"The Great Quinine Fraud": Legality Issues in the "Non-Narcotic" Drug Trade in British India[1]

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Abstract. Until late in the British Raj (1857-1948), the colonial authorities envisaged the drug problem on the sub-continent as one of control of the illicit trade in narcotics. By the inter-war period the Government of India began to become aware that there were problems within the medicinal market. Having previously prided themselves that any medicinal drug sold by officials or given free to the poor during epidemics was as pure as science could make it, individual physicians, pharmacologists and politicians would bring to the government's attention the problem of the adulteration of the official drugs. Using the example of quinine, this paper examines why, despite increasing evidence of the "quinine fraud," government at both central and provincial level was slow to respond to the problem. For the provincial Chemical Examiners who were entrusted with analysing the quality of medicinal drugs, this was only one of their many tasks, and often regarded as the least important. However, India simply followed an international trend. The League of Nations Health Section preferred to set standards for biological products such as sera and anti-toxins, the products of newer scientific medicine, rather than for older alkaloid products such as quinine. Authorities in India, therefore, were left to attempt to create standards for medicinal products which would permit the prosecution of the crime of adulteration when it was still a controversial issue for international authorities.

Outwith the parameters of "narcotics," there was only a lax definition of what constituted a drug offence in India for most of the years of formal British rule between 1857 and 1947. While medical practitioners identified the effects on the Indian populace of "drugs" such as opium and cannabis as problematic from the early days of the Raj, it was not until the inter-war period that officials responded to the problem of the adulteration of everyday medicines used in hospitals and dispensaries and sold in the marketplace. In the late nineteenth century it had been an article of faith that official quinine supplies were as pure as possible. However, as early as 1907 Dr John Megaw had warned that his malaria patients in Calcutta were failing to be cured not because of the standard official explanation that they were not taking their medicine as prescribed, but because "they had failed to receive the doses of

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quinine prescribed to them" as a result of the adulteration of official supplies.[2] As a lone voice, though, Megaw could not enforce a change in the law governing prescribed medicines.

By 1939 it was estimated by R.N. Chopra, the famous Indian pharmacologist who headed the new Biochemical Standardisation Laboratory in Calcutta, that some sixty per cent of all quinine and cinchona febrifuge products prescribed and purchased in the sub-continent were subject to adulteration and fraud. There were various levels of fraud including the deliberate substitution of quinine, with less potent cinchona alkaloids, and the reduction of the principal active ingredient or its omission and replacement with adulterants such as chalk and flour mixed with a cheaper antifebrile which cheated patients into believing that they had received a full dose of quinine.[3] The resulting inadequate and inconsistent dosage in the treatment of malaria had far reaching implications for the perception of government efforts to deal with one of the foremost epidemic scourges in India. At the outset of the Second World War it was accepted by the medical profession in India that quinine was useless as a prophylactic and had only limited use as an antimalarial drug in comparison with the new synthetics, such as atebran, a belief that was to have major implications for the health of troops in the South Asian sector.[4] Yet to what extent were such perceptions the result of inadequate dosage? Adulterated medicines not only reduced the curative and prophylactic abilities of quinine, they deepened suspicions of Western medicine and compromised the official quininisation programmes. This in turn raised doubts about the sincerity of the British authorities to treat their colonial subjects' ailments at a time of rapidly rising nationalist sentiment.

This "silent" aspect of the drug problem in British India did not result in royal commissions and only one short-lived Committee of Enquiry, but affected a greater proportion of the population than the more widely publicised "narcotic problem." It was not a problem which greatly excited the minds of officials, missionaries or nationalist alike involved in the temperance agitation in British India. Thus, it would require wartime deprivation, when supplies of quinine and other anti-malarials were at a premium, before the Government of India took the first serious steps to deal with the problem of drug adulteration. Using quinine as a case study, this paper will discuss the reasons why drug adulteration and fraud became such a problem in British India and the faltering steps that were taken when officials finally realised that there was another dimension to the "drug" problems in the sub-continent.

Adulteration of medicinal drugs is one of the less prominent issues in the history of pharmacology. Abraham argued in 1999 that the problem still had to be set firmly within the socio-economic history of Western medicine and this remains the case.[5] Apart from the seminal work of Stieb on nineteenth-century adulteration of medicine in Great Britain, the collection of essays edited by Blake, and Liebenau's comments in his study of the development of the pharmaceutical industry in the United States, the historiography is fragmented,

in comparison to the wider analysis of the control of narcotic drugs.[6] Alternatively there are odd paragraphs in works on legislation against the adulteration of food products or analysis of the problem is subsumed into studies of quacks and quackery.[7] Within the history of medicine, pharmacy and pharmacology in colonial India, even less has been written. Bhagat briefly refers to the colonial history in his survey of adulteration, fraud and other problems in the modern Indian drug industry and Sinha has referred to the issue in his work on the development of the pharmaceutical industry in India.[8]

In the wider studies of colonial medicine in the Indian sub-continent there have been many analyses of individual diseases and their treatments, particularly plague, and an emphasis upon the role of colonial medicine as a "tool of empire," allowing westerners to survive in the tropics and, in power, to manipulate access to this medicine on racial lines.[9] The history of pharmaceutical development in colonial South Asia can add much to illustrate such themes, but as part of the history of science as well as medicine in the sub-continent, the issue has been neglected and has not developed greatly since Sanyal's study written in 1964.[10] Instead more emphasis has been placed upon the role which the sub-continent played in the international narcotics trade, particularly the long-term fascination with the Indian opium trade with China, or the social consequences of the domestic use of intoxicants.[11] Little has been written about the development of pharmacy as a profession, the establishment of the market for medicinal drugs or the impact of the use of adulterated medicines upon the health of the people of colonial South Asia. None of the recent work on the history of the search for effective anti-malarials discusses the issue of drug adulteration. Yet for the citizens of colonial India, this was literally a life and death issue.[12]

Malaria was one of the greatest scourges in the sub-continent. While there was considerable debate about the accuracy of official statistics, with some believing them to be greatly over-estimated,[13] over time the view of the Public Health Commissioner, A. J. H. Russell came to be regarded as the official position:

