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Indian Imaginaries of Chinese Success in the Global Herbal Medicine Market

A Critical Assessment

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Abstract

India's share in the global herbal market is dwarfed by that of China. Public and policy discourse in India exhorts Ayurvedic stakeholders to emulate Chinese medicine's "science-based approach" to expand their global market share. But contrary to popular perception in India, China has been largely unsuccessful in making inroads into the coveted Euro-American herbal medicine market. Chinese medicine's global footprint is largely the result of historical-cultural links, diasporic influences, and acupuncture practitioners. With national traditional medicine policies increasingly shaped by the evidence-based regulatory paradigm, the future of these informal bottom-up pathways is uncertain. Ignoring the roots of Chinese medicine's global career has led to a distorted image of its "success" as an outcome of state investment in scientific validation and standardization programs. Our findings underscore the need to critically examine the imaginaries of success that drive stakeholders of non-biomedical traditions toward scientization to earn legitimacy and profits in the global realm.

Keywords

Globalization – Ayurveda – Indian medicine policy – Chinese medicine – herbal medicine – evidence-based medicine

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Introduction

Between the late 1980s and mid-1990s, many Asian countries undergoing market liberalization launched schemes to globalize their sale of traditional medicines, hoping to garner a share in the fast-expanding multibillion-dollar global herbal market.[1] The earliest among them to wake up to this opportunity was China, which began restructuring its traditional medicine sector in the early 1990s with a focus on the global commercial potential of Chinese medicine.[2] Although counted with Chinese medicine as the largest and the most influential of Asian medical traditions,[3] Ayurveda lags far behind in its global market accomplishment. In 2015–16, Indian medicinal herb and herbal product exports amounted to a mere $358.6 million, estimated at 0.5 percent of the global herbal market.[4] During the same period, the value of China's exports was $3.8 billion,[5] ten times that of India.[6] This performance gap looms large in the mainstream discourse surrounding globalization of Ayurveda. For Ayurvedic stakeholders with global aspirations, China serves as both a competitor to catch up with and a model to emulate.

The specter of competition from China has been instrumental in effecting radical policy changes in the Indian economy. The first critical step in India's economic liberalization, the devaluation of Indian currency, was justified by citing competitive pressures from China in the export market.[7] Similarly, a narrative of Chinese medicine's global success shapes the policy and discourse of traditional medicine in India. For both China and India, the desire to repackage traditional medicine as modern and scientific is inextricably linked to global ambitions, national identity, and a newly cultivated neoliberal value system. The anxiety to "get on track with the world" that had gripped China in

1 Estimated at $60 billion in 1991, expected to exceed $107 billion by 2017. Nutraceuticalsworld 2012.

2 Hsu 2008a. In keeping with anthropological usage, we use "Chinese Medicine" as an umbrella term to include all schools of Chinese medicine, old and new, including Traditional Chinese Medicine (TCM) which, to quote Hsu is "a form of Chinese medicine promoted in government-run institutions between the late 1950s and early 1990s" (Hsu 2008, 466).

3 Alter 2005, 24.

4 Based on global market estimated at $70 billion (*Economic Times* 2016). This is likely an underestimate; the market size was $83 billion in 2008 according to WHO estimates (Robinson and Zhang 2012).

5 State Council of PRC 2016.

6 This would amount to 5 percent of the global market, on the basis of the above estimate of $70 billion.

7 Alamgir 2005, 16.

the 1990s[8] caught up with India a decade later.[9] This is evident in a report on medicinal plants published by the Indian Planning Commission in 2000. The report underscored the need to speed up the development of pharmacopoeia standards because "countries like China have gone ahead and have captured a major share of global export market. India cannot wait."[10]

In public and policy discourse in India, Chinese medicine's success in the global market is largely attributed to its "progressive," "science-based approach," a model that Ayurvedic stakeholders are urged to follow. Authors of a highly cited comparative analysis of traditional medicine in China and India capture what has become commonplace thinking about China's success and the direction India must follow: "China has successfully promoted its own therapies over the globe with a science-based approach.... Global acceptance of Ayurveda is gearing up," and "increasing use of traditional therapies demands more scientifically sound evidence for the principles behind therapies and for effectiveness of medicines." The authors further argue that various approaches taken by China, such as standardizing raw materials, streamlining agricultural practices, and so on, are essential "to raise the image of Ayurvedic medicines in the global business."[11]

This discourse on "Chinese success" is based on the assumption that China's investment in scientific R&D has paid off by giving Chinese medicine global legitimacy and access to the lucrative global herbal medicine market.[12] However, when one looks beyond general references to China's success in Indian scholarly literature,[13] media accounts,[14] and policy discourse,[15] few details emerge about particular marketing strategies followed by Chinese medicine stakeholders, and little evidence is available to link Chinese medicine's science-based product strategies with China's accomplishments in the global herbal

8 Zhan 2009, 43.

9 A number of measures were initiated, including Good Manufacturing Policy (2000), creation of the National Medicinal Plant Board (2001), an intellectual property bill (2001), and the first separate national policy on traditional medicine (2002). For further discussion, see Banerjee 2004.

10 Planning Commission 2000, 108.

11 Patwardhan et al. 2005, 465–68.

12 The sources for our findings include Kudlu's field notes of seven national and international Ayurvedic conferences held in India between 2008 and 2016 (see Kudlu 2013, 2016); articles on Ayurveda in Indian journals of Ayurveda, ethnobotany, ethnopharmacology, and evidence-based medicine; and media reports and features on Ayurveda.

13 See, e.g., Dubey, Kumar, and Tripathi 2004; Aneesh et al. 2009; Katiyar 2012; Gupta et al. 2014; Singh 2015.

14 See, e.g., Dogra 2006; *Financial Express* 2016; Pisupati 2017.

15 See, e.g., Planning Commission 2000; Press Information Bureau 2014.

market. To gain deeper insight into Chinese medicine's global market success, and the extent to which it is based on adopting a science-based approach, we examined a variety of information sources, including academic articles from multiple disciplines, articles in the media, business reports, and policy documents.[16] Since the Euro-American herbal medicine market is the key target of both Chinese and Indian medicine stakeholders,[17] our review primarily aimed at understanding whether and to what extent science-based strategies have helped Chinese medicine gain access to this lucrative market.

The findings of our review contradict Indian claims of "Chinese success." While crude herbs and herbal extracts dominated China's herbal product exports, dietary supplements dominated the Chinese processed herbal product segment in Western markets. The current global pharmaceutical footprint of Chinese medicine was found to be constituted through various pathways created by long-standing historical-cultural links with East and Southeast Asia, post-1950s socialist-diplomatic ties in parts of the developing world, East Asian diasporic influences, and the global spread of acupuncture. The incongruence between the Indian imagination of China's success and Chinese medicine's realities, we argue, has arisen from lack of attention to the foundational and continuing contribution of these multiple historic roots, channels, and dimensions of Chinese medicine's globalization.

16 Over a period of two years, we searched databases maintained by PubMed, Science Direct, and Google Scholar using such search keywords as "Chinese medicine exports," "Chinese herbal medicine exports," "Chinese herbal pharmaceutical exports," "herbal medicine EU market imports," "herbal medicine American market imports," "informal global pathways of Chinese medicine," "herbal medicine pathways of legitimacy in western markets," "herbal medicines in China and EBM," "clinical trials," "intellectual property," and so on. We collected over 1,000 sources written in English from journals of complementary/traditional/integrative medicine, Ayurveda, Chinese medicine, ethnomedicine, ethnopharmacology, and the social sciences, with special attention given to medical anthropological research on Asian medicine and sociological works on complementary and alternative medicine. Also accessed were press reports, industry reports, and business case studies. Since we did not have access to Chinese-language journals, we made it a point to collect key review articles by scholars of Chinese medicine who have extensively cited Chinese-language sources. We referred to journals originating in China such as *China Economic Review*, *World Journal of Traditional Chinese Medicine*, and *Chinese Business Review* and media publications such as Xinhua, *Asian Times*, *China Daily*, and *Global Times*. Nichter also consulted his professional network of scholars who study traditional Asian medicine, ethnomedicine, and pharmaceutical practice.

17 European and North American markets constitute 45 percent and 11 percent of the global herbal market respectively. Agarwal et al. 2013.

The role of grassroots herbalists in taking Chinese herbal medicine products across the world has been noted by Fleischer, Su, and Lin.[18] Acupuncture, the trailblazer for Chinese medicine in much of the world, deserves special attention for carving a legitimate space for Chinese medicine products and therapies within Euro-American medical regimes. Although primarily used as a specialist therapeutic tool, acupuncture acted as a conduit for the flow of Chinese medicine techniques, philosophies, herbs, and medicines.[19] While acupuncture's contribution to popularizing Chinese medicine in the West has been well recognized,[20] our review highlights its role in facilitating the flow of Chinese medicine herbs and medicaments. We also call attention to the impact of "regulatory globalization"[21] on Chinese medicine's bottom-up pathways of global expansion. A brief review of the status of Chinese medicine exports in the aftermath of a European Union (EU) directive on herbal medicines illustrates how the tightening of centralized drug regulatory regimes has come to impede the organic expansion of Chinese medicine's global pharmaceutical footprint.

The primary aim of this review paper is to flag discrepancies in the mainstream Indian narrative of Chinese success, hoping to provide pointers for further investigation. We argue that lack of attention to bottom-up medicocultural pathways of globalization leads to a distorted image of Chinese medicine's global footprint, which in turn misleads Indian medicine stakeholders into overestimating the power and reach of a "science-based approach" to globalization. However, it is important to note that this narrative of success is not shared by Chinese medicine stakeholders in China, who are acutely conscious of their inability to breach Euro-American evidence-based herbal medicine markets. Analyzing key strands of Chinese medicine's mainstream narrative emerging from the review of literature, we show how a narrative of "potential success" helps in maintaining the dominance of the evidence-based medicine approach to pharmaceutical innovation, regardless of its poor rate of return.

The political economies of global imaginaries that inform policy and discourse surrounding the globalization of traditional medicine pharmaceuticals are similar across India and China. However, embracing the evidence-based medicine pathway constitutes a significant ideological departure for Ayurveda,

18 Fleischer, Su, and Lin 2017, 107.

19 Kaplan 1997, S7.

20 Furth 2011; D. R. Kim et al. 2016.

21 The term "regulatory globalization" is used to refer to "the process which concerns the rules and regulations that facilitate and control the spread of drugs and, in the case of TCM drugs, that may secure its status as legitimate or disqualify them when they travel globally" (Kuo 2015, 318).

whereas for Chinese medicine it is only a natural extension of a biomedicine-friendly approach to modernization adopted by the People's Republic of China (PRC) post-1950s.[22] We point to the need for Indian medicine stakeholders to be exposed to multiple dimensions of Chinese medicine globalization, to the critical voices of Chinese medicine stakeholders unrepresented in mainstream literature, and also to critical social science literature on the political economy of regulatory barriers that impede transnational movement of traditional medicine pharmaceuticals.

The Global Footprint of China

Limited Successes in the Evidence-Based Pathway

Chinese herbal product exports can be categorized into three classes: crude herbs, sliced herbs, prepared/finished products. Finished products include herbal medicines and herb-based healthcare products (food supplements and cosmetics). For the science-based approach to be considered instrumental to Chinese medicine's success in the global market, proprietary Chinese herbal medicine products would have to constitute a substantial proportion of herbal exports. But this is not the case. In 2015, only 14.6 percent of herbal exports were finished products. Crude herbs and extracts were found to constitute over 80 percent of total Chinese herbal exports.[23] It would be erroneous to count herbal extract exports among Chinese medicine's global accomplishments. Besides being delinked from Chinese medicine pharmacology, they are exported as ingredients for a variety of non-Chinese medicine products such as biomedical drugs, cosmetics, perfumes, dyes, and food products.[24]

The magnitude of finished herbal product exports is still noteworthy, amounting to around $200 million each in the Chinese herbal medicine and healthcare product segments.[25] However, Chinese medicine can barely claim to have breached European or American herbal medicine regulatory barriers, which are governed respectively by the Traditional Herbal Medicinal Products Directive (THMPD) and the United States Food and Drug Administration (USFDA) botanical drug pathways. As of 2015, only two of the 1,577 herbal

22 See Banerjee 2004, 92.

23 In 2015, Chinese herbal medicine exports were constituted of 56.8 percent plant extracts, 28.6 percent Chinese herbal medicine products and decoction pieces, 7.3 percent healthcare products, and 7.3 percent finished Chinese medicine products; patent medicines constituted only 3–4 percent of exports. Liu et al. 2016, 365.

