumed that if a læce observed recovery after the administration of the remedy, the remedy was a contributing factor. Focusing on chronic diseases, therefore, eliminates the actions of the immune system as a confounding factor.

The Anglo-Saxon medical corpus provides numerous examples of remedies for diseases which demand some kind of intervention besides the patient’s immune system. Remedies for lice, *lyss* in Old English, constitute one such example. The Anglo-Saxon *Leechbooks* contain two remedies for lice:

Against lice; pound in ale oak rind and a little wormwood, give to the lousy one to drink. Against lice; quicksilver and old butter; one pennyweight of quicksilver and two of butter; mingle all together in a brazen vessel.

The *Lacnunga* lists another three remedies:

Make a salve for lice: boil in butter the lower part of hemlock and wormwood or boden; anoint the head with it; the salve ensures that

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51 “Wiþ lusum acrind 7 hwon wermod gecnua on ealu sele drincan. Urð lusum ewic seolfor 7 eald butere an pening seolfres 7 tu pening wegę buteran meng on arfet eal toSomne” Cockayne, pp. 124-5.
there will be fewer lice… Make a good drink for lice: take lovage and wormwood and hemlock; put them in ale; give a good bowlful to drink, fasting for a night… For lice, a salve: hog’s fennel, celery-leaved crowfoot, radish, wormwood, and equal amount of all these; pound into powder; knead with oil; anoint the whole body with it.\textsuperscript{52}

These remedies for lice are fundamentally different from the remedy for a stye in that an Anglo-Saxon lece would have been able to correctly correlate the remedy with the effect. Without chemical interventions, e.g. the aforementioned remedies, or mechanical interventions, e.g. lice combs, lice persist; the patient does not recover on his own.\textsuperscript{53} The immune system, therefore, would not have confounded the lece’s observations when he administered the above remedies. Due to this, these remedies are excellent candidates for laboratory testing.

Although persistence in materia medica is not an effective measure of biomedical efficacy, other methods exist for ethnopharmacologists wishing to select potentially efficacious remedies. Ethnopharmacologists can identify remedies whose actions are apparent without controls or statistical tests and remedies whose actions would not have been confounded by the immune system.

\textsuperscript{52}“Wyrc sealfe wið lusum: wyll in butaran nydoewewearde hymlic 7 wyrmod oðde boden; smyre mid þæt heafod; seo sealfe gedeð þæt þær bið para lusa láes... Wyrc godne drænc wið lusum: genim lufesite 7 wyrmód 7 hymlic; doo in eala; syle drincan on nihstig godne bollan fulne... Wið lusan, sealfe; commuc, clofðung, raedic, wermod, ealra efenfela; gecnuca to duste; gecned wið ele; smyre mid ealne done lichoman” Pettit, pp. 86-95. Pettit left boden untranslated because he was unsure of which plant exactly it corresponded to.

\textsuperscript{53}Burgess, “Human Lice and Their Control.”
CONCLUSION

For ethnopharmacologists hunting for drugs new to modern biomedicine, the Anglo-Saxon medical corpus could provide biomedically efficacious remedies, but the historian’s expertise must be used in deciding which of the hundreds of remedies should be tested. Instead of assuming that most of the remedies worked (or, conversely, that none of the remedies worked), the historian should adopt a more nuanced view, informed by the historian’s knowledge of the past culture and its medicine.

Many historians use persistence in materia medica as evidence for biomedical effectiveness, but this approach is problematic. For some remedies it is difficult or even impossible to determine efficacy without large sample sizes, controls, and statistical tests. Persistence, then, cannot accurately reflect efficacy if physicians, those who maintained the remedies in materia medica, could not have accurately determined efficacy. Without the constraint of biomedical efficacy, other selective pressures, such as theory and tradition, can influence the persistence of remedies. Historians, therefore, should discard persistence as a means to determine a remedy’s effectiveness in curing disease.

Without persistence, historians and ethnopharmacologists can turn to other factors. For example, historians should first consider remedies that were intended to have readily discernable effects and remedies for diseases in which the immune system would
have had little effect in recovery. With the former instance, past physicians would have been able to see the effects of a remedy without controlled trials or statistical tests because the effect would have been explicit. With the latter, the confounding actions of the immune system are reduced, allowing past physicians to better judge the efficacy of remedies.

Aside from accurately translating texts, plant names, and diseases, therefore, the historian can provide the context for the historical medical texts. Being familiar with the culture and theories that shaped the texts and the medical traditions documented within them, the historian is equipped with the tools to answer the questions: “What kind of bodily response was this remedy designed to elicit?” “Based on the kind of disease for which the remedy is meant, would a physician have been able to accurately determine the efficacy of the remedy?” “Did theory shape the construction of this remedy?” Answers to these questions can help bring certain premodern remedies, those that are most likely to have desired effects, to the fore. The ethnopharmacologist can then test the remedy in the laboratory. Therefore, to successfully screen through premodern remedies, the historian’s work in understanding the cultures, medicine, and sciences of the past is paramount.


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