> It may be fairly estimated that during 1933 malaria exacted a toll of at least 1,000,000 lives. This terrible mortality is apt to be lost sight of owing to the defective and misleading nature of statistical records and because of the less dramatic nature of the disease as compared with cholera, plague and smallpox, except when a violent epidemic occurs such as that of 1908 in the Punjab. But year after year malaria is probably responsible for about 20 per cent of the total recorded deaths and many millions of the population experience periods of sickness which cause grave loss of earning power and much economic distress.[14]

In comparison, recorded deaths from cholera, smallpox and plague during 1933 combined to a total 214,590.[15] Russell recorded that hospitals and dispensaries treated 11 million malaria patients in what was admittedly a season of heavy rains and flooding: ideal breeding conditions for mosquitoes.[16] Until the inter-war period and the advent of synthetic anti-malarials, the only cure

was quinine. Despite an increasing number of government schemes devised at both provincial and central level to distribute quinine in higher quantities to more people, Russell angrily reported that the amounts were "ludicrously small."[17] Russell's successor, E. Cotter, in 1938 estimated that in the United Provinces the average treatment per patient was 22.5 grains at a time when the prescribed dose was 30 grains per day for at least one week.[18] Thus, any adulteration of the limited medicines available to patients was a grave matter. Quinine, therefore, provides an important case study. It was the primary drug in one of the few mass-medicalisation programmes attempted by the Government of India and local authorities. Quinine was regarded as the quintessential "tool of empire" by Headrick and access to adequate treatment of malaria was regarded by contemporaries and historians alike as evidence of the creation of discriminatory forces in the access to colonial medicine in colonial South Asia.

The Market for Cinchona Preparations in Colonial India and the Rationale for Fraud

From the turn of the twentieth century quinine was considered the drug of choice against malaria, replacing the earlier use of mercury and arsenic compounds. In contrast to the myriad of preparations in the catalogues of drug companies which utilised quinine in everything from anti-fever treatments to hair tonics, in both the *British Pharmacopoeia* [B.P.] and the *United States Pharmacopoeia* [U.S.P.], quinine was specified for both the prophylaxis against and treatment of malaria.[19] However, it was the most expensive of the natural cinchona alkaloids and increasingly preparations of combined alkaloids under the name of cinchona febrifuge came onto the market in India. There had been experiments in planting cinchona in India, Ceylon and Burma from the 1860s, however, by the inter-war period, only the government plantations in Bengal and Madras remained. Between them they produced around 70,000lb. of quinine per annum, but this supplied only a fraction of Indian requirements. Between 100,000 and 140,000lb. were imported annually from Java, which held a virtual monopoly on world production of cinchona.[20] While the possibility of increasing cinchona production in India, and thus securing a domestic source of quinine, was raised at the end of the Great War, British experts had argued this would be costly and that quinine, now regarded as a weak weapon in the fight against malaria, would soon be superceded by synthetic alternatives. So there was no great expansion in cinchona planting and authorities in India and Britain would ultimately rue the short-sighted recommendations of the early 1920s.[21]

There was a bewildering array of powders, pills and tablets on the market in India, produced both by government and private manufacturers. At the top of the range, Burroughs Wellcome manufactured its quinine "tabloids" in Bombay, fiercely protecting its patented trade name. Government supplies of less sophisticated tablets were manufactured in central jails across India. Lahore

Jail, for instance, had begun manufacturing tablets in 1911 with the purchase of two "Eureka" machines capable of producing 25,000 tablets a day.[22] The quinine for such tablets was purchased from the Bengal Government Cinchona Factory, the major supplier of domestic cinchona alkaloids. Quinine also featured in a wide range of imported patent medicines from the quinine wines of continental Europe and the elixoids and decoctions of British and American manufacturers including the various combinations of quinine, iron and strychnine which were regarded so highly as a tonic they formed the basis of a popular malted drink.[23] Yet even the combined Indian production and imports failed to meet the needs of malaria patients in India. Sinton estimated that only 10 per cent of malaria sufferers were being treated by the mid-1930s and that even the combined annual world production of cinchona would be insufficient to meet Indian demand.[24] Such a competitive medicinal market opened up the temptation to rogue trading.

A key problem was cost. Quinine was a valuable therapeutic product. Its price in the inter-war market was governed by two factors, the cost of production and the world market price set by the Kina Board in Amsterdam. The latter was composed of the cinchona plantation owners and the world's major quinine manufacturers in Java, Amsterdam, the United Kingdom and the United States. In 1936 the Kina Board price was Rs22 per lb. However, the cost of production in the Madras and Bengal plantations was only around Rs13 per lb. The Government of India would not allow home produced quinine to be sold at less than Rs18 per lb, fearing that if the retail cost of domestic quinine reflected its true production cost, it would quickly be snapped up by exporters anxious to undercut the Kina Bureau price, and thus would be lost to Indian medical practitioners and patients.[25] It was a vicious circle. Meanwhile the new synthetic antimalarials such as plasmoquine were just as expensive. So the search for a cheaper mass-produced drug once more switched from the expensive quinine products of the *Cinchona ledgeriana* tree and its hybrids to use of its minor alkaloids such as cinchonine and quinoidine. In the Bengal Quinine Factory production costs for the differing cinchona febrifuges containing these minor alkaloids ranged from Rs6 to Rs10-8-0 depending upon the quinine content, which seemed to offer more hope for a cost-effective government sponsored mass anti-malaria campaign.[26]

Various reports in the 1920s, under the auspices of the British Medical Research Council and the League of Nations Health Section, agreed that combinations of the minor alkaloids could provide an antimalarial as effective as quinine sulphate but at a fraction of the cost. Both the Government of India and the authorities in Java vied to sell their version of such cinchona febrifuges. However, these products were largely non-standardized. Sinton's 1930 paper lists some dozen combined preparations available within India alone.[27] While malariologists in India recommended the domestic product because the higher cinchonine content of its Javanese competitor had more side effects, there were problems with the Government of India product too.