24 J. Xu and Yang 2009, 134; Liu et al. 2016, 365.

25 Liu et al. 2016, 365.

products approved under the EU's Traditional Use Registration[26] were based on Chinese herbal medicines.[27] Of the 768 marketing authorizations for herbal medicinal products granted under the EU's "Well-Established Use" scheme,[28] only one was based on Chinese herbal medicines.[29] Likewise, only one Chinese herbal medicine-based product has received approval by the USFDA's botanical drug pathway since 2004.[30] Most Chinese herbal medicine-based proprietary products imported into Euro-American markets are dietary supplements, food products, and cosmetics.[31]

In the past decade, a handful of Chinese medicine companies, universities, and research institutes have been successful in Investigational New Drug (IND)[32] submissions to the USFDA's botanical pathway. Moreover, around 25 percent of the total applications are based on Chinese medicine herbs.[33] While these can be counted among returns to Chinese medicine's investment in scientific research and development, INDs do not necessarily lead to successful drugs. In fact, most of the over 400 pre-INDs and INDs submitted are intended for phase I and II studies to investigate preliminary safety/efficacy; few are intended for phase III trials leading to approvals of new drugs.[34] Summing up their experiences in reviewing over 350 applications up to 2007, the USFDA's botanical team led by Shaw Chen points out that IND submissions are often misused by opportunistic manufacturers to claim scientific

26 European Medicines Agency 2016, 2.

27 Phynova Joint and Muscle Relief Tablets and Isatis Cold and Flu Relief were approved as over-the-counter drugs by the United Kingdom's Medicines and Healthcare Products Regulatory Agency in early 2015; see Chunyan 2015.

28 European Medicines Agency 2016, 2.

29 Diao Xin Xue Kang capsules for the treatment of myocardial ischemia were approved under the simplified registration scheme by the Dutch Medicines Evaluation Board in 2012; see Nan, Yu, and Haoting 2014.

30 Veregen, a topical wart treatment, was approved by the USFDA in 2006; see *China Economic Review* 2013.

31 See, e.g., Job et al. 2016; Sammons et al. 2016.

32 IND status provides drug investigators with an exemption from mandatory marketing-approval regulations governing the distribution of a drug under investigation across state borders (within the United States) for the purpose of conducting clinical trials. This requirement is applicable only to a drug studied for its effect on a disease and not to a dietary supplement whose impact is limited to structure and/or function of the body. IND status is not mandatory for the first two phases of the three-phase drug approval process, if clinical studies are done abroad. Once there is sufficient evidence on the drug's safety and effectiveness to meet the USFDA's requirements for marketing approval, the sponsor submits a new drug application (NDA); see https://www.fda.gov/drugs/development approvalprocess. For further discussion, see Chow 2016, 373–80.

33 Tai-Ping Fan et al. 2012, 579.

34 Ibid.

credentials for already-marketed dietary supplements, exploiting laypersons' inability to distinguish between INDs and approved drugs. Trials are often terminated midway, because unfavorable results could jeopardize their current market.[35] Some applicants also use delaying tactics to prolong their IND-status claim, as in the case of the media-hyped Compound Danshen Dripping Pills (alternatively named Dantonic Capsules).[36]

While there is much hype in the Chinese media about a handful of products currently under trial,[37] many reports also highlight stakeholder concerns regarding the cost and time required for regulatory approval.[38] An illustrative case is that of the botanical Phy906, which has passed the USFDA's phase II trials as an adjuvant in several cancer therapies. Wen-Hua Kuo's ethnography shows how the excitement over the drug gradually declined as it was dragged through a fifteen-year-long regulatory journey from innovation to publication of its phase II results in 2014.[39] A modernized form of the traditional four-herb Chinese herbal medicine Huang-Qin Tang, Phy906 was formulated in 1999 by pharmacologist Yun-chi Cheng, cofounder of the Yale University—sponsored start-up Phytoceutica Inc. Heavily publicized as the first Chinese medicine-based compound drug to get IND approval, Phy906 was touted as a trailblazer for polyherbal Chinese medicine. Phy906's fame led to the formation of the Consortium for Globalization of Chinese medicine in 2003 under Cheng's leadership. While the consortium emerged as an international platform for globalizing Chinese herbal medicine, bringing together influential stakeholders across the globe, Phy906 quietly disappeared from center stage. With one of its key corporate sponsors shifting focus toward nutritional supplements, the drug was sold to Kadmon Pharmaceuticals in 2012. Renamed KD018, the once-celebrated botanical continues to languish in the USFDA regulatory path.

Three other highly publicized drugs—Dantonic Capsules, Kanion Capsules, and HMPL-004—which completed USFDA phase II trials as botanical drugs in 2009 and were expected to be on the market by 2014,[40] have not yet seen the light of day. The most celebrated, commercially successful scientific accomplishment of Chinese medicine to date is the Nobel Prize—awarded innovation antimalarial artemisinin. However, recent ethnographies of the artemisinin market in Africa call into question the narrative of beneficence

35 S. Chen et al. 2008, 1080.

36 L. Wang and Hepeng 2011.

37 For example, Hutchison Meditech's HMPL-004, Tasly Pharmaceutical's Compound Danshen Dripping Pills (Dantonic Capsules), and Luye Pharma's Xuezhikang.

38 For examples, see *China Economic Review* 2013; Tian 2014.

39 Kuo 2015.

40 Xiang et al. 2014, 406.

that has been used to promote the evidence-based approach to pharmaceutical innovation.[41] The World Health Organization's (WHO) advocacy of the biomedical artemisinin combination therapy as the preferred antimalarial treatment has displaced traditional artemisinin products proffered by petty Chinese medicine practitioners in Africa[42] and has diverted attention away from exploring the efficacy of more affordable[43] Chinese medicine-based alternatives.[44]

The fear of intellectual property appropriation is pervasive in the Chinese media discourse surrounding Chinese medicine's globalization.[45] Increased focus on scientific research and development has certainly led to a noteworthy increase in Chinese medicine-based drug patents within China, growing steadily from 43 in 1985 to 629 in 1992, and rising sharply to 2,166 in 2000. Although international applicants constituted only 1.4 percent of the domestic Chinese medicine-based patent applications in China, what ultimately matters is not the number but the commercial viability of patents. Although only four of the 68 patents on the Chinese medicine herb ginkgo are owned by foreigners, they cover almost all the ginkgo extraction processes.[46] Notably, China's science-savvy neighbors have raced far ahead in exploiting Chinese medicine's global brand value. China holds only a 3–5 percent share of the global processed herbal medicine/supplement market (outside China), while Japan and Korea together hold 80–90 percent.[47] Imports from Japan have also begun to threaten Chinese medicine's domestic stakes, as Chinese consumers tend to believe "made in Japan" products to be of better quality.[48] The popular perception that Chinese herbal raw material is of lower quality is an added problem that Chinese medicine stakeholders have to contend with. In recent years, the Chinese market has begun to be flooded by high-value "foreign herbs" originating mostly from Germany, Japan, South Korea, and the United States.[49]

41 Meier zu Biesen 2010; Hsu 2015.

42 Meier zu Biesen 2010.

43 Although the drug Coartem produced by Novartis is supplied at subsidized rates through the public healthcare system, research reports on antimalarials in African countries show that because of poor accessibility consumers depend on the private sector, where commercial drugs containing artemisinin are far more expensive (see, e.g., Meier zu Biesen 2010; Onah 2018; Alonso, Munguambe, and Sicuri 2017).

44 For examples, see Willcox et al. 2011; Elfawal et al. 2012; Hsu 2015.

45 See, e.g., Chen Tian 2014; Wenshu 2015.

46 Yongzhong and Xuezhong 2009, 47.

47 Ibid., 54.

48 Yiming 2016.

49 Teng et al. 2016, 1229.

Bottom-Up Globalization of Chinese Medicine: Multiple Pathways

Much of the discussion regarding Chinese medicine's success in penetrating global markets is focused on Western markets. However, it is a fact that the vast majority of sales of Chinese medicine are in Asian markets, along well-established routes paved by diasporic networks and long-standing medicocultural exchanges. What is referred to as "Chinese medicine" today is, in fact, part of a collective historical medicocultural tradition better represented by the terms "East Asian medicine" or "oriental medicine." Other prominent members of this collective are Japanese Kampo and Korean Hanbang. China is also home to ethnic medical traditions like Tibetan, Uighur, and Mongolian, which provide a substantial traditional medicine market in Central Asia and Russia. The traditional medicine policy of the PRC incorporates conscious strategies to exploit these traditional routes for Chinese medicine's global expansion. The "Belt and Road" strategy formulated in 2014, integrated within the Traditional Chinese Medicine Development Plan for 2015–20, aims to exploit historic connections along the Silk Road stretching through Central Asia.[50] Countries along this route are considered a natural destination for Chinese medicine products since these countries have a relatively high level of acceptance of Chinese medicine.[51]

The Chinese medicine market in East and Southeast Asia is largely a natural extension of its domestic market. In 2015, this region alone accounted for 60.7 percent of China's raw and processed herbal medicine exports.[52] A Chinese media report on an impending EU herbal directive in 2011 observed that while the directive would adversely affect exports to Europe, the potential economic loss for Chinese firms might be minimal since the primary markets for Chinese medicine were domestic and Southeast Asian markets.[53] Until recently, globalization for Chinese medicine manufacturers primarily meant eastward expansion. Cochran observes that between the 1880s and 1950s, Chinese businesses surpassed their Western counterparts in capturing Chinese and Southeast Asian medicine markets.[54] An illustrative case is China's oldest Chinese medicine manufacturer Tong Ren Tang Pharmaceuticals. Founded in 1644, it was a supplier to the Imperial Pharmacy during the Qing dynasty. As early as 1920, it was marketing its medicines throughout China and Southeast Asia. Today it has clinic-pharmacies in most of East and Southeast Asian

50 Yingqi 2015. Also see Liu et al. 2016, 367.

51 Liu et al. 2016, 367.

52 Some key importing countries include Hong Kong, Japan, Malaysia, South Korea, Indonesia, Vietnam, and Singapore (Boyuan 2015).

53 Xinhua 2011a.

54 Cochran 2006.

countries,[55] but as of 2011, its Western presence was limited to a single outlet in the United Kingdom and two each in Canada and Australia.[56] These outlets catered primarily to the Chinese diaspora; only 10–20 percent of clientele were non-Chinese.[57]

Although acupuncture had reached the United States in the early 1800s via Chinese immigrants, its practice was largely restricted to immigrant communities.[58] The modern career of acupuncture in the United States took off only in the 1970s. American public and professional interest in acupuncture was first triggered by media reports of miraculous cures that followed Nixon's visit to China in 1972. Widespread media coverage on its clinical successes soon catapulted acupuncture into the popular imagination of the American public. The successful cure experienced by a sports celebrity and a few other highly publicized cases fostered interest in acupuncture and by extension other forms of Chinese medicine. American practitioners returning after acupuncture training in Europe and China in the late 1970s met with an enthusiastic public reception. Within the span of a decade, an entire system for acupuncture training and accreditation had become established in the United States.[59] By the turn of the millennium, forty-five states had legalized acupuncture; there were fifty accredited schools as of 2006 and 27,835 registered acupuncture practitioners as of 2012.[60]

While recognizing the role of acupuncture in the popularization of Chinese medicine in the West, Furth raises a pertinent question: "How was it that in the second half of the 20th century Chinese medicine, and not some other tradition like Ayurvedic medicine or homeopathy, came to dominate the discourse about the alternative medical scene in the US?"[61] She attributes Chinese medicine's dominance and popular acceptance to the ending of Cold War barriers in 1970 and to the post-1965 flow of new Asian immigrants. Historians' accounts show how Chinese medicine's status in the West waxed and waned between the sixteenth and twentieth centuries in tune with shifting public perceptions of China's status.[62] It is therefore important to factor in the contribution of geopolitical considerations and diplomatic channels to Chinese medicine's

55 Romann 2011.
56 Mo 2011.
57 Yingqi 2015.
58 Kaplan 1997, S7.
59 Ibid., S8.
60 NCCAOM, n.d.
61 Furth 2011, 17.
62 D. R. Kim et al. 2016, 19–22.

global footprint. Although practitioners are typically the agents of influence on the ground, diplomatic channels often provided the enabling conditions for medicocultural exchanges. Western pioneers of acupuncture were primarily European diplomats posted in China and Japan.