Some doctors warned that "the absorption of the official government tablet is most uncertain and unsatisfactory… Unfortunately even the Indian cinchona febrifuge is not constant: if it contains a high cinchonine content it is apt to induce vomiting."[28]

If there was a bewildering array of alkaloids to be marketed, so was the range of products in which they reached the Indian populace. If treated in a government or plantation or railway hospital, patients would receive either quinine sulphate or quinine hydrochloride tablets or injection from stock solutions of the alkaloids prepared by the hospital dispenser. In rural areas there was also a patchy network of local board and itinerant dispensaries: the most extensive networks existed in the Punjab and Madras, the poorest in Bihar and Orissa. By far the largest official networks were the complex schemes operated by local governments during threatened and actual epidemics, utilizing post offices or anyone from district officers, schoolteachers, *zamindari* (landlord) agents, vaccinators, village headmen to schoolchildren and Junior Red Cross Brigades, or as one official described, "any other respectable persons recommended for the work."[29] Treatments had originated in single dose "pice packets" of powdered quinine sulphate or cinchona febrifuge (pice was the smallest denomination in the Indian currency), but by the 1930s a preference had emerged for full course treatments of twenty to thirty tablets, usually available in a glass or paper vial. While some of these treatments were provided free in an attempt to either reduce potential or existing epidemics, most of the supplies were sold to patients, wherein lay the potential for adulteration of supplies. In such a confusing marketing network it was difficult to maintain quality checks, despite government declarations about the purity of their supplies and that they were always of the stated dose.

The Chemical Examiners

One group which might have been expected to assure the quality of medicinal products sold in colonial South Asia were the Chemical Examiners and public analysts who were being hired from the mid-nineteenth century. However, due to a combination of shortage of trained personnel and the multitudinous roles of those appointed, the testing of medicinal products for purity were low on their agendas. Instead, the testing of medicinal preparations was largely for the determination of excise or the presence of narcotics and poisons rather than the examination of purity and quality of the therapeutics. The link was most explicit at the All-India level, where the Government of India Chemical Adviser was an official of the Central Board of Revenue. The prime function of his laboratory was to analyze the strength of government manufactured opium products to establish the correct level of excise duties. However, as opium sales increasingly were restricted by international treaty, the Government of India looked to the medical market and, recognizing that quality expedited sales, the role of the Chief Chemical Adviser changed to one which ensured that "samples of medicinal opium powder and alkaloids are tested in

the course of manufacture as required to ensure the preparation of a standard product."[30] The central government was not, however, so thorough when it came to the establishing legally backed official standards for other medicinal products.

In the provinces, the prime function of the laboratories of the Chemical Examiner's Department was medico-legal, searching for the use of poison in criminal cases, but they also had customs and excise responsibilities, as well as examination of water, food, drugs and medicines for quality. The laboratories were consistently underfunded, understaffed and overworked: often they were subjected to retrenchment measures, some of which seemed needlessly petty. Boyd, the Chemical Examiner to the Government of Bengal, complained in 1926 that, "on account of the abolition of the telephone since [last] year, this department has been working at a disadvantage."[31] The following year, on the retirement of his assistant Hiralal Sinha and his failure to be allowed a replacement, he observed, "it does not appear to be generally recognized that proficiency can only be obtained in this very specialized branch by long training and experience."[32] Normally the duties of Chemical Examiner were combined with that of Professor of Chemistry at the local Medical College. In Bengal, Boyd's successor K.N. Bagchi was able to impress upon the local government that by splitting the posts, "the Chemical Adviser is able to give his undivided attention to his legitimate duties which was not possible before." This concession was only to last for two years, however, and by 1937 Bagchi was again taking lectures in chemistry, though now he had managed to finish teaching by 11:00 a.m. "so it would not interfere with my examiner's work."[33] Even the Chemical Analyser for the Government of India had problems, sharing laboratory facilities at the University of Lahore, while officials stalled the sanctioning of the cost of construction of the proposed Central Laboratory in New Delhi.[34] Little wonder, then, that few appear to have given high priority to testing for drug adulteration and often simply the number of the few tests performed was recorded without the results. This was reflected in the reporting on the work of the Chemical Examiners. The editors of the *Indian Medical Gazette*, for instance, regularly focused upon the grizzly details of the medico-legal cases rather than the more mundane data on goods tested for quality.

The provincial Chemical Examiners, like the Central Chief Chemical Analyser, continued simply to test the spirit content of patent and proprietary medicines, both imported and domestically produced, to determine the level of customs and excise duties to be levied. Thus, while a few samples of quinine preparations might be tested annually for purity, it was more usual that preparations such as Herring and Co.'s Cinchona Yellow Infusion would be analysed for spirit content for tax purposes. In 1903 alone some fifty imported cinchona and quinine preparations were analyzed for such purposes in the laboratories in Calcutta, Bombay and Madras. The cinchona preparations crossed the laboratory benches alongside such concoctions as Parke Davis's

Lightening Laxative Liquid, Eli Lilley's Alterative Juice and Shikari's Talismanic Injection for Gonorrhoea and Gleet.[35] Thus, at a time when some measures were beginning to be taken in Britain and the United States to limit the adulteration of medicinal preparations and the false promises of patent medicines, in India the main concern of the authorities remained the correct calculation and timeous payment of customs and excise duties.

If they did comment upon medicinal drugs, the Chemical Examiners persisted in seeing only the issue of drugs as possible poisons, which, no doubt, resulted from their dual medico-legal roles as well as the example of legislation in Britain. Thus, Boyd was concerned with the colour and shape of bottles, demanding that medicinal drugs should be clearly demarcated from any other preparations on sale in the bazaar to prevent accidental poisoning[36] and in 1925 he was also to be found advising "on the inclusion of some patent medicines in the Poisons Act of 1919."[37]

Adulteration of Medical Preparations and The Drugs Enquiry Committee

Whether quinine sulphate or the increasingly accepted cinchona febrifuges were being used to treat malaria, it seems that the opportunity for adulteration was increasing from the early twentieth century. The problem of adulteration of quinine supplies was first raised by Megaw in 1907 when he noticed an increase in the number of "quinine failures" in the Calcutta hospital. On testing the stock quinine solutions, he was shocked to discover that instead of the expected 10 per cent mixture, the solutions were massively under-strength containing only between 2 and 4 per cent quinine. However, despite publishing his finding in the *Indian Medical Gazette* there was little response to Megaw's initial report. Without corroboration from elsewhere in India, it appears that Megaw's discovery was treated as an aberration. While it was believed that preparations purchased in the bazaar might commonly be adulterated, it was an article of faith that medicines in government hospitals and dispensaries could be relied on to be up to strength.[38] It was not until he conducted a second more rigorous analysis in the late 1920s which replicated his earlier findings that the issue of drug adulteration began to have a higher profile in India.