Diplomatic channels played a key role in taking Chinese medicine to Africa. In the 1950s, as part of Cold War era diplomatic initiatives to build a nonaligned third front, China began to dispatch medical aid packages to parts of the developing world, including Africa. By 1976, China's medical personnel had reached sixteen African countries. The aid provided was modeled after medical practice in rural China and included both biomedicine and acupuncture. By the 1970s, acupuncture came to be deployed in mainstream hospitals throughout Africa.[63] Although state driven at the start,[64] the eventual spread of Chinese medicine across Africa was a side effect of long-term relationships of camaraderie and trust created by China's biomedical aid programs.[65] In the 1990s, when restrictions on private practice were removed, these sociopolitical links were put to use by Chinese medicine practitioner-entrepreneurs from China who began to immigrate to countries like Kenya and Tanzania to take advantage of business opportunities. These practitioners tended to rely on standardized medicines rather than custom prescriptions, fueling demand for proprietary Chinese herbal medicine imports.[66] China's interest shifted toward Euro-American and East Asian markets in the 1980s,[67] but outside Asia and the West, Africa is reportedly among the fastest-growing markets for China's pharmaceutical exports, both Chinese medicine and biomedicine.[68]

Recognizing the heterogeneity of Chinese medicine globalization and the contribution of bottom-up pathways to Chinese medicine's performance in the global herbal market could alert Indian stakeholders to the potential of Ayurveda's own cultural capital. Although Ayurveda's global footprint is much smaller, it has no dearth of historical-cultural pathways and cultural resources to capitalize on. Very similar to China's position in East and Southeast Asia,

63 Zhan 2009, 37–38.

64 Hsu (2008b) identifies five fields of Chinese medicine influence in Africa: Chinese biomedical doctors and Chinese medicine practitioners who arrived as part of socialist aid programs, medical exchange students, the WHO-promoted Chinese medicine pharmaceutical model of the early 1980s, and post 1990s private sector constituting largely of immigrant Chinese medicine doctor-entrepreneurs. Of these, the third is particular to Tanzania.

65 Hsu 2002.

66 Hsu 2008b.

67 Zhan 2009, 25.

68 *China Economic Review* 2012; Friesen 2013.

India is the origin and core of the medicocultural geography of South Asia extending to Southeast Asia. Indian medical texts have traveled across the world through Buddhist channels, and trade routes have carried them to Central and Southeast Asia, including Japan and China.[69] The thirty-million-strong Indian diaspora spread across 125 countries is another important source of cultural capital. Legal recognition of Ayurveda in East Africa, Thailand, Mauritius, and Oman indicates the potential of various streams of diaspora, old and new, to act as cultural ambassadors.

The Indian diasporic influence is insignificant in Euro-American markets,[70] but the well-established brand values of yoga[71] and *pañcakarma* (a class of cleansing techniques and associated therapies)[72] provide ready conduits for Ayurvedic medicaments to flow.[73] Ayurvedic medicines are marketed through these channels as dietary supplements, often capitalizing on the reputation of established medicoreligious therapy brands. This market tends to be driven by consumer demand for holistic and wellness-oriented medicine rather than science-based curative herbal drugs. An illustrative example is the "Maharishi Ayur-Ved" brand, which promotes dietary supplements as a self-help approach to Ayurveda, guided by a simplistic humoral (*doṣa*-based) self-diagnosis. Although targeted at the mass market, "product differentiation" is the key marketing strategy used. Claims of "superior quality" are made on the basis of qualitative credentials of "distinction" rather than evidence-based standards or standards of classical Ayurveda.[74] While this does not render the evidence-based approach irrelevant, it certainly calls into question the rationale of its dominance in the discourse and policy of Ayurvedic globalization.

69 For details, see Zysk 1998; Salguero 2014; Sen 2003, 2017.

70 Reddy 2002.

71 A survey of complementary and alternative medicine in the United States in 2012 shows that while Ayurveda was used by only 0.1 percent of the population, yoga's popularity is on the rise, increasing from 5.1 percent in 2002 to 6.1 percent in 2007 and to 9.5 percent in 2012. This was also much higher than acupuncture (1.5 percent), tai chi (1.1 percent), and qigong (0.3 percent). See Clarke et al. 2015.

72 *Pañcakarma* is practiced in combination with herbal medicines. The post-1990s boom in Ayurvedic tourism in Kerala has opened up the global market for *pañcakarma* therapies and medicines, especially Ayurvedic oils for massages.

73 Although yoga is a school of nonmedical practice, in the Western imagination of an integrated Indian medicoculture, Ayurveda is seen as being naturally associated with yoga.

74 Humes 2008.

Bottom-Up Pathways Restricted by Centralized Regulatory Regimes: the Case of the EU's Traditional Herbal Medicinal Products Directive

Having gained mainstream acceptance in much of the Western world by the 1980s, acupuncture provided ready cultural capital to exploit when the Chinese government launched its project of globalizing Chinese medicine. The role of acupuncture practitioners in popularizing Chinese medicine has been well recognized by medical historians and anthropologists.[75] Here, we call attention to the significance of their role in facilitating the movement of Chinese herbal medicine products, especially in Euro-American markets where Chinese medicine lacks statutory legitimacy.

Of the forty-five US states that have legalized acupuncture, twenty-six allow Chinese herbal medicine within the scope of practice and eleven require formal certification in Chinese herbology.[76] Most acupuncture schools in the United States offer full-fledged courses in oriental massage, herbalism, and dietary therapy.[77] Chinese medicine achieved a new milestone in early 2014 when Cleveland Clinic, a top-rung hospital, opened the Chinese Herbal Therapy Clinic as part of its Center for Integrative Medicine. This development was made possible by new legislation allowing herbal therapy in the state of Ohio.[78] Chinese herbal medicine products used in clinics in the United States are primarily regulated as dietary supplements.[79] The USFDA's drug regulatory framework had long been unfriendly to herbal medicines until it opened up a separate botanical pathway in 2004, a development that was celebrated as a new window of opportunity for Chinese medicine manufacturers.[80] However, the entry barriers are so high that, as mentioned earlier, only two botanical drugs have been approved in over a decade, one of which is based on Chinese medicine.

In Europe, Chinese medicine clinics combining acupuncture and Chinese herbal medicine have flourished in countries with a liberal complementary and alternative medicine policy. Since herbal medicine is an integral part of acupuncture practice, it is common for acupuncture clinics to house pharmacies

75 Unschuld 1998; Hsu 2008a; Furth 2011; D. R. Kim et al. 2016.
76 NCCAOM, n.d.
77 Baer et al. 1998.
78 Hart 2014, 334.
79 Tai-Ping Fan et al. 2012, 579.
80 See, e.g., Jia and Zhang 2005, 231.

or health product stores, or both.[81] For instance, the United Kingdom and the Netherlands have around 3,000 and 1,600 Chinese medicine clinic-pharmacies respectively.[82] On average, around 500 Chinese medicine drugs are used in a typical European Chinese medicine clinic.[83] Over 150 Chinese herbal remedies are popular in the United Kingdom; the most common ailments addressed include depression, gynecological issues, and skin diseases.[84] One large Chinese herbal medicine clinic-pharmacy in the Netherlands reportedly proffers 150 Chinese herbal medicine products, 450 herbal drinks, and 80 granule products.[85] This long-standing Chinese herbal medicine product market was disrupted by the THMPD of 2004, which took effect on April 30, 2011, and banned all industrially manufactured traditional medicines that could not prove a history of thirty years of use in a European country or a fifteen-year presence in the EU market. Herbal medicines were to be available only by prescription; all over-the-counter herbals had to be approved either under the Traditional Use Registration scheme or under the Well-Established Use scheme.

Although a seven-year window was provided for registration of products hitherto sold in European markets without a license, not a single Chinese medicine product was registered by the deadline. Even large companies with a long-term presence in the European market found it difficult to muster the capital required for drug approvals and registrations.[86] Reportedly, even the largest herbal drug company, Taiji Group, with a turnover of $300 million (as of 2001), encountered financial and technical difficulties in meeting international business demands.[87] A majority of Chinese medicine companies are small and medium enterprises, specializing in the production of traditional Chinese herbal medicine products.[88] Not surprisingly, the average Chinese medicine manufacturer evinces little interest in the global market.[89] In addition to standardization challenges posed by the natural variability of traditional herbs and multicomponent Chinese herbal medicine products,[90] the Chinese medicine

81 For a descriptive account of Chinese medicine clinics, see Haizhou 2011.

82 Liu et al. 2016, 362.

83 M. Wang and Franz 2015, 13.

84 Haizhou 2011.

85 Xinhua 2016.

86 Liu et al. 2016; S. Wang, Van der Borght, and Song 2016, 532–33.

87 Jia and Zhang 2005, 244.

88 Ibid., 363–64; S. Wang, Van der Borght, and Song 2016, 530–33; Jia and Zhang 2005, 244.

89 Liu et al. 2016, 370. According to State Council of PRC 2016, there are 2,088 Chinese herbal medicine manufacturers in China.

90 Several factors contribute to this variability, including differences in raw-material quality, naming practices, and composition. Drugs with the same name need not have the same ingredients. For example, Ganmaoling, a drug for the common cold, is manufactured by

industry is grossly underequipped to meet global market standards in terms of manufacturing standards and quality control.[91] The status of the traditional medicine sector in Korea is no different.[92] While Korean exploits in the global processed-herb market are commonly attributed to its superiority in modern production technologies, Korean traditional medicine manufacturers face similar barriers.[93]

The problem is further compounded by the practical difficulty of protecting the intellectual property of complex natural-product formulations.[94] The complexity of polyherbal medicines makes the approval process time-consuming as well as expensive. Long-drawn-out regulatory processes may be routine for a modern pharmaceutical company with deep pockets and steep profit margins, but they are not affordable for most Chinese medicine manufacturers, who survive on small profit margins in the highly saturated domestic market.[95] The chairman of the European Herbal and Traditional Medicine Practitioners Association noted that the THMPD was an "unsuitable vehicle" for Chinese medicine given the complexity of polyherbal medicines. Even those who could afford the cost failed to satisfy European authorities on stability and toxicology criteria.[96] Although proprietary Chinese medicine products in China are subject to biomedical-style safety and clinical trials,[97] Chinese medicine scholars draw a distinction between "modernization" and "westernization." The former is considered to be sensitive to Chinese medicine's complexity whereas the

a hundred companies with varying composition. It is also common to find one drug produced under different names. For example, Liuwei Dihuang Pills, a medicine manufactured by over three hundred companies, is marketed under a dozen different names. See Liu et al. 2016,370–71. Also see Jia and Zhang 2005, 244.

91 Liu et al. 2016, 370.

92 The survey of market globalization of 567 Korean herbal medicine manufacturers found that a substantial number of them are small and medium enterprises. A quarter of them had attempted to market their products abroad but had encountered financial difficulties and language barriers and suffered from poor knowledge of marketing strategies and inadequate funds for research and development. See D. Kim et al. 2015.

93 Tian 2014.

94 Besides the difficulty of meeting the novelty criteria for products long existing in the public domain, polyherbals are not easily protectable by patents (Jia and Zhang 2005, 243). It is difficult to ascertain patent infringement, as competitors can easily create new combinations (Yongzhong and Xuezhong 2009, 47).