Megaw's new research was a blow to the prestige of both the Government of India and its Medical Service.[39] This time he had broadened his enquiry testing stocks in a government and a tea plantation hospital, as well as dispensaries operated by a local board and a tea plantation in Bengal. The outcry when Megaw published his results, in which the purest tablets were those few purchased on the open market, forced the Government of India to act. Megaw's study had come at the end of a decade in which interest in the protection of the quality of pharmaceutical preparations was increasing at home and abroad. As well as the UK's Therapeutic Substances Act (1925), committees were being established for a revision of the *British Pharmacopoeia*, including

an invitation to the Government of India to establish its own committee to advise those in London. There was the publication of the reports of the British Medical Research Council and the League of Nations on the quality and use of cinchona products. It was also an era or rising nationalist political consciousness in colonial South Asia. Therefore, Megaw's new research could not have come at a worse time for the Government of India.

A Drugs Enquiry Committee was established led by Professor R N. Chopra, Professor of Pharmacology at the Calcutta School of Tropical Medicine. It also included Fr. J. F. Caius, a pharmacologist at the Haffkeine Institute in Bombay, and a research chemist from a leading domestic drug company, Stanistreet and Co. of Calcutta. Although Chopra suffered from ill health at the time, the Committee traveled throughout India during 1930 meeting local Chemical Examiners, representatives of the burgeoning Indian pharmaceutical industry and of foreign firms in India, medical and pharmacy professionals and local government representatives and interested members of the public.

The Chemical Examiners provided evidence before the Committee. In December 1930 Boyd testified that adulteration of drugs took place regularly in Bengal, Bihar and Orissa, providing a "list… showing the chemicals and drugs that did not satisfy the B.P. tests and the results of those examinations during 1926, 1927 and 1928."[40] Thomas gave a typically full presentation to his visitors, arguing that "drugs locally manufactures are seldom within 10 per cent of the B.P. standard," and that "the dispensing of prescriptions is not always accurate, what is in the prescription is not always what is found in the bottle." He shared the prejudices of many British medical and scientific professionals in India that imported drugs were equally suspicious "unless from reliable firms." He recommended that all ingredients should be listed on the bottles of patent medicines, but that there should not be increased import duties on them "for the simple reason that patients would eventually bear the cost." Above all he desired that "chemists should all be qualified and licensed and that dispensers should be trained and examined." In the meantime, "until such time as a Pharmaceutical Society is formed, Government through their analysts should continue to exercise control."[41]

The pharmacologists on the Committee also collected and analysed samples of drugs from throughout India on their travels, as did their witnesses, including 51 samples of quinine. They found evidence of a wide range of pharmaceutical problems, from adulteration to outright fraud. Of their samples, two contained no quinine whatsoever, one had only a trace of the alkaloid, and another 20 per cent had deficiencies ranging from 10 to 44 per cent under strength. The editor of the *Indian Medical Gazette* vented his ire at the results: "we can think of no more despicable act than the selling to a malaria-stricken peasant as 'quinine' a tablet containing nothing but chalk or some such inactive substance… If these are a fair sample of quinine tablets on the market, it is obvious that the most serious adulteration is going on within the country."[42]

Chopra's report, issued in 1931, found that, "all drugs and medicines in India were subject to considerable adulteration," that opportunities for adulteration existed at every level of the drugs business and that legislation to preserve the purity of drugs had fallen between the different tiers of government in colonial India. The problem was too big for the provincial authorities to whom it had been transferred in 1919. They lacked the skilled chemists and laboratories needed for testing and the financial and political will to tackle drug adulteration. Chopra and his peers concluded that, "the lack of definite standards and tests, the want of skilled experts and the absences of well-equipped laboratories and the requisite facilities to work them have stood as insuperable barriers to a comprehensive system of control." The report recommended that the Government of India should assume control once more and that a Central Biochemical Standardization Laboratory should be established. Such a laboratory should be based in a city in which the pharmaceutical industry was being developed, which was also a major centre for the distribution of imported drugs and where both domestically manufactured and imported medicines were used on a large scale, in effect Calcutta where Chopra was based. Legislation should be tightened to more rigorously enforce the B.P. standards with the Indian addendum, and that fines should be increased.[43]

The Initial Response to the Chopra Report

Prior to the publication of the Chopra Report, only a few provinces in colonial South Asia had any legal definitions governing the sale of medicinal drugs which would enable government analysts and public health inspectors to successfully bring drug adulteration cases before the courts. The convoluted politics of the sub-continent during the colonial period had resulted in the responsibility for health issues being transferred from the central government in Delhi to provincial and municipal authorities. Here, where financial pressures was a constant worry, protective legislation tended to focus upon food standards, particularly for infant feeding, rather than medicinal drugs. Some cases were brought to local courts under the Indian Merchandising Marks Act for the "misbranding" of products but were mostly thrown out of on the basis that there were no legal standards for the drugs by which misbranding could be proven.[44]

Unfortunately the publication of the Drug Committee coincided with the inter-war depression and while its recommendations received a favourable hearing, financial stringency was used as an excuse to delay enacting its provisions. Despite Chopra's insistence that the testing of drugs should once more become the responsibility of the central government, political tensions had increased with Gandhi's civil disobedience campaigns, and the transfer of any responsibilities back from provincial to central government could not be sanctioned. So in 1935 the members of the Council of State in Delhi, while again agreeing that the report's recommendations should be implemented "as soon as possible," ignored its central premise declaring, "the Government of

India recognizing the seriousness of the situation, again impressed on Local Governments the need for action and enquired whether, in view of the urgency of the problem, they would be prepared to take further action."[45]

This was unlikely given the poor lead from the central authorities. Of the 1935 Council meeting Russell, the Public Health Commissioner, reported that "the establishment of a Central Drug Testing Laboratory was also made the subject of reference," usually a device to bury the recommendations of committees. In May 1935, Russell also represented India at an Inter-Governmental Conference of the League of Nations Health Organization at which it was agreed that the Central Research Institute at Kasauli would become the Indian national centre for the standardization of sera, hormones and vitamins, thus adopting "in full the recommendations made by the Biological Standardization Committee on this question"[46] Although India was now meeting the international standards set by the League for the limited range of biological products, the vast bulk of medicines sold in the sub-continent were still not covered. With few provinces reacting to the 1935 statement, though, the Government of India was forced to act and in the following year, the Central Laboratory recommended by Chopra's Committee was finally established in Calcutta. This was the extent of central action; legislation proposed to introduce more rigorous inspection of manufacturers and dispensaries and increased fines for offences had to wait until war changed the market conditions a decade after the Commission had originally reported.