95 Liu et al. 2016, 363–64; S. Wang, Van der Borght, and Song 2016, 530–33.

96 Haizhou 2011; Chunyan 2013.

97 Since the 2007 revision of drug registration by China's State Food and Drug Administration, new TCM drug registrations are subject to strict safety evaluation and clinical trial regulations on a par with those pertaining to chemical drugs. TCMs with a long history of use may be eligible for partial exemption (Wan-Ying Wu et al. 2014).

latter is seen as a universalistic application of evidence-based protocols for determining efficacy, effectiveness, and safety.[98]

Observing the cost and time involved in gaining regulatory approvals, a health sector consultant struck a cautionary note. Pointing out that going global was a "highly risky" affair, he advised Chinese medicine companies not to venture west unless they were certain of the product's sales potential in Western markets.[99] While the USFDA's botanical drug pathway lowered the requirements for botanicals, it takes close to a decade to get through the three phases of clinical trials and is estimated to cost over $15 million.[100] As for the EU market, the per-product cost for approval under the THMPD is estimated to be between $114,000 and $462,000.[101] Even in the United Kingdom, which accounts for 13 percent of total Chinese medicine exports, individual product sales are too low for Chinese medicine companies with large product ranges to go through the approval process. For a company with eight hundred products, registration fees could equal its whole turnover.[102] The cost is further compounded because EU regulations are interpreted differently in each member country, with each country requiring a separate registration.[103] A Mutual Recognition Procedure is available within the THMPD, but as of 2012, no manufacturer has taken advantage of it.[104]

The definition of what constitutes a drug varies from country to country, even within the EU. While Germany, Austria, and Denmark regulate herbal medicines as medicinal products, France and Sweden classify herbal medicines under a specific category called "herbal traditional products." In the Netherlands and Portugal, regulatory laws are less stringent, and most herbal medicines are registered as food.[105] Tai-Ping Fan et al. cite the case of Dantonic Capsules to illustrate the paradox that arises when EU agencies "recognize medicinal use in China in one context, but not in another."[106] Since their invention in 1996, Dantonic Capsules, an angina treatment drug, have been legally marketed in more than twenty-six countries as an over-the-counter or prescription drug; in thirty-two countries, including the United States, as a dietary supplement; and in Canada as a traditional drug. Despite their popularity and

98 Q. Xu et al. 2013; Chow 2016, 1–2, 24.
99 Tian 2014.
100 Ibid.
101 See Mader 2011, 24, for the first figure and Xinhua 2011b for the second.
102 Ibid.
103 Liu et al. 2016, 370; S. Wang, Van der Borght, and Song 2016, 531.
104 Tai-Ping Fan et al. 2012, 571.
105 Littoz-Monnet 2014, 6.
106 Tai-Ping Fan et al. 2012, 571.

record of use, Dantonic Capsules did not qualify for the simplified registration path for "traditional use" drugs under the THMPD, as they had no documented use in Europe. On the other hand, they were denied food supplement status in the EU on the grounds of their documented medicinal use in China. Ironically, their medicinal use in China was insufficient for gaining the status of a medicine but sufficient for their disqualification as a food product.

Cultural knowledge and technical expertise in navigating this regulatory maze give Western-origin companies a natural advantage in Euro-American markets. Reviewing key botanical INDs approved by the USFDA, Xiang et al. point out that all of them had been possible only with international cooperation. They advise Chinese medicine stakeholders to actively seek international collaborations in both preclinical and clinical phases to maximize their chance of success.[107] Evidently, negotiating the regulatory process is as much an art as a science. On the basis of her ethnography of Phy906's journey in the USFDA's botanical drug pipeline, Kuo concludes that successful navigation of regulatory barriers is achieved by a complex art of strategic negotiations rather than by means of a simple act of scientific invention.[108]

Biomedical bias in drug registration criteria and a requirement that application for product registration be made only through European companies make the THMPD inherently discriminatory.[109] Europe's Alliance of Natural Health, a natural health nonprofit organization, has legally challenged the THMPD, alleging it is a "protectionist tool" designed to favor the European phytopharmaceutical system while discriminating against non-European traditional systems of medicine.[110] Around 14 herbal medicine interest groups, including Pukka (the largest Ayurvedic herb supplier in the United Kingdom), have backed the alliance's legal challenge against the THMPD.[111] A chairman of a Chinese medicine college with insider knowledge of the regulatory process alleged that major multinational companies had bribed lobbying groups to push the legislation. The high registration fee, he pointed out, was meant to discourage Chinese companies in order to give multinational corporations a larger share of the Chinese medicine market.[112]

Some of these allegations find substantiation in Littoz-Monnet's political economic analysis of the THMPD framing process, which reveals the strategic

107 Xiang et al. 2014, 406.
108 Kuo 2015.
109 S. Wang, Van der Borght, and Song 2016, 532.
110 Mader 2011, 24.
111 Ibid.
112 Xinhua 2011b.

role played by the United Kingdom's Medicines Control Agency.[113] As a body that earned 95 percent of its revenues from licensing, the Medicines Control Agency was motivated by its vested interest in regulating the £300 million UK herbal market; 80 percent of the products sold hitherto had been exempt from licensing. While it failed to browbeat the herbal industry at home, at the EU level it was able to garner support from large herbal product companies, which would directly benefit, as increased regulation would push small businesses out of the market.[114]

Framing herbal licensing as an issue of public safety was key to the success of the Medicines Control Agency in pushing for a centralized regulatory regime. Leading up to the THMPD, a concerted campaign was carried out to sensitize the public to the danger of consuming unregulated herbal products. This also involved a crackdown on small unlicensed Chinese medicine shops.[115] Consequently, even before the THMPD came into effect, the campaign had damaged consumer trust in herbal medicine. For instance, Pukka's product lines decreased by 15 percent, which the company attributes to "doubt, confusion and fear" among both consumers and retailers related to the negative publicity about safety concerns with herbal products.[116] Predictably, after the THMPD's implementation in late 2011, the herbal medicine sector took a severe hit. Asian medicines were particularly affected because of the differential recognition given to traditional usage within and outside Europe and also because nonherbal active substances[117] were not included under the THMPD.[118] The greatest loss was to the Chinese medicine and Ayurvedic medicine that had a substantial European presence.[119]

Mei Man-fong, chairman of the Chinese Medical Council, UK, and president of a London-based clinic-pharmacy chain, witnessed the historic evolution of Chinese medicine in the United Kingdom and observed in 2011 that global demand for Chinese products was at its peak in the previous decade, which he called a "golden period." Regulatory pressures halved the number of Chinese medicine clinics. The THMPD directive, he pointed out, was "a knockout blow to the industry," as patent medicines constituted 40 percent of Chinese medicine consumption in Europe. Chinese medicine clinics tended to depend heavily on modern forms such as pills and granules to cater to

113 Littoz-Monnet 2014.
114 Mader 2011, 25.
115 Ibid.
116 Ibid.
117 Such as minerals, metals, and animal parts.
118 Littoz-Monnet 2014, 9.
119 Sammons et al. 2016, 1118.

demand for convenient and palatable products.[120] Increasing by 6.4 percent in 2011, the value of Chinese medicine product exports plunged by 22 percent in 2012.[121] According to one forecast, around 100,000 Chinese medicine workers were predicted to lose their jobs post-THMPD.[122] Reporting on the impact of the THMPD on the Chinese medicine business, a *China Daily* report states that "therein lies the twist in the tale. Just as TCM [i.e., Traditional Chinese Medicine] makes waves in UK and the rest of Europe with alternative therapies such as acupuncture and massage, it finds itself being denied market access for medications."[123]

One sees a noteworthy parallel when examining the impact of the WHO's promotion of China's Barefoot Doctors program in the 1970s as an ideal model of integrated primary healthcare providing low-cost, culturally sensitive healthcare to all. Recent reviews have found that in actuality the program led to a decline in the popularity of Chinese medicine.[124] The success of the program appears to be based on "more political mythology than actual outcomes."[125] Findings of our review indicate that the feted ability of evidence-based policies to bring global profitability to traditional medicine is likewise another myth that thrives on the promise of future success. But the already-visible wide gap between objectives and achievements of Chinese medicine globalization calls into question the dependability of this promise. In 1996, China's Ministry of Science and Technology and State Administration of Traditional Chinese Medicine set a modest objective of gaining market approval for two to three Chinese medicine-based herbal drugs by 2010, a dream far from being fulfilled nearly a decade later.[126]

Thus, quite ironically, the organic expansion of the Chinese herbal medicine product market was checked at a time when "globalization" was aggressively promoted by the WHO as a justification for international harmonization of traditional medicine standards.[127] Over the past decade, the narrative of global market beneficence has increasingly incentivized national traditional medicine policies to conform to the biomedicalized global health order promoted

120 Haizhou 2011.
121 Liu et al. 2016, 366.
122 *SinoCast Daily* 2011.
123 Chunyan 2013.
124 Barefoot doctors popularized biomedicine in rural China, as the sale of antibiotics was one of the primary means through which they received payment (Fang 2015).
125 Kadetz 2015, 144.
126 Xiang et al. 2014, 403.
127 WHO 2002, 2013. The 2002 WHO Strategy for Traditional Medicine initiated the task of harmonizing traditional medicine regulations across the world, carried forward with renewed vigor by the WHO Strategy for Traditional Medicine, 2014–2023.

by the WHO.[128] As traditional medicine practices and products are subjected to regulation and formalization, informal channels of flow are increasingly restricted.

Tracking the flow of Ayurvedic pharmaceuticals to East Africa, Meier zu Biesen shows how diaspora-based Ayurvedic markets are increasingly restricted by top-down regulatory regimes.[129] The Indian diaspora in East Africa, the vast majority of which are Gujarati trading communities, provide a fertile ground for the development of a vibrant Ayurvedic market. The Kenyan and Tanzanian states recognize a formalized Ayurveda, instituting procedures for drug and practitioner licensing. Despite having access to such a legitimate marketplace, Indian Ayurvedic companies have relied heavily on traditional-cultural capital. While clinical trial data was part of their promotional material, they target doctors "already sensitized" to Ayurveda, that is, doctors with Indian roots or East African doctors who had received medical training in India. The Afro-Indian ideological heritage of the Nehru era diplomacy of nonalignment was another cultural resource utilized. However, despite such strong enabling factors, the companies failed to cash in on increasing consumer demand. Stringent regulatory demands, prohibitive fees, and an arbitrary and corrupt administrative regime made the regulatory barriers impenetrable.[130] Summing up her findings, Meier zu Biesen observes:

> The increasingly liberal market and neoliberal phase of economic globalization brought about reforms in global institutional governance and opened spaces for new drug flows as well as South—South alliances. Despite such alliances, regulations governing the circulation of goods operate at different levels in terms of rules, standards, certification, and guidelines. These differences cause frictions and play a significant role in the process of how Ayurvedic drugs are traded, bounded, or facilitated. The flow of Ayurveda is imbricated in networks and different epistemic frameworks that guide it. At the macro level, global agencies such as the WHO set policy frameworks determining which materia medica should be allowed to flow freely. But while pharmaceutical regulations are essential for accelerating the movement of drugs, they can also act as market entry barriers.[131]

128 Pordié 2010.

129 Meier zu Biesen 2018.

130 However, Ayurvedic medicines continue to circulate unofficially through diasporic networks, mobile practitioners, and illicit trade channels (Meier zu Biesen 2018).

131 Ibid., 340–41.

In the recent past, the Indian government entered into bilateral agreements with many countries for the promotion of Ayurveda, aiming to tap into its shared cultural histories and diaspora linkages. However, the utility of intergovernmental treaties in promoting exports of Ayurvedic pharmaceuticals is likely to be limited if the parties in question are subject to WHO-initiated evidence-based protocols. As the East Africa example shows, the diaspora advantage will be frittered away if the Indian government fails to negotiate an alternative Ayurveda-friendly drug regulatory regime.

Discussion

Indian Imaginaries of Chinese "Success"

Findings emerging from our review of literature on global trajectories of Chinese medicine herbals demonstrate that the prevailing Indian portrayal of Chinese medicine's scientization as "successful" is a presumption backed up by little data, and accepted without critical assessment. The review further reveals that Chinese medicine's global market expansion has benefited far more from preexisting cultural capital than from science-based and state-driven policies. There is no denying that the Chinese state has put in tremendous effort to meet the demands of Western evidence-based regulatory regimes over the past two decades. However, until the recent tightening of regulatory barriers, the expansion of Chinese medicine in the West was largely promoted by informal and often unregulated medico-cultural exchanges.

In both scholarly literature and public discourse on Ayurvedic globalization, Chinese success in the global herbal market is commonly attributed to the post-1980s state project of globalization. In his introductory talk on the WHO's global atlas of traditional medicine at an Ayurvedic conference in India, the editor in chief of the atlas, Gerard Bodeker, called attention to the stark difference between the footprints of Ayurveda and Chinese medicine on the global map. In an attempt to explain the difference, he argued that unlike Ayurveda, which has been carried around the world largely by individual entrepreneurs, globalization of Chinese medicine was primarily a centralized government-led project backed by the WHO.[132] Ignoring East Asian and diasporic factors and overemphasizing the contribution of a "science-based approach" to China's success in the global herbal market have served as justification for subjecting Ayurvedic products and therapies to greater standardization and scientization.

132 Bodeker et al. 2005. International Delegates Forum, Fourth World Ayurveda Congress, Bengaluru, India, December 7–10, 2010.