In the provinces there was a similar story. The convocation of the Drugs Enquiry Committee sparked off some interest in the governments of the larger provinces into looking once more at legal provisions concerning drug sales. It is noticeable, however, that it was still predominantly within the parameters of drugs as poisons. In the Punjab, for instance, the authorities proposed a new Pharmacy and Poisons Bill which would "place the control and sale of poisons under the supervision of an advisory committee called the Poisons Board, on which the medical profession will have representation." Thomas, the Chemical Examiner, again used the ensuing discussions to make an impassioned plea for a wider remit than initially proposed by government. In effect he was demanding full clinical trials of all new drugs with

> careful toxicological and therapeutic tests on the human subjects as well as on animals before they are placed on the market. The medical profession should be fully informed, not only of the therapeutic properties for good of new drugs, but also of the dangers which may arise from idiosyncrasy or over-dosage. The existing system of scheduling poisons is quite inadequate to keep pace with the rapid developments of the chemical manufacturing industries, which are daily launching new and imperfectly tried organic drugs on the market in this country.[47]

However, Thomas would soon lose interest in this aspect of his work and return to his beloved pathological analyses. While welcoming the prospect of higher fines and access to pharmacies and drug companies to conduct qual-

ity control tests, it quickly became clear that the provincial examiners did not agree with the creation of a laboratory under the auspices of the central government. H. Hay Thorburn, Inspector General of Civil Hospitals of the North-West Frontier Province, backed up the Examiner's position that, "the testing of drugs for purity… can be undertaken in the Provincial Laboratory at Peshawar with little extra cost."[48]

With so little positive support for Chopra's recommendations, progress remained slow and drug adulteration continued. Russell reported that at the inaugural meeting of the Central Advisory Board of Health in Simla in June 1937 the problem of rogue traders was raised once more:

> Effective control intended to prevent the sale of adulterated quinine is also a question of considerable importance. The replies received to a reference made to provincial Directors of Public Health and Administrative Medical Offices have indicated that in certain parts of the countries[sic] so-called "quinine tablets," which contain little or no quinine, are being placed on the market. In one province at least, a number of firms have been issuing for sale tablets which, on analysis, were found to consist of a mixture of chalk and gum, with mere traces of quinine and its related alkaloids. In another province, five grain tablets obtained from eleven Post Offices showed that on analysis, a quinine content ranging from between 2.41 and 4.01 grains. At the same time, it is only fair to add that the quinine tablets issued by reputable firms were found on analysis to be genuine.[49]

This again suggested that the problem was not simply confined to the sale of indigenous product manufactured for the bazaar but also quinine tablets from government stocks sold by official distributors, here found wanting beside the "genuine" products of "reputable firms." However, there is no indication of where in the distribution chain the adulteration was taking place.

Even after the Central Laboratory had been established, there was confusion about its existence. The Fifteenth All-India Medical Conference in November 1938, seemingly unaware of Chopra's laboratory in Calcutta or misinformed about its remit, passed a motion calling for "a central analytical laboratory and the provision of laboratories in each province" to ensure uniformity in the standards of medicinal preparations. It also called on its members to "report to Government all cases where the medicines are found to be below the standard of the advertised specification." In a similar fashion to the British Medical Association a decade earlier, the Indian Conference demanded that Government should "provide a check on the extravagant claims put forward on behalf of patent medicines."[50]

In the meantime, Chopra and his colleagues quickly got to work in the new laboratory. By 1939 they were producing a series of reports on the adulteration of medicines and medicinal preparations as varied as digitalis and ergot to the purity of cod liver oil. In this early period, though, the most publicised report was that continuing the work of Megaw into the standards of quinine and cinchona alkaloids available for the treatment of malaria in India. Chopra's team tested over 100 different varieties of quinine and cinchona products from throughout India, both from official and bazaar sources. The results

were shocking. Twenty years after Megaw's original investigation, some 63 per cent of all cinchona alkaloid preparations in the Indian market were still found to be adulterated or the subject of fraud with some containing no quinine whatsoever.[51]

War and the Adulteration Problem

The problem of drug adulteration increased as war drove up the price of scarce imported drugs, and quinine was no exception. It seemed that the authorities in India might finally act to create legally binding drug standards. The need for a high quality supply of antimalarials was of the first importance. Even before the attack on British colonial possessions in South East Asia, Indian medical personnel and troops were involved in the African campaigns, while the areas of highest potential recruitment into the British Indian Army were also the regions of highest malarial endemicity. Drug adulteration was caught up in the militarization of medicine in late colonial India.

In 1940 the Government of India finally proposed a Pharmacy Act. Under its terms local public health officials were to collect samples at every stage in the supply of the medicinal market from manufacturers, pharmacists and dispensers, to the official distributors such as post offices and *zamindari* agents, as well as supplies from hospitals and dispensaries, both government and privately run. The samples were to be sent to the Biomedical Laboratory in Calcutta for analysis on a regular basis. If the samples were found to be adulterated, the Act increased the level of fines. The vexed question of training of dispensers and compounders was grasped with all future members to be trained at university or college level, no longer simply going through a three or four year apprenticeship. All manufacturing operations and pharmacy outlets were to be licensed and there was to be stricter control of the advertising claims of patent medicines.[52]

Yet despite both the seriousness of the problem and its wide recognition, the legislation would not be used in wartime India. Provincial governments again stressed that they did not have the financial or personnel resources to implement the legislation during the conflict and, meanwhile, provincial Chemical Examiners were quick to declare their competency to test drug quality. Bagchi in Bengal, for instance, requested the appointment of one additional assistant examiner and one laboratory assistant:

> If this scheme is accepted by Government, the control of the manufacture of drugs will be successfully carried out by the Excise Department and will be more effective and less expensive than the complicated machinery proposed under the Drugs Act of 1940. As the present time is not opportune for giving effect to the expensive recommendations embodied in the Drugs Act, the Government may be requested to consider my proposal and to sanction it at an early date so that the proper control may be exercised on the Drug industry of Bengal which contributes about half the total output of India, required for military purposes at this time.