Some clear parallels are observable between the general context of economic globalization and the specific context of Ayurveda. In both policy contexts, distorted narratives of Chinese success provided the basis for justifying ideological departures. The contribution of the Chinese diaspora[133] and investments and technological input from East Asian economies in kick-starting China's economic growth story[134] have been underplayed in the Indian discourse of economic globalization. Instead, inordinate credit is given to the openness of the Chinese economy, an argument that has helped to justify greater privatization.[135] Much praise is also heaped on the superiority of China's "authoritarian regime," leading to an antidemocratic narrative in Indian public and policy discourse. Pointing out inaccuracies and raising concerns regarding the problematic nature of this narrative, a special report in the *Economist* observed, "Comparison with China has become a distorting mirror in which Indians see their country's shortcomings grotesquely magnified."[136]

Even a decade and a half since India took its first steps to promote globalization, the angst of failing to catch up with China continues to shape public and policy discourse on Ayurveda. On the occasion of the Sixth World Ayurveda Congress in November 2014, the minister of health expressed regret that India had "missed the bus": "It is a pity that China has captured such a huge share of the world market whereas India's presence is nonexistent."[137] In early 2016, inaugurating the "Vision Conclave" of the Global Ayurveda Festival in Kerala, Prime Minister Narendra Modi pointed out that India had the potential to become a world leader in alternative medicine if only it would emulate the experience of countries like China. "Inability to capture the global market signified not the inadequacy of Ayurveda, but the failure of Ayurvedawallahs [the Ayurvedic community]," he said, underscoring the urgent need to innovate products tailored to Western consumers and to establish Ayurveda's presence in international scientific journals.[138]

For well over a decade, scholars of Indian medicine have called attention to the rising influence of evidence-based rhetoric in Indian policy discourse.[139] For Asian medicine stakeholders with global aspirations it has become established common sense to subscribe to WHO's traditional medicine harmonization

133 Between 1979 and 2000, foreign direct investment from the Chinese diaspora constituted a third of China's GDP, three-quarters of which came from East Asia (Lee 2016).

134 Dirlik 2011, 132.

135 Alamgir 2005.

136 *Economist* 2003.

137 Press Information Bureau 2014.

138 Field notes.

139 See, e.g., Banerjee 2004; Bode 2009; Sujatha 2011.

project.[140] In fact, WHO recognition is celebrated as recognition of a medical system's global legitimacy and as a stepping stone to global market success.[141] Although WHO's traditional medicine policy is not overtly coercive, its persuasive power hinges on the barriers created by the structural dominance of biomedicine in Western healthcare markets. Pordié's portrait of a Tibetan medical practitioner illustrates well the confluence of factors that have led Asian medical practitioners to embrace official narratives that favor evidence-based approaches to traditional medicine drug development and testing. Factors noted by Pordié include financial interest, desire for mainstream legitimacy, and fear of intellectual property appropriation.[142] In India, belief in the potential of the evidence-based approach for achieving these ends is bolstered by the perception of its being instrumental to China's global market success.

That the Chinese government has invested heavily in standardization and evidence-based research to promote Chinese medicine's globalization is common knowledge.[143] Policies and measures implemented to standardize various aspects of Chinese medicine production and practice are well publicized in academic literature originating from China.[144] Understandably, the Indian perception of Chinese medicine policy as predominantly "science-based" in its approach to globalization is largely informed by this narrative. However, the portrayal of Chinese medicine's scientization as "successful" appears to be essentially a speculative presumption on the Indian side, as there is little in Chinese scholarly or media discourse to give such an impression. Rather, mainstream Chinese discourse on Chinese medicine displays an acute awareness of Chinese medicine's limited success in the evidence-based pathway. The discontent that pervades the discourse on Chinese medicine globalization in China[145] is hardly distinguishable from that surrounding Ayurveda in India.[146] In both cases, poor global performance is commonly attributed to inadequate standardization, paucity or poor quality of scientific evidence, poor production quality, a fragmented market, the conservativeness of manufacturers, and

140 As outlined in WHO Strategies of Traditional Medicine (WHO 2002, 2013).

141 See, e.g., Q. Xu et al. 2013; Patwardhan 2016.

142 Pordié 2010.

143 A comprehensive account of the current status of Chinese medicine standardization is provided in J. Wang, Guo, and Li 2016.

144 These include international journals of Chinese medicine, traditional medicine, integrative medicine, complementary and alternative medicine, and evidence based medicine.

145 Liu et al. 2016, 363–64; Jia and Zhang 2005, 244; J. Wang, Guo, and Li 2016.

146 See, e.g., Aneesh et al. 2009; Sahoo and Manchikanti 2013; Gupta et al. 2014; Dogra 2006; Sharma 2015.

so on. Notwithstanding such discontent, an optimistic note of "future potential" pervades mainstream discourse on the globalization of Chinese medicine.

Chinese Imaginaries of Future Success

While mainstream Chinese medicine discourse comes across as being fairly realistic and self-critical in its assessment of Chinese medicine's accomplishments in the science-based global herbal medicine market, much hope is reposed in the future potential of the evidence-based pathway to earn legitimacy and profits in the global market. Poor progress in breaching Western herbal medicine regulatory barriers is seen as a temporary problem, best resolved by scientific capacity-building through international collaborations; the recently completed European consortium on Chinese medicine is touted as a milestone in this direction.[147] Not all votaries of scientific modernity are uncritical of the conventional clinical trial protocol. Many mainstream scholars of Chinese medicine consider the evidence-based framework reductionist, but they believe it can be tailored to suit the epistemology of Chinese medicine.[148] Although some efforts have been made in this direction, most Chinese medicine clinical trials tend to rely on biomedical diagnostic categories and fail to take theoretical constructs of Chinese medicine seriously.[149] Other forward-thinking critics advocate viewing Chinese medicine through the lenses of systems biology, pharmacogenomics, and "omics" technologies to overcome current limitations in pharmaceutical technologies.[150] But to date these conceptual frameworks have not resulted in marketable products, leading X. Chen, Pei, and Lu to observe that it is "embarrassing" that Chinese medicine has been unable to make "any key breakthroughs despite using such technologies."[151]

Nevertheless, optimism continues to prevail. The paradigmatic status of science, combined with the invisibility of macropolitical processes that shape global regulatory regimes, gives rise to an underlying perception of evidence-based market barriers as a natural product of science, and hence nonnegotiable. Chinese medicine is inherently vulnerable to this perception, as its modern history has coevolved with the state ideology of scientism. Lei's historic analysis

147 The EU brought together two hundred scientists for coordinated action on TCM research, resulting in the production of twenty editorials and in-depth reviews. For further discussion, see Q. Xu et al. 2013.

148 Especially with regard to an individualized approach to treatment, complexity of treatment protocols, and multi-ingredient formulations. See, e.g., Chan, Zhang, and Lin 2014; Fung and Linn 2015.

149 Shea 2006, 259–62.

150 See, e.g., Jia and Zhang 2005, 244; Chan, Zhang, and Lin 2014; Chan 2016.

151 X. Chen, Pei, and Lu 2013 273–74.

shows how the project of scientization of Chinese medicine was initiated by the Republican Chinese state with the founding of the Institute of National Medicine in 1931, which paved the way for the creation of a standardized TCM in Communist China in the 1950s.[152] The Institute of National Medicine aimed to "put in order" Chinese medicine and pharmacy with "scientific methods." Pharmaceutical innovation involved isolating scientifically validated, commercially viable compounds from Chinese drugs. Discovery of ephedrine from the Chinese herb *mahuang* in the 1920s provided the archetype for the program of "Scientific Research on Nationally Produced Drugs."

Validation of the antimalarial efficacy of *changshan* in the 1940s paved the way for the 1960s state project on antimalarials that eventually produced the Nobel Prize—winning innovation of artemisinin.[153] Although numerically insignificant, these successes are celebrated as a validation of Chinese medicine's scientific legitimacy. From the vantage point of the inevitability of the science-based path of modernity, these are taken as stepping stones toward realizing Chinese medicine's inherent scientific potential. Long-drawn-out regulatory journeys of botanicals such as Phy906 continue to be celebrated as portending Chinese medicine's illustrious global future, regardless of exorbitant costs, inordinate delays, and looming uncertainty.[154] Lei calls attention to the underlying "politics of valuation" that obscures the inappropriateness of the conventional protocol for pharmaceutical innovation in Chinese medicine. Commenting on the poor productivity of the Chinese Medicine drug discovery program, he observes that "the otherwise disappointing results simply reconfirmed the valuation on which it had been based," as this valuation was "built upon and reinscribed a particular regime of values and risks, a regime that assumed many traditional drugs to be ill-founded and even threatening."[155]

However, far from presenting a united front, Chinese medicine practitioners and manufacturers tend to be divided in their response. Furth points out that there are "plenty of critics within the TCM world" who disapprove of the imposition of a biomedical model to TCM research.[156] Much of this criticism, however, does not find expression. Wang and Farquhar note that while many Chinese medicine practitioners are suspicious of the utility of the scientific approach to the progress of Chinese medicine, they do not feel free to express their views openly."[157] The paradigmatic status of the biomedical episteme

152 Lei 2014, 5–10.
153 Ibid.
154 See, e.g., Q. Xu et al. 2013; Chan, Zhang, and Lin 2014, 840.
155 Lei 2014, 217–21.
156 Furth 2011, 15.
157 J. Wang and Farquhar 2009, 70–71.

upon which Chinese medicine's science-based model is founded makes it difficult for Chinese medicine stakeholders, who operate in much lower positions of power, to challenge the mainstream discourse.

It is important to note the difference in agency of practitioners between the contexts of modernization and globalization. Lei's analysis of Chinese medicine's modern history shows that Chinese medicine practitioners had survived the epistemic violence inflicted by state-imposed scientism in both the Republican and the Communist periods by aligning with economic and cultural nationalism. They had exploited the disunity and heterogeneity of sciences to develop a particularized approach to modernization that challenged the concept of universalist modernity.[158] However, the drive to globalize Chinese medicine pressures stakeholders to conform to the universalist global health discourse. This difference is well acknowledged in contemporary Chinese medicine discourse, visible in the distinction made between "modernization" and "westernization."[159]

With traditional medicine becoming a part of the "socio-technical imaginaries"[160] of global modernity, biomedical doctors, ethnopharmacologists, and allied scientists have emerged as key actors in national and international traditional medicine policy-making,[161] marginalizing voices of dissent from Chinese medicine's traditional quarters. Shea notes that Chinese medicine practitioners lack the freedom to reject the paradigm. Clinical practice in both biomedicine and Chinese medicine has increasingly become indexed to evidence-based criteria, she points out, following its institutionalization by the Chinese state through the Cochrane database project, promotion of scientific journals (such as the *Journal of Evidence-Based Medicine*), and the institution of graduate courses in evidence-based medicine.[162] WHO's privileging of the biomedical framework of therapeutic evaluation created a national and international policy environment wherein the "medical" space of traditional medicines came to be equated with biomedicine.[163]

Wang and Farquhar note that in the Guideline for the New Development of Chinese Medicine, 2006–2020, Chinese medicine was touted as one of

158 Lei 2014.

159 E.g., see Q. Xu et al. 2013; Chow 2016, 1–2, 24.

160 Defined as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff 2015).

161 Pordié 2010; Kadetz 2015.

162 Shea 2006, 258.

163 Pordié 2010, 57.

the key science and technology breakthroughs. They observe, "It seems as if 'Chinese medical science,' a new name that has been used frequently in official accounts, will gradually replace the old name 'traditional Chinese medicine' in the near future. In the eyes of Chinese medicine's most experienced clinicians, the results of this form of development are perhaps inevitable, but nevertheless far from desirable."[164] Hsu observes that, post-1990s, the context of commodified global health led to the ascendance of "Chinese Medicine and Pharmacotherapy" (*zhongyiyao*), the commercial potential of which had driven Chinese medicine to "aim for recognition by the globally accepted biosciences," overriding "TCM's appeal to China's cultural heritage."[165] Consequently, despite its poor record of accomplishment, the evidence-based pathway has taken center stage in public, popular, and professional discourse on globalization of Chinese medicine. To quote Furth, "The PRC-led World Federation of Chinese Medicine Societies believes that the route to international scientific acceptance of Chinese medicine lies in gaining credibility with the biomedical establishment, with an eye to the developing global markets for PRC-produced medicinals."[166]