In showing all his political skills, Bagchi also pointed out that the local phar-

maceutical companies "contribute substantially to the revenues of Government."[53] Bagchi successfully convinced the Government of Bengal to invest in a provincial standardisation facility, consisting of a pharmacologist, a bacteriologist and a chemist. In turn, this was hailed by the Government of India as evidence that finally local authorities were now taking their responsibilities seriously.

While the enactment of the Pharmacy Act was delayed by inter-governmental squabbles, Delhi utilised wartime legislation in an attempt to force laggard authorities into action. With drugs increasingly in short supply even in the early stages of the war, under the Drug Rules of the 1940 Defence of India Act, the inspection of premises for manufacturer or sale of drugs was devolved to the provincial governments. All products and manufacturing establishments had to be licensed and local authorities were given full rights of entry and of confiscation of all products found to be adulterated. The latter right provided them with a far more rigorous element of control than the possibility of small fines which hardly made a dent in the profits of drug manufacturers and salesmen.[54]

Even though most provincial authorities pled poverty and lack of resources during wartime as an excuse to do as little as possible, legislation had been passed. It was now a question of when it would be implemented fully. To preserve their interests manufacturers came together to form a trade association, the Indian Chemical Manufacturers' Association, led by the pioneer of the Bengali pharmaceuticals industry, Sir P. Roy. It complained bitterly that while it had repeatedly brought to the government's attention "the trade in spurious drugs by bogus and unscrupulous manufacturers… The enforcement of the Indian Drugs Act of 1940 is still being delayed."[55] Meanwhile the government was blaming the manufacturers for not setting their industry in order and failing to self police. Chopra had earlier added to the manufacturers' complaints, arguing that it was their failure to invest in quality research and development facilities of the type found in Britain and the United States that compounded the problem by making drugs easy to adulterate. Though he did admit there was probably some unintentional adulteration caused by problems of storage of drugs in Indian climatic conditions.[56] This latter belief was borne out by Imperial Chemicals (ICI) chemists who experimented with the first use of plastic packaging of drugs during World War Two to protect plasmoquine tablets carried by troops in South and South East Asia.[57]

The Search for International Legal Standardization of Quinine Products

Given that its colonial ruler, Britain, was one of the pioneers of anti-adulteration legislation, why was there no such concomitant legislation in India before 1940? Unfortunately legislation in Britain was equally weak and contradictory. While Britain professed free trade as its priority, the balance between manufacturers' interests and consumers' rights was always skewed towards

the former. While the B.P. was accepted as the de facto standard, it did not have the same legal standing afforded to the U.S.P. and the American National Formulary under the terms of the 1906 Pure Food and Drug Act and the 1938 Food, Drugs and Cosmetic Law. British legislation from the 1868 Pharmacy Act onwards was more concerned with defining poisons and the restriction of their sale was bound up in the long-running battle between doctors and pharmacists for control of the drug trade. Nor was the process of establishing standards so easy in America. Having campaigned for so long for the privilege, once made the legal standard, the members of the of the U.S.P. Convention quickly found that accurate tests for many of the medicinal products had still not been accepted. The standards in the 1910 revision of the U.S.P. also had to be dropped to meet the manufacturers' needs.[58]

It would take most of the twentieth century to provide workable scientific tests with which to back legal standards for medicinal drugs. It would prove easier to establish scientifically accurate assays for the newer biological products such as sera, vaccines and anti-toxins, but more difficult for older galenical substances such as quinine. While alkaloids of galenicals had been in use for over a century, they were still the subject of controversy, including maximum and minimum dosages. Physicians on both sides of the Atlantic admitted to flaws in the testing procedures. The British Committee on the Control of Therapeutic Substances of 1920 was scathing about the quality of the tests for galenicals preparations in the B.P., in which "certain primitive tests and methods of identification are therein provided for them. There is, however, an important body of professional opinion that these tests are far from adequate as standards of therapeutic efficiency."[59] Such tests were regarded as inferior to the B.P.'s accurate scientific assays of biological products which were easily replicated in any well-equipped laboratory. The Report of 1921 called for the creation of a Central Laboratory in which research could be conducted to establish standards and conduct analysis of samples, licensing and inspections of manufacturing plant, though most of the samples would be taken from manufacturer's stocks and the open market "leaving to the manufacturers the primary responsibility for securing that the products conform to the records and methods of biological testing and, when necessary, to the filling and sealing of containers." Given such a scenario which was clearly open to abuse and ultimately the Therapeutic Substance Act (1925) was limited to biologics.[60]

Nor was the search for standards at an international level proving any easier. By the 1930s the question of drug standardization was on the agenda for the Health Section of the League of Nations. However, initially it would not rule upon the standardization of anti-malarials, concentrating instead upon the assay of biochemical rather than galenical preparations, such as quinine. Eventually, after pressure from the League's Malaria Commission which had prepared a series of reports on what it regarded as the most problematic health issue of the time, two standards were issued for a combination cinchona feb-

rifuge preparation called *Totaquina*. While these standards were accepted by member nations, they were not enforceable by law and the scope for adulteration of quinine and cinchona products remained.[61]

Conclusion

It was not until independence that legislation against drug adulteration was finally enacted. Why had it taken so long to be taken seriously when, in the case of quinine and malaria, it had affected the lives of so many of the Indian population? Politics was one factor. With health a subject transferred to provincial governments, local politicians and nationalist sentiment combined to uphold their right of authority over the issue of quality of medicinal preparations, even if they did not enact any such legislation. Meanwhile provincial Chemical Examiners were quick to argue that testing should not be transferred to the Central Biochemical Standardisation Laboratory when it had been created in the late 1930s. The issue was also sensitive, one of local "rogue traders" against foreign drug companies of repute, to use the terminology of the Western medical practitioners in India. It was also a period in which doctors in India were seeking to stress their qualifications and professionalisation against the compounders and dispensers whose training was still largely one of apprenticeship despite the creation of some pharmacy courses in Indian universities. No doubt the Government of India was loathe to become involved in demarcation disputes between the rival medical practitioners.