With its relatively high market share in the global herbal market, along with its political clout in the WHO, China unwittingly has had a huge influence on India. The dominant discourse on Chinese medicine in China continues to shape the Indian discourse on the future of traditional medicine. The scope of our review has been limited to Chinese medicine pharmaceuticals, but we would note in closing that the Indian perception of the Chinese healthcare integration model is also similarly shaped by a narrative of success inconsistent with realities on the ground in China. This discrepancy is observed by Goh, who points out that the realities of Chinese healthcare are not consistent with Patwardhan et al.'s observation of China's success in "integrating TCM into modern medicine on a scientific evidence-based approach."[167] On the basis of interviews with various stakeholders in China, including practitioners and policy-makers, she points out several inadequacies of the so-called successful integration model. That the Chinese model of healthcare integration is neither complete nor successful is a fact that has been pointed out by many scholars.[168] Poor representation of Chinese medicine in clinical practice guidelines and the dismal record in evidence grading of Chinese medicine therapies call into

164 J. Wang and Farquhar 2009, 60–61.
165 Hsu 2008a, 481.
166 Furth 2011, 23.
167 Goh 2012, 65.
168 See, e.g., R. Fan and Holliday 2007; Kadetz 2013. For a detailed literature review, see Goh 2012.

question the evidence-based credentials of Chinese medicine's much-touted integrated healthcare model.[169]

In contrast to China's biomedical-friendly approach, India followed a relatively combative path to modernization,[170] a bottom-up process led by practitioners rather than imposed by the state.[171] But since the 1990s, the Indian state has become increasingly interventionist, and policy debates have gradually come to be dominated by an epistemic community influenced by bioscience. Dominated by a technoscientific perspective, mainstream discourse on Indian medicines is ignorant of the critical perspectives of Chinese medicine practitioner-scholars,[172] besides being oblivious to the heterogeneity of Chinese medicine, which is well acknowledged in historical and social science literature.[173] The Indian discourse is also uninformed by critical social science analysis of the political economy of traditional/herbal medicine regulatory barriers.[174] As Adams rightly points out, desire for Western legitimacy interferes with the ability of practitioners to recognize the unevenness of the epistemological playing field.[175] Observing the lack of reflexivity among Ayurvedic doctors in India, Bode and Shankar express concern that Ayurveda's uncritical acceptance of biomedicine's claim to objectivity and value neutrality could cost it its uniqueness and autonomy. We concur with their argument that a critical social science perspective on the construction of medical knowledge could provide Ayurveda with a much-needed critique of the logical positivist reification of medical knowledge.[176]

169 Chinese medicine therapies were found to constitute only 12 percent (74) of the 604 official clinical practice guidelines prepared by the Chinese government. Only 7 percent of the 74 Chinese medicine-based guidelines provide evidence grading, indicating that the methodology on which the Chinese medicine recommendations were formulated was neither transparent nor evidence-based. See Ren et al. 2015.

170 Banerjee 2004, 92. For discussion of differences between the Ayurvedic and the Chinese approach to pharmaceutical innovation, see Pordié and Gaudillière 2014.

171 Kadetz 2013, 56. For a comparison of Ayurvedic and Chinese medicine models of modernization, see Crozier 1970; Islam 2017.

172 See, e.g., Jingfeng 1988; R. P. Fan 2003; R. Fan and Holliday 2007; Wilson 2015.

173 See, e.g., Farquhar 1994; Scheid 2002; Alter 2005; Hsu 2008a; Zhan 2009; Furth 2011.

174 See, e.g., Janes 1999; Adams 2002; Pordié 2010; J. Wang and Farquhar 2009; Craig 2011; Bode and Payyapallimana 2013; Gaudillière 2014a, 2014b; Littoz-Monnet 2014; Kadetz 2015; Kuo 2015.

175 Adams 2002, 670.

176 Bode and Shankar 2017, 171.

Conclusion

In his seminal work on the globalization of Asian medicine, anthropologist Joseph Alter criticizes the mainstream narrative of globalization for taking modern national identities of Asian medicines as sacrosanct, ignoring their historic transnational identities.[177] Renowned medical historian Paul Unschuld points out that the recent intensification in the westward flow of Chinese medicine is "merely another high point in an interaction between the two systems of medicine that [has] been going on for a long time."[178] Although the knowledge of historic transnational pathways is embedded in historical and anthropological accounts of Chinese medicine,[179] the mainstream Indian narrative on globalization remains largely uninformed by these histories. Ignoring the historic roots of Chinese medicine's contemporary global career has led to a distorted image of its success in the global herbal market. This representation has misled Indian medicine stakeholders into believing in the potential beneficence of the biomedicine-friendly regulatory framework promoted by WHO policy on traditional medicine. Overestimating the agency of state and science leads to an undervaluing of the significance of practitioner-driven channels and other sources of Ayurveda's cultural capital.[180]

Notably, the Chinese state does recognize the importance of cultural capital as a driver of Chinese medicine. This is amply illustrated by China's recent "Belt and Road Policy" targeting Central Asian countries (noted above). A different set of strategies have been put in place to target societies that are unfamiliar with Chinese culture. Considering the "lack of cultural knowledge" among Westerners as an important lacuna to be addressed, the state's Chinese medicine policy actively seeks to familiarize Westerners with Chinese culture and heritage, as a means of promoting Chinese medicine.[181] At the same time, Chinese medicine has also been promoted for metamedical reasons as a

177 Alter 2005, 24.

178 Unschuld 1998, 120.

179 See, e.g., Alter 2005; Zhan 2009; D. R. Kim et al. 2016.

180 As noted above, this includes the diffused transnational medicocultural heritage of Ayurveda, the globally dispersed thirty-million-strong Indian diaspora, and the established brand value of yoga and *pañcakarma* in Euro-American markets.

181 This includes establishing overseas institutions to propagate Chinese language and culture, dispatching Chinese medicine therapists to provide free clinic services in foreign countries, arranging health lectures, and aggressive promotion of Chinese medicine to international students. As of December 2014, a total of 475 Confucius Institutes and 851 Confucius Classrooms had been established in 126 countries and regions. These include 159 Confucius Institutes in 39 European countries, and 211 Confucius Classrooms in 25 European countries. See Liu et al. 2016, 366.

vehicle to promote Chinese culture. Taking note of the Chinese state's attempts to promote Chinese medicine as a means of promoting China's culture, Scheid observes, "the definition of TCM as a national treasure removes its definition as a science even further from the field of debate."[182] Thus, even as Chinese medicine policy and discourse are dominated by evidence-based medicine, the Chinese policy on Chinese medicine reveals an implicit acknowledgment of the limitations of a strictly science-based approach to penetrating Western markets.

Social scientists studying Asian medicines subject to the influences of globalization have expressed concerns regarding their increasing unaffordability to traditional consumers, their distancing from their traditional practitioner-stakeholders, and the adverse impact of scientization on their epistemological integrity.[183] The findings of our review call into question the beneficence of traditional medicine scientization from the perspective of its own stated goal: global market access and benefit. In discussing these findings, we have also pointed to some factors that contribute to the persistence of faith in the beneficence of the evidence-based pathway. In the PRC, traditional medicine has always been an integral part of the modern state's sociotechnical imaginary, and hence conformity to Western standards is seen as a natural progression toward scientific advancement. Chinese medicine's small achievements in the evidence-based pathway are hence seen as stepping stones to future success; the imagined global future obfuscates the gap between expectations and accomplishments. In India, faith in the evidence-based pathway is triggered by an overestimation of Chinese medicine's scientific accomplishments, combined with ignorance of the multidimensional roots of Chinese medicine's global pharmaceutical footprint. The findings of our review underscore the need to critically examine the imaginaries of success that drive stakeholders of various non-biomedical traditions toward scientization as a means to gain access to global pharmaceutical markets.

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182 Scheid 1999, SIV10.

183 See, e.g., Janes 1999, 2002; Adams 2002; Nichter and Lock 2002; Banerjee 2004; J. Kim 2006, 2009; Wang and Farquhar 2009; Sujatha 2011; Craig 2011; Blaikie 2009; Pordié 2010; Madhavan 2013; Bode and Payyapallimana 2013; Schrempf 2015; Kloos 2017.

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Bibliography

Adams, Vincanne. 2002. "Randomized Controlled Crime: Postcolonial Sciences in Alternative Medicine Research." *Social Studies of Science* 32 (5–6): 659–90.

Agarwal, Paru, Shashi Alok, Amreen Fatima, and Amita Verma. 2013. "Current Scenario of Herbal Technology Worldwide: An Overview." *International Journal of Pharmaceutical Sciences and Research* 4(11): 4105–4117.

Alamgir, Jalal. 2005. "The Power of Narrative in Managing Globalization in India." Working Paper Series, Department of Political Science, University of Massachusetts. Accessed December 5, 2017. http://www.pol-sci.umb.edu/papers/Alamgir_Narrative_in_India_2005.pdf.

Alonso, S., K. Munguambe, and E. Sicuri. 2017. "Market for Artemether-Lumefantrine to Treat Childhood Malaria in a District of Southern Mozambique." *Health Economics* 26 (12): e345–e360. Accessed April 2, 2019. https://doi.org/10.1002/hec.3514.

Alter, Joseph S., ed. 2005. *Asian Medicine and Globalization*. Philadelphia: University of Pennsylvania Press.

Aneesh, T. P., Mohamed Hisham, Sonal Sekhar M., Manjusree Madhu, Deepa T. V. 2009. "International Market Scenario of Traditional Indian Herbal Drugs—India Declining." *International Journal of Green Pharmacy* 3 (3): 184–90.

Baer, Hans A., Cindy Jen, Lucia M. Tanassi, Christopher Tsia, and Helen Wahbeh. 1998. "The Drive for Professionalization in Acupuncture: A Preliminary View from the San Francisco Bay Area." *Social Science and Medicine* 46 (4–5): 533–37.

Banerjee, Madhulika. 2004. "Local Knowledge for World Market: Globalizing Ayurveda." *Economic and Political Weekly* 39 (1): 89–93.

Blaikie, Calum. 2009. "Critically Endangered? Medicinal Plant Cultivation and the Reconfiguration of Sowa Rigpa in Ladakh." *Asian Medicine—Tradition and Modernity* 5: 243–72.

Bode, Maarten. 2009. "On the Effectiveness of Ayurvedic Medical Treatment: Humoral Pharmacology, Positivistic Science, and Soteriology." *Electronic Journal of Indian Medicine* 2:1–24. Accessed November 10, 2017. https://ugp.rug.nl/eJIM/article/view/24718.

Bode, Maarten, and Unnikrishnan Payyapallimana. 2013. "Evidence-Based Traditional Medicine: For Whom and to What End?" *eJournal of Indian Medicine* 6 (1): 1–20. Accessed November 15, 2017. https://ugp.rug.nl/eJIM/article/download/24746/22196.

Bode, Maarten, and Prasan Shankar. 2017. "Ayurvedic College Education, Reifying Biomedicine and the Need for Reflexivity." *Anthropology and Medicine* 25 (2): 162–75.

Boyuan, Chen. 2015. "TCM Industry Feels Chill." *China Org*, November 5. Accessed March 30, 2019. http://www.china.org.cn/business/2015-11/05/content_36988901.htm.

Chan, Kelvin. 2016. "The Evolutional Development of Traditional Chinese Medicine (TCM) outside the Chinese Mainland: Challenges, Training, Practice, Research, and Future Development." *World Journal of Traditional Chinese Medicine* 2 (4): 6–28.

Chan, Kelvin, Hongwei Zhang, and Zhi-Xiu Lin. 2014. "An Overview of Adverse Drug Reactions to Traditional Chinese Medicines." *British Journal of Clinical Pharmacology* 80 (4): 834–43.

Chen, Shaw T., Jinhui Dou, Robert Temple, Rajiv Agarwal, Kuei Meng-Wu, and Susan Walker. 2008. "New Therapies from Old Medicines." *Nature Biotechnology* 26 (10): 1077–83.

Chen Tian. 2014. "Trials of TCM." *Global Times*. Accessed March 30, 2019. http://www.globaltimes.cn/content/835270.shtml.

Chen, Xiuping, Lixia Pei, and Jinjian Lu. 2013. "Filling the Gap between Traditional Chinese Medicine and Modern Medicine, Are We Heading to the Right Direction?" Letter to the editor. Complementary Therapies in Medicine 21 (3): 272–75.

China Economic Review. 2012. "Africa Becomes Largest Export Market for Chinese Medicine." November 5. Accessed March 30, 2019. http://www.chinaeconomicreview.com/africa-becomes-largest-export-market-chinese-medicine.

China Economic Review. 2013. "Chinese Medicine Plays by Western Rules to Gain Acceptance." July 5. Accessed March 30, 2019. http://www.chinaeconomicreview.com/traditional-Chinese-medicine-TCM-healthcare-pharmaceuticals-botanical-drugs-FDA.