Penn and Stieb have argued that legislation against drug adulteration required three inter-related factors. Qualified practitioners willing to speak out against the malpractice had to have the equipment to prove the existence of the adulteration. Finally there had to be a gradual build up of wider professional and public awareness leading to a desire for asocial controls to be placed on the industry, forcing governments to drop previously held positions of non-intervention in the medicinal market.[62] While these factors had developed in Britain and the United States, backed by fears of the widespread sale of poisons and some well-publicised drug disasters, the process was continuing in India until the end of the colonial period. The process in colonial India would move beyond the focus on poisons in contemporary Britain to discussion of the variety of ways in which medicinal drugs could be adulterated. However, it would take the drug shortages of the Second World War to provide the push to the emerging synthesis of factors demanding change in the operation of the drugs market in India. India, therefore, mirrored the slow development that had been taking place in the metropolitan centres, though for different reasons. The Government of India was bound by its role as a colonial government to subsume health issues to those of politics. It was easier to enact legislation against narcotics since that was part of both the colonial, nationalist and international political agenda. Meanwhile, the slow application of the recommendations of the Chopra Committee was bound up in the schism between colonial politics and the everyday health of the peoples of the

sub-continent.

This was a major problem in the treatment of malaria and the use of quinine and the cinchona alkaloids. The Government of India and the local authorities had been willing to establish mass-medicalisation schemes to combat the worst ravages of the disease. However, it became clear that the use of impure pharmaceutical preparations was hindering the progress of these campaigns. Worse, the seeming failure of quinine as a prophylactic helped to increase doubts about the whole-heartedness of the government's desires to treat the people. It seemed yet another way in which colonial medicine was stratified on racial lines, with cheaper more easily adulterated cinchona febrifuges being used to treat Indians, while Europeans had greater access to quinine sulphate. The irony was that all the supplies were open to fraud and adulteration because of the lack of legally enforced standards both domestically and internationally for galenical preparations. Then, as now, there was limited international interest in creating standards for therapeutic treatments to combat tropical diseases. As malaria became increasingly located as tropical disease, there was little importance attached to the creation of legal standards for antimalarials in Britain and the United States, while the League of Nations had only reluctantly adopted two products with only suggested guidelines for their composition. Ultimately, then, the Government of India and the provincial and local authorities of the sub-continent were being left to formulate effective policies for the safety of medicinal products such as quinine and the other cinchona alkaloids when international authorities had declined the responsibility.

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Endnotes

1. Versions of this paper was read at the International Conference on Drugs and Alcohol in History, Huron University College, London, Ontario, Canada, 13-16 May 2004 and at the Cradle to Grave Seminar Series, Centre for the Social History of Health and Healthcare, Glasgow Caledonian University, September 2006. I would like to thank the comments from those present and reviewers of the paper.

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3. Indu Bhusan Bose, B. Mukerji and R. N. Chopra, "Quality of Quinine Preparations in Indian Hospitals and Dispensaries," *IMG* 74 (October 1939): 610-11.

4. M. Harrison, "Medicine and the Culture of Command: The Case of Malaria Control in the British Army during the Two World Wars," *Medical History* 40 (1996): 437-52.

5. John Abraham, *Science, Politics and the Pharmaceutical Industry. Controversy and Bias in Drug Regulation.* (London: University College London Press, 1995).

6. E. W. Stieb, *Drug Adulteration: Detection and Control in Nineteenth-Century Britain* (Madison and London: University of Wisconsin Press, 1966); John B. Blake, ed. *Safeguarding the Public: Historical Aspects of Medicinal Drug Control* (Baltimore: Johns Hopkins University Press, 1970); Jonathan Liebenau, *Medical Science and Medical Industry: The Formation of the American Pharmaceutical Industry* (London: Macmillan, 1987).

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8. Mukarram Bhagat, *Aspects of the Drug Industry in India* (Bombay: Centre for Education and Documentation, 1982); Harkishan Sinha, *History of Pharmacy in India and Related Aspects. Pharmacopoeias and Formularies* (Delhi: Vallabh Prakashan, 1991).

9. Studies include, D. Arnold, *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth-Century India* (Berkeley: University of California Press, 1993); Mark Harrison, *Climates and Constitutions: Health, Race, Environment and British Imperialism in India 1600-1850* (Cambridge: Cambridge University Press, 1994); Harrison, "'Hot Beds of Disease': Malaria and Civilization in Nineteenth Century India," *Parassitologia* 40 (1998): 11-18; Harrison, *Climates and Constitutions: Health, Race, Environment and British Imperialism in India 1600-1850* (New Delhi: Oxford University Press, 1999); Daniel Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981).

10. P. K. Sanyal, *A Story of Medicine and Pharmacy: Indian Pharmacy 2000 Years ago and After* (Calcutta: Amitava Sanyal, 1964). Valuable work on the history of science includes Zaheer Baber, *The Science of Empire: Scientific Knowledge, Civilization, and Colonial Rule in India* (Delhi: Oxford University Press, 1998); Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Oxford: Oxford University Press, 1999); J. Lourdusamy, *Science and National Consciousness in Bengal, 1870-1930* (Hyderabad: Orient Longman, 2004).

11. For example, William B. McAllister, *Drug Diplomacy in the Twentieth Century: An International History* (London: Routledge, 2000); Carl A. Trocki, *Opium, Empire and the Global Political Network: A Study of the Asian Opium Trade 1750-1950* (London and New York: Routledge, 1999); Soma Ghosal, *The Politics of Drugs and India's Northeast* (Kolkata: Anamika Publishers & Distributors (P) Ltd, 2003); A. Farooqui, *Smuggling as Subversion: Colonialism, Indian Merchants and the Politics of Opium 1790-1843* (Oxford: Lexington, 2005); J. F. Richards, "The opium industry in British India," *The Indian Economic and Social History Review* 39 (2002):149-80; M. Emded ul-Huq, *Drugs in South Asia: From Opium to the Present Day* (London: Palgrave, 2000); D. E. Owen, *British Opium Policy in India and China* (New Haven: Yale University Press, 1934); M. Greenberg, *British Trade and the Opening of China, 1800-1842* (Cambridge: Cambridge University Press, 1951); James H. Mills, *Cannabis Britannica: Empire, Trade and Prohibition* (Oxford: Oxford University Press, 2003).

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13. For example, Rogers, utilising the post mortem reports in Calcutta, argued that only 17% of local patients had "true malaria." L. Rogers, *Happy Toil: Fifty Years of Tropical Medicine* (London: Frederick Muller Ltd., 1950): 124. Christophers, meanwhile, argued that the seasonal pattern of mortality suggested malaria was the cause: malaria mortality peaked between September and December, cholera between July and August. Presidential Address to the Medical Research Section of the 5th Indian Science Congress, 1924.

14. *Annual Report of the Public Health Commissioner with the Government of India for 1933*, (New Delhi: Central Government Publishing, 1935), I: 2.

15. Indian Public Health Report, 1933, p. 2.

16. Ibid., 61.

17. Ibid., 2.

18. *Annual Report of the Public Health Commissioner with the Government of India for 1938*, (New Delhi: Central Government Publishing, 1940), I: 46.

19. In 1901, for instance, preparations including cinchona products were sold as treatment for Addison's Disease, mouth ulcers, lupus and loss of voice, *Merck's 1901 Manual of the Materia Medica. A Ready Reference Pocket Book for Practicing Physicians and Surgeons* (New York and Chicago: Merck and Co, 1901), in file C38 (a) I Merck and Co., Kremers' Reference Files, American Institute of the History of Pharmacy, University of Wisconsin, Madison.

20. Statistical Abstract for British India, Cmd 5804 of 1938, Table 262, pp. 838-39; "Quinine Cultivation in India," *IMG* (July, 1939): 433.

21. By the late 1930s with the failure to produce a cheap synthetic anti-malarial and the prospect of war once more on the horizon, British government and medical authorities once again returned to the possibility of securing imperial cinchona supplies. See, for instance, British Library, India Office Records, M/3/180 "Question of Quinine Production in the Empire, 1937" and British National Archives CO850/93/11 of 1937 "Quinine as Prophylaxis."

22. C. A. Gill, "A Summary of Anti-malarial Measures in the Punjab," Imperial Malaria Conference, 1909, Report, Cd. 6538 of 1912, p. 59

23. *Alphabetical List of Drugs, Medicines, etc, free from and containing Spirit compiled from the Results of Tests made by the Customs Houses at Calcutta, Bombay and Madras* (Madras Government Press, 1903).

24. J. Sinton, "Human Costs of Malaria," *Records of the Malaria Survey of India* [henceforth *Records*], 7, 1936

25. A. J. H. Russell, "Quinine Supplies," 240-41.

26. Central Advisory Board of Health: quinine supplies in India, E & O, 44002 of 1937, p. 6.

27. J. A. Sinton, "The Relative Values of the Cinchona Alkaloids in the Treatment of Malarial Fevers," *Records*, 1, 1930, 468-69.

28. R. Knowles and B. M. Das Gupta, "Clinical Studies in Malaria by Cultural and Enumerative Methods," *IMG* (January 1931): 1.

29. For examples of such networks see, Proceedings of the Second All-India Sanitary Conference, Madras, 1912, Cd. 6777 of 1913; or the annual reports of the Public Health Commissioner of the Government of India or the individual local authorities.

30. *Report of the Chemical Laboratories maintained by the Central Board of Revenue for 1934-35* (New Delhi: Government Press, 1936): 8.

31. *Annual Report of the Chemical Examiner's Department, Bengal, for the Year 1925* (Calcutta: Bengal Secretariat Book Depot 1926): 1.

32. Chemical Examiner's Report, Bengal (1926): 9.

33. Letter, D.P. Goil, Surgeon-General, Bengal, No. 23549/2R-21-36, September 21, 1936; Chemical Examiner's Report, Bengal (1937): 1, para. 1.

34. Central Board of Revenue Report, (1934-35): 1.

35. Alphabetical List, 1903.

36. Chemical Examiner's Report, Bengal (1922): 1, para. 5.

37. Ibid., 1, para. 7.

38. Megaw, *IMG* (1907).

39. Megaw, *IMG* (1928).

40. Chemical Examiner's Report, Bengal (1930): 1 para 7.

41. Chemical Examiner's Report, Punjab (1930): Appendix, iv.

42. "Editorial," *IMG* (January 1932): 29-30.

43. "Recommendations," *Report of the Drugs Enquiry Committee, 1930-31*. (Madras: Superintendent, Government Press and Calcutta: Central Publication Branch, 1931).

44. See, for instance, the evidence of Dr. Nair, "Inspection of Food and Drugs in Relation to Public Health," *Proceedings of the Second All-India Sanitary Conference, Madras, November 11th to 16th, 1912* (Simla: Government Central Branch, 1913): II, 547.

45. Quoted in Indian Public Health Report (1935): 190.

46. Indian Public Health Report (1935): 199.

47. Chemical Examiner's Report, Punjab (1931): 9.

48. *Annual Report of the Chemical Examiner, Government of the North-West Frontier Province, 1935* (Peshawar: Government Printing, 1936), Letter No. 10610-A/M of 1936.

49. Indian Public Health Report (1938): 63.

50. "Conference Report," *IMG* (March 1939): 173.

51. Bose, Mukerji and Chopra, "Quality of Quinine Preparations," *IMG* (1939): 610-11; "Medical News Comment: Control of Drugs in India: Existing Legislation Ineffective," *IMG* (February 1939): 104.

52. GoI, Dept of Health, Drug Standard Control, The Drugs Act 1940 and the Drugs Rules, 1945 (with explanatory Memo) as corrected up to 31st March 1950. (New Delhi: Manager of Publications; Kanpur: Job Press Ltd, 1950): Part II, para 5.

53. Chemical Examiner's Report, Bengal (1941): 5, para. 6.

54. R, N, Chopra, "Report on the activities of the Biological Standardisation Laboratory," *IMG* (April 1943).

55. Report of Association's complaint in *IMG* (July 1943): 353.

56. R.N. Chopra, "The Drug Industry of India and its Problems," *IMG* (April 1939): 230.

57. ICI, *The Progress of Science in the Conquest of Disease.* (Wimslow: ICI, 1950): 11. The plastic product was called "Alkathene."

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59. Quoted in "The Biological Assay of Drugs in India," *IMG* (October 1932): 573.

60. T. D. Whittet, "Drug Control in Britain, World War I to 1968' in Blake, *Safeguarding*, 32-33.

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