Chow, Shein-Chung. 2016. *Quantitative Methods for Traditional Chinese Medicine Development*. New York: CRC Press.

Chunyan, Zhang. 2013. "Bitter Pill for Traditional Chinese Medicine." *China Daily Asia*, November 25. Accessed March 30, 2019. http://www.chinadaily.com.cn/china/2013-11/25/content_17127855.htm.

Chunyan, Zhang. 2015. "Country's Cold Remedy Enters the UK Market." China Daily USA, July 6. Accessed March 30, 2019. http://www.chinadaily.com.cn/business/2015-07/06/content_21187410.htm.

Clarke, Tainya C., Lindsey I. Black, Barbara J. Stussman, Patricia M. Barnes, and Richard L. Nahin. 2015. "Trends in the Use of Complementary Health Approaches among

Adults: United States, 2002–2012." *National Health Statistics Report* 79:1–16. Accessed December 8, 2018. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4573565/.

Cochran, Sherman. 2006. *Chinese Medicine Men: Consumer Culture in China and Southeast Asia*. Cambridge, MA: Harvard University Press.

Craig, Sienna R. 2011. "'Good' Manufacturing by Whose Standards? Remaking Concepts of Quality, Safety, and Value in the Production of Tibetan Medicines." *Anthropological Quarterly* 84 (2): 331–78.

Crozier, Ralph C. 1970. "Medicine, Modernization, and Cultural Crisis in China and India." *Comparative Studies in Society and History* 12 (3): 275–91.

Dirlik, Arif. 2011. "The Idea of a 'Chinese Model': A Critical Discussion." *International Critical Thought* 1 (2): 129–37.

Dogra, Sapna. 2006. "Breaking Barriers." *Express Pharma*, April 1–15.

Dubey, N. K., Rajesh Kumar, and Pramila Tripathi. 2004. "Global Promotion of Herbal Medicine: India's Opportunity." *Current Science* 861: 37–41.

Economic Times. 2016. "India's Share in Global Herbal Medicinal-Market Just 0–5: Government." November 8. Accessed March 30, 2019. https://economictimes.indiatimes.com/industry/healthcare/biotech/pharmaceuticals/indias-share-in-global-herbal-medicinal-market-just-0-5-government/articleshow/55498419.cms.

Economist. 2003. "Two Systems, One Grand Rivalry." June 19. Accessed December 7, 2017. http://www.economist.com/node/1858862.

Elfawal, Mostafa A., Melissa J. Towler, Nicholas G. Reich, Douglas Golenbock, Pamela J. Weathers, Stephen M. Rich. 2012. "Dried Whole Plant Artemisia Annua as an Antimalarial Therapy." *PLoS One* 7 (12): e52746. Accessed April 9, 2019. https://doi.org/10.1371/journal.pone.0052746.

European Medicines Agency. 2016. "Uptake of the Traditional Use Registration Scheme and Implementation of the Provisions of Directive 2004/24/EC in EU Member States." Accessed December 8, 2017. http://www.ema.europa.eu/docs/en_GB/document_library/Report/2011/05/WC500106706.pdf.

Fan, Ruiping, and Ian Holliday. 2007. "Which Medicine? Whose Standard? Critical Reflections on Medical Integration in China." *Journal of Medical Ethics* 33: 454–61.

Fan, Ruiping. 2003. "Modern Western Science as a Standard for Traditional Chinese Medicine: A Critical Appraisal." *Journal of Law, Medicine and Ethics* 31: 213–21.

Fan, Tai-Ping, G. Deal, H. L. Koo, D. Rees, H. Sun, S. Chen, J. H. Dou, et al. 2012. "Future Development of Global Regulations of Chinese Herbal Products." *Journal of Ethnopharmacology* 140 (3): 568–86.

Fang, Xiaoping. 2015. *Barefoot Doctors and Western Medicine in China.* Rochester, NY: University of Rochester Press.

Farquhar, Judith. 1994. *Knowing Practice: The Clinical Encounter of Chinese Medicine.* Boulder, CO: Westview Press.

Financial Express. 2016. "Pushing Ayurveda." Accessed March 30, 2019. http://www.financialexpress.com/opinion/pushing-ayurveda/231464/.

Fleischer, Tom, Yi-Chang Su, and Sunny Jui-Shan Lin. 2017. "How Do Government Regulations Influence the Ability to Practice Chinese Herbal Medicine in Western Countries?" *Journal of Ethnopharmacology* 196:104–9.

Friesen, David. 2013. "TCM Business or Market Fad?" *CKGSB Knowledge*, January 8. Accessed March 30, 2019. http://knowledge.ckgsb.edu.cn/2013/01/08/china/traditional-chinese-medicine-business-blockbuster-or-false-fad/.

Fung, Foon Yin, and Yeh Ching Linn. 2015. "Developing Traditional Chinese Medicine in the Era of Evidence-Based Medicine: Current Evidences and Challenges." *Evidence-Based Complementary and Alternative Medicine, 2015*. Accessed October 5, 2017. http://dx.doi.org/10.1155/2015/425037.

Furth, Charlotte. 2011. "The AMS/Paterson Lecture: Becoming Alternative? Modern Transformations of Chinese Medicine in China and in the United States." *Canadian Bulletin of Medical History / Bulletin canadien d'histoire de la medicine* 28 (1): 5–41.

Gaudillière, Jean-Paul. 2014a. "Herbalised Ayurveda?" *Asian Medicine* 9 (1–2): 171–205.

Gaudillière, Jean-Paul. 2014b. "Indian Path to Biocapital? The Traditional Knowledge Digital Library, Drug Patents, and the Reformulation Regime of Contemporary Ayurveda." *East Asian Science, Technology and Society* 8 (4): 391–415.

Goh, Cheng Soon. 2012. "Regulation of the Practice of Traditional Medicine in China, India, and Malaysia." PhD diss., University of Leeds.

Gupta, Pooja D., G. Poonam Daswani, and Tannaz J. Birdi. 2014. "Approaches in Fostering Quality Parameters for Medicinal Botanicals in the Indian Context." *Indian Journal of Pharmacology* 46 (4): 363–71.

Haizhou, Zhang. 2011. "A Bitter Pill to Swallow." *China Daily Asia*, May 17. Accessed March 30, 2019. http://www.chinadaily.com.cn/cndy/2011-05/17/content_12521366.htm.

Hart, Jane. 2014. "Chinese Herbal Therapy Clinic Opens at the Cleveland Clinic." *Alternative and Complementary Therapies* 20 (6): 334–37.

Hsu, Elisabeth. 2002. "The Medicine from China Has Rapid Effects: Chinese Medicine Patients in Tanzania." *Anthropology and Medicine* 93: 291–313.

Hsu, Elisabeth. 2008a. "The History of Chinese Medicine in the People's Republic of China and Its Globalization." *East Asian Science, Technology and Society: An International Journal* 2 (4): 465–84.

Hsu, Elisabeth. 2008b. "Medicine as Business: Chinese Medicine in Tanzania." In *China Returns to Africa: A Superpower Power and a Continent Embrace*, edited by Christopher Alden, Daniel Large, and Ricardo Soares de Oliveira, 221–35. London: Hurst.

Hsu, Elisabeth. 2015. "From Social Lives to Playing Fields: 'The Chinese Antimalarial' as Artemisinin Monotherapy, Artemisinin Combination Therapy and Qinghao Juice." *Anthropology and Medicine* 22 (1): 75–86.

Humes, Cynthia Ann. 2008. "Maharishi Ayur-Veda: Perfect Health through Enlightened Marketing in America." In *Modern and Global Ayurveda: Pluralism and Paradigms*, edited by D. Wujastyk and F. M. Smith, 309–32. Albany: State University of New York Press.

Islam, Nazrul. 2017. *Chinese and Indian Medicine Today: Branding Asia*. Singapore: Springer.

Janes, R. Craig. 1999. "The Health Transition, Global Modernity and the Crisis of Traditional Medicine: The Tibetan Case." *Social Science and Medicine* 48 (12): 1803–20.

Janes, R. Craig. "Buddhism, Science, and Market: The Globalization of Tibetan Medicine." *Anthropology and Medicine* 9 (3): 267–89.

Jasanoff, Sheila. 2015. "Future Imperfect: Science, Technology, and the Imaginations of Modernity." In *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, edited by S. Jasanoff and S. Kim, 1–33. Chicago: University of Chicago Press.

Jia, Wei, and Lixin Zhang. 2005. "Challenges and Opportunities in the Chinese Herbal Drug Industry." In *Natural Products: Drug Discovery and Therapeutic Medicine*, edited by L. Zhang and A. L. Demain, 229–50. Totowa, NJ: Humana Press.

Jingfeng, Cai. 1988. "Integration of Traditional Chinese Medicine with Western Medicine—Right or Wrong?" *Social Science and Medicine* 27 (5): 521–29.

Job, Kathleen M., Tony K. L. Kiang, Jonathan E. Constance, Catherine M. T. Sherwin, and Elena Yu. Enioutina. 2016. "Herbal Medicines: Challenges in the Modern World, Part 4, Canada and United States." *Expert Review of Clinical Pharmacology* 9 (12): 1597–1609.

Kadetz, Paul. 2013. "Challenging a Universal Approach to Health Care Integration: China, Cuba, and the Philippines." *European Journal of Integrative Medicine* 5 (1): 54–61.

Kadetz, Paul. 2015. "Safety Net—the Construction of Biomedical Safety." *Asian Medicine—Tradition and Modernity* 10: 121–51.

Kaplan, Gary. 1997. "A Brief History of Acupuncture's Journey to the West." *Journal of Alternative and Complementary Medicine* 3 (1): S5–S10.

Katiyar, Chandra Kanta. 2012. "Ayurveda and Traditional Chinese Medicine: Challenges and Strategies." In *The Modern Ayurveda: Milestones beyond the Classical Age*, edited by C. P. Khare and Chandra Kanta Katiyar, 7–18. Boca Raton: CRC Press.

Kim, Dongsu, Miyoung Ahn, Jeeyoun Jung, Soohyun Kwon, Eun-Ji Park, Ki Hoon Koo, and Jong-Min Woo. 2015. "Perspectives on the Market Globalization of

Korean Herbal Manufacturers: A Company-Based Survey." *Evidence-Based Complementary and Alternative Medicine 2015*. Accessed January 5, 2018. http://dx.doi.org/10.1155/2015/515328.

Kim, Dong, Ryul Sang, Beom Kim, Hye-il Kim, and Wung Seok Cha. 2016. "A Review of Discussions on the Introduction of East Asian Medicine into America." *Oriental Pharmacy and Experimental Medicine* 161: 17–29.

Kim, Jongyoung. 2006. "Korean Medicine's Globalization Project and Its Powerscapes." *Journal of Korean Studies* 11 (1): 69–92.

Kim, Jongyoung. 2009. "Transcultural Medicine: A Multi-sited Ethnography on the Scientific-Industrial Networking of Korean Medicine." *Medical Anthropology* 28 (1): 1–64.

Kloos, Stephen. 2017. "The Pharmaceutical Assemblage: Rethinking Sowa Rigpa and the Herbal Pharmaceutical Industry in Asia." *Current Anthropology* 58 (6): 693–717.

Kudlu, Chithprabha. 2013. "Brand Kerala: Commodification of Open Source Ayurveda." PhD diss.,Washington Univ. in St. Louis.

Kudlu, Chithprabha. 2016. "Keeping the Doctor in the Loop: Ayurvedic Pharmaceuticals in Kerala." *Anthropology and Medicine* 23: 275–294.

Kuo, Wen-Hua. 2015. "Promoting Chinese Herbal Drugs through Regulatory Globalisation." *Asian Medicine* 10 (1–2): 316–39.

Lee, John. 2016. "The Chinese Diaspora's Role in the Rise of China." *East Asia Forum.* Accessed January 12, 2018. http://www.eastasiaforum.org/2016/09/14/the-chinese-diasporas-role-in-the-rise-of-china/.

Lei, Sean Hsiang-lin. 2014. *Neither Donkey nor Horse: Medicine in the Struggle over China's Modernity*. Chicago: University of Chicago Press.

Littoz-Monnet, Annabelle. 2014. "The Role of Independent Regulators in Policy Making: Venue-Shopping and Framing Strategies in the EU Regulation of Old Wives' Cures." *European Journal of Political Research* 53 (1): 1–17.

Liu, Yunfang, Zhiping Yang, Jing Cheng, and Daiming Fan. 2016. "Barriers and Countermeasures in Developing Traditional Chinese Medicine in Europe." *Frontiers of Medicine* 103: 360–76.

Mader, Lindsay Stafford. 2011. "THMPD Effects on Ayurveda and Traditional Chinese Medicine." *HerbalGram* 92:24–26.

Madhavan, Harilal. 2013. "Towards a 'Pharmaceutical Vicious Circle': Revisiting Kerala Ayurvedic Sector." *IIAS Newsletter* 65:32–34.

Meier zu Biesen, Caroline. 2010. "The Rise to Prominence of Artemisia annua L.—the Transformation of a Chinese Plant to a Global Pharmaceutical." *African Sociological Review* 14 (2): 24–46.

Meier zu Biesen, Caroline. 2018. "From Coastal to Global: The Transnational Flow of Ayurveda and Its Relevance or Indo-African Linkages." *Global Public Health* 13 (3): 339–54.

Mo, Lian. 2011. "Just the Right Prescription." *China Daily*, January 11. Accessed March 30, 2019. http://www.chinadaily.com.cn/business/2011-01/11/content_11827853.htm.

Nan, Zhong, Li Yu, and Lu Haoting. 2014. "Chengdu Diao Brings TCM Cures to World." *China Daily*, April 8. Accessed March 30, 2019. http://www.chinadaily.com.cn/business/2014-04/28/content_17469376.htm.

NCCAOM. n.d. Accessed November 5, 2017. http://www.nccaom.org/.

Nichter, Mark, and Margaret Lock, eds. 2002. *New Horizons in Medical Anthropology: Essays in Honor of Charles Leslie*. London: Routledge.

Nutraceuticalsworld. 2012. Onah, Paul Otor. 2018. "Availability, Accessibility and Affordability of Antimalarial Drugs in Benue State, North Central Nigeria." *Journal of Advances in Medical and Pharmaceutical Sciences* 16 (2): 1–14.

Ong, C. K., G. Bodeker , C. Grundy, G. Burford, and K. Shein. 2005. *WHO Global Atlas of Traditional, Complementary and Alternative Medicine.* Kobe: WHO Center for Health Development.

Patwardhan, Bhushan. 2016. "Strategic Cooperation with WHO." Editorial. *Journal of Ayurveda and Integrative Medicine* 7:1–2.

Patwardhan, Bhushan, Dnyaneshwar Warude, P. Pushpangadan, and Narendra Bhatt. 2005. "Ayurveda and Traditional Chinese Medicine: A Comparative Overview." *ECAM* 24:465–74.

Pisupati, Balakrishna. 2017. "Integrated Healthcare Boom: Is India Ready?" *Economic Times*, May 22. Accessed March 30, 2019. https://health.economictimes.indiatimes.com/news/industry/integrated-healthcare-boom-is-india-ready-/58783397.

Planning Commission. 2000. *Report of the Task Force on Conservation and Sustainable Use of Medicinal Plants.* New Delhi: Government of India.

Pordié, Laurent. 2010. "The Politics of Therapeutic Evaluation in Asian Medicine." *Economic and Political Weekly* 45 (18): 57–64.

Pordié, Laurent, and Jean P. Gaudillière. 2014. "The Reformulation Regime in Drug Discovery." *East Asian Science, Technology and Society* 8 (1): 57–79.

Press Information Bureau, Government of India, Ministry of Health and Family Welfare. 2014. "Government to Push for Standardization in Ayurvedic Drug Production." Accessed November 4, 2017. http://www.pib.nic.in/newsite/PrintRelease.aspx?relid=111136.

Reddy, Sita. 2002. "Asian Medicine in America: The Ayurvedic Case." *Annals of the American Academy of Political and Social Science* 583 (1): 97–121.

Ren, Jun, Xun Li, Jin Sun, Mei Han, Guo-Yan Yang, Wen-Yuan Li, Nicola Robinson, George Lewith, and Jian-Ping Liu. 2015. "Is Traditional Chinese Medicine Recommended in Western Medicine Clinical Practice Guidelines in China? A Systematic Analysis." *BMJ Open* 5 (6). doi:10.1136/bmjopen-2014-006572.

Robinson, Molly Meri, and Xiaorui Zhang. 2012. Traditional medicines: global situation, issues and challenges, *The World Medicines Situation 2011.* Geneva: WHO.

Romann, A. 2011. "Test in the West." *China Daily Asia* September 2. Accessed March 30, 2019. http://epaper.chinadailyasia.com/pools/2-20110902-012.pdf.

Sahoo, Niharika, and Padmavati Manchikanti. 2013. "Herbal Drug Regulation and Commercialization: An Indian Industry Perspective." *Journal of Alternative and Complementary Medicine* 19 (12): 957–63.

Salguero, C. Pierce. 2014. "Buddhism and Medicine in East Asian History." *Religion Compass* 8 (8): 239–50.

Sammons, Helen M., Michael I Gubarev, Lubov V Krepkova, Valentina V Bortnikova, Fenella Corrick, Kathleen M Job, Catherine MT Sherwin, and Elena Y Enioutina. 2016. "Herbal Medicines: Challenges in the Modern World, Part 2, European Union and Russia." *Expert Review of Clinical Pharmacology* 9 (8): 1117–27.

Scheid, Volker. 1999. "The Globalisation of Chinese Medicine." *Lancet* 354: SIV10.

Scheid, Volker. 2002. *Chinese Medicine in Contemporary China: Plurality and Synthesis*. Durham, NC: Duke University Press.

Schrempf, Mona. 2015. "Contested Issues of Efficacy and Safety between Transnational Formulation Regimes of Tibetan Medicines in China and Europe." *Asian Medicine* 10 (1–2): 273–315.

Sen, Tansen. 2003. *Buddhism, Diplomacy, and Trade: The Realignment of Sino-Indian Relations, 600–1400*. Honolulu: University of Hawaii Press.

Sen, Tansen. 2017. *India, China, and the World: A Connected History*. New York: Rowman & Littlefield.

Sharma, Usha. 2015. "Reviving Ayush." *Express Pharma*, June 23. Accessed March 30, 2019. http://www.financialexpress.com/pharma/cover-story/reviving-ayush/88919/.

Shea, Jeanne L. 2006. "Applying Evidence-Based Medicine to Traditional Chinese Medicine: Debate and Strategy." *Journal of Alternative and Complementary Medicine* 12 (3): 255–63.

Singh, R. H. 2015. "Doing Ayush in India Today: Against all Odds." *Annals of Ayurvedic Medicine* 4 (3–4): 62–63.

SinoCast Daily. 2011. "TCM to Lose European Market." *SinoCast Daily Business Beat*, March 29.

State Council of PRC. 2016. "Traditional Chinese Medicine in China: White Paper." Accessed March 30, 2019. http://english.gov.cn/archive/white_paper/2016/12/06/content_281475509333700.htm.

Sujatha, V. 2011. "What Could Integrative Medicine Mean?" *Journal of Ayurveda and Integrative Medicine* 2 (3): 115.

Teng, Lida, Qiang Zu, Gangzhou Li, Tian Yu, Kathleen M Job, Xiaoyan Yang, Liuqing Di, Catherine MT Sherwin, and Elena Y Enioutina. 2016. "Herbal Medicines: Challenges in the Modern World. Part 3. China and Japan" *Expert Review of Clinical Pharmacology* 9 (9): 1225–1233.

Tian, Chen. 2014. "Trials of TCM." *Global Times*, January 1. Accessed March 30, 2019. http://www.globaltimes.cn/content/835270.shtml.

Unschuld, Paul. 1998. *Chinese Medicine*. Brookline, MA: Paradigm Publications.

Wang, Jun, and Judith Farquhar. 2009. "Knowing the Why but Not the How: A Dilemma in Contemporary Chinese Medicine." *Asian Medicine* 5: 57–79.

Wang, Juan Yi Guo, and Gui Lan Li. 2016. "Current Status of Standardization of Traditional Chinese Medicine in China." *Evidence-Based Complementary and Alternative Medicine.* Accessed Oct. 18, 2017. http://dx.doi.org/10.1155/2016/9123103.

Wang, Ling, and Jia Hepeng. 2011. "Long Way to Go for TCM's US Dream." *Royal Society of Chemistry*, August 16.

Wang, Mei, and Gerhard Franz. 2015. "The Role of the European Pharmacopoeia (Ph Eur) in Quality Control of Traditional Chinese Herbal Medicine in European Member States." *World Journal of Traditional Chinese Medicine* 1 (1): 5–15.

Wang, Saisai, Kim Van der Borght, and Xiaoting Song. 2016. "A Legal Analysis on the Current Trade Status of Traditional Chinese Medicinal Product in the EU: From the Perspectives of WTO Law and EU Pharmaceutical Law." *Asian Journal of WTO and International Health and Policy* 11: 513–38.

Wenshu, Chi. 2015. "Writing its Own Prescription." *Beijing Review*. Accessed March 30, 2019. http://www.bjreview.com/Business/201511/t20151102_800041718.html.

WHO. 2002. "WHO Traditional Medicine Strategy: 2002–2005." Geneva: World Health Organization.

WHO. 2013. "WHO Traditional Medicine Strategy: 2014–2023." Geneva: World Health Organization.

Willcox, Merlin L., Shelly Burton, Rosalia Oyweka, Rehema Namyalo, Simon Challand, and Keith Lindsey. 2011. "Evaluation and Pharmacovigilance of Projects Promoting Cultivation and Local Use of Artemisia Annua for Malaria." *Malaria Journal* 10 (1): 84. Accessed April 2, 2019. http://www.malariajournal.com/content/10/1/84.

Wilson, Carla J. 2015. "Opinions of Practitioners of Chinese Medicine and Acupuncture on the Emergence of Integrative Medicine." PhD diss., California Institute of Integral Studies.

Wu, Wan-Ying, Jin-Jun Hou, Hua-Li Long, Wen-Zhi Yang, Jian Liang, and De-An Guo. 2014. "TCM-Based New Drug Discovery and Development in China." *Chinese Journal of Natural Medicine* 12 (4): 241–50.

Xiang, Lei, Jing Chen, Chun-Xiang Liu, Jia Lin, Jing Lou, and Hong-cai Shang. 2014. "Status and Thoughts of Chinese Patent Medicines Seeking Approval in the US Market." *Chinese Journal of Integrative Medicine* 20 (6): 403–8.

Xinhua. 2011a. "Faced with Delisting, TCM Firm Tries to Survive EU Ban." *China Daily*, April 17. Accessed March 30, 2019. http://www.chinadaily.com.cn/china/2011-04/17/content_12340437.htm.

Xinhua. 2011b. "TCM Supporters Push Europe to Relax Ban." *China Daily*, May 3. Accessed March 30, 2019. http://www.chinadaily.com.cn/cndy/2011-05/03/content_12432272.htm.

Xinhua. 2016. "Traditional Chinese Medicine Goes Global." *China Daily*, September 8. Accessed March 30, 2019. http://www.chinadaily.com.cn/regional/2016-09/07/content_26734714.htm.

Xu, Judy, and Yue Yang. 2009. "Traditional Chinese Medicine in the Chinese Health Care System." *Health Policy* 902:133–39.

Xu, Qihe, Rudolf Bauer, Bruce M. Hendry, Tai-Ping Fan, Zhongzhen Zhao, Pierre Duez, Monique S J Simmonds, Claudia M Witt, Aiping Lu, Nicola Robinson, De-an Guo, and Peter J Hylands. 2013. "The Quest for Modernization of Traditional Chinese Medicine." *BMC Complementary and Alternative Medicine* 13:132. Accessed October 1, 2017. https://doi.org/10.1186/1472-6882-13-132.

Yiming, Guo. 2016. "TCM Going Global." *China.org*, March 11. Accessed March 30, 2019. http://www.china.org.cn/china/NPC_CPPCC_2016/2016-03/11/content_37996249.htm.

Yingqi, Cheng. 2015. "Traditional Knowledge Inspiring Novel Drugs." *China Daily Asia*, June 12. Accessed March 30, 2019. https://www.chinadailyhk.com/asiaweekly/2015-06/12/content_15276081.html.

Yongzhong, Qiao, and Zhu Xuezhong. 2009. "Patent Protection of the Traditional Chinese Medicine and Its Impact on the Related Industries in China." *Journal of International Biotechnology Law* 63: 45–55.

Zhan, Mei. 2009. *Other-worldly: Making Chinese Medicine through Transnational Frames*. Durham, NC: Duke University Press.

Zysk, Kenneth G. 1998. *Asceticism and Healing in Ancient India: Medicine in the Buddhist Monastery*. Delhi: Motilal Banarsidass.