

Sex in the laboratory: the Family Planning Association and contraceptive science in Britain, 1929–1959

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Abstract. Scientific and medical contraceptive standards are commonly believed to have begun with the advent of the oral contraceptive pill in the late 1950s. This article explains that in Britain contraceptive standards were imagined and implemented at least two decades earlier by the Family Planning Association, which sought to legitimize contraceptive methods, practice and provision through the foundation of the field of contraceptive science. This article charts the origins of the field, investigating the three methods the association devised and employed to achieve its goal of effecting contraceptive regulation. This was through the development of standardized methods to assess spermicidal efficacy; the establishment of quality, strength and manufacturing standards for rubber prophylactics; and the institution of animal trials to ensure the safety of specific contraceptives. The association publicized the results of its scientific testing on proprietary contraceptives in its annual Approved List of contraceptives. This provided doctors and chemists with a definitive register of safe and effective methods to prescribe.

Introduction

Between 1929 and 1959 the British Family Planning Association (FPA) and its predecessor the National Birth Control Association (NBCA) were heavily invested in standardizing and regulating the various contraceptive products then available and in development. This article offers an account of the three primary scientific testing programmes founded and pursued by the NBCA/FPA: efficacy, safety and quality testing. These activities constituted the formation and consolidation of a new branch of chemical and biological science, and the association's research became integral in its goal of regulating contraceptive technology available in Britain during the mid-twentieth century.

The history of the regulation of contraception and the scientific control of human fertility is a broad field that has not attracted the full attention of historians. Several historians – Merriley Borell, Illana Löwy, Richard Soloway and Adele Clarke – have examined the relationship between biological science and contraceptive history. It is almost exclusively from these accounts that the pioneering and legitimizing role of biological and

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chemical science in contraceptive history emerges.¹ This scholarship either offers a distinctly American perspective, or, where it is transnational, diverts focus from British efforts in the aftermath of the successful 1930s challenge of the American Comstock Laws, which prevented publication of material deemed obscene.²

These historians have attended to the scientific research employed by contraceptive advocates in the US, in the context of legitimizing or medicalizing contraceptives. No historian, however, has yet directly articulated the concept of contraceptive science *sui generis*, or addressed the scientific development of contraceptive standards. Soloway articulates a pragmatic concept of applied research, discussing how British scientists undertook to develop a simple and effective contraceptive that even ‘the stupidest ... most undesirable members of society’ could easily apply. He acknowledges the ‘clandestine and unregulated’ nature of the early twentieth-century British contraceptive trade, but does not elaborate upon its connection with the science. Löwy discusses British laboratory-based spermicide evaluations from 1929, and the 1937 development of Volpar, ‘a powerful spermicide, non-irritating, inexpensive, small, solid ... unaffected by the ordinary range of climates and odourless’.³ Although she explains collaborations between British researchers, their financial backers and private industry, which worked to promulgate contraception, she ignores the NBCA, the primary contraceptive provider and financial supporter of this research. Borell, meanwhile, claims that before 1940 social activists were the primary supporters of contraceptive research, not scientists or physicians.⁴ Borell concludes that ‘chemical contraceptives never summoned the interests of scientists’.⁵ Clarke agrees, explaining that this was due to the ‘contraceptive quid pro quo’, whereby the scientific profession declined to investigate traditional mechanical and chemical contraceptives, promising instead to develop a ‘scientific’ contraceptive that would be acceptable to both the scientific and medical professions. All of these historical works skirt the topic of contraceptive science as a valid field of enquiry; nor do they investigate the development of standards as the means through which it might be legitimized and publicized.

The formation of a field of scientific enquiry dedicated to investigating contraceptive science arose in conjunction with the mid-1920s social-activist-led collectives which aimed to remedy overpopulation, poverty and public-health concerns. For these groups, which included the Society for the Provision of Birth Control Clinics, the Society for Constructive Birth Control and Racial Progress, and the Eugenics Society, contraception became a panacea with the potential to address social, health and

1 Merriley Borell, ‘Biologists and the promotion of birth control research, 1918–1938’, *Journal of the History of Biology* (1987) 20(1), pp. 51–87; Ilana Löwy, ‘“Sexual chemistry” before the Pill: science, industry and chemical contraceptives, 1920–1960’, *BJHS* (2011) 44(2), pp. 245–274; Richard Soloway, ‘The “perfect contraceptive”: eugenics and birth control research in Britain and America in the interwar years’, *Journal of Contemporary History* (1995) 30(4), pp. 637–664; Adele E. Clarke, *Disciplining Reproduction: Modernity, American Life Sciences, and the ‘Problems of Sex’*, Los Angeles: University of California Press, 1998.

2 Marks, *op. cit.* (1), p. 33.

3 Löwy, *op. cit.* (1), pp. 255–256.

4 Borell, *op. cit.* (1), pp. 81–82.

5 Borell, *op. cit.* (1), p. 85.

moral concerns. Yet at the same time it was acknowledged that very little was known about the functional mechanisms of spermicidal products, the safety of their use, or even the actual physiology of sex. One particular group, the Birth Control Investigation Committee (BCIC), was formed by physicians and scientists late in the decade with the aim of understanding human sex, reproduction and contraception through physiological, medical, chemical, biological and statistical investigations. Within years of its formation this group became the research arm of the primary contraceptive collective in the UK, the NBCA.

This article, then, charts the origins of the field of contraceptive science within the ‘pure’- and ‘applied’-science debates of the early twentieth century, and argues that the BCIC legitimized both laboratory investigations of sexological and contraceptive topics and, when appropriate, the practice of contraception. It further discusses the advent and strengthening of the Approved List of contraceptives through the development of biological and chemical laboratory tests to assess and rank chemical contraceptives supplied through NBCA clinics. It argues that the chemical tests the association’s scientists designed to assure physicians, retailers and the public of the efficacy of available contraceptive products became used as a standardizing tool that the association could apply to regulate contraceptives sold in Britain in the mid-twentieth century. Finally, it argues that the field of contraceptive science was consolidated by the NBCA/FPA through the expansion of chemical, biological and physiological lab testing to address safety concerns regarding spermicides, and to establish and enforce rubber standards for prophylactics.

Creating a contraceptive science in the early twentieth century: ‘pure’- and ‘applied’-science debates

The expansion of scientific research into health, fertility and sexual matters through the broad discipline of sexology at the turn of the twentieth century proposed combining philosophical and medico-scientific approaches to such issues on a global scale. The slow but definite successes of sexology made laboratory and sexual science increasingly attractive to birth control campaigners who hoped to legitimize their cause and methodology. It was in this flourishing research environment that contraceptive advocates began petitioning in the 1920s for scientific and medical support, and for sympathy for the problems to which contraception was their proposed solution.

In 1927 Margaret Sanger convened the World Population Conference, dedicated to uncovering the potential for science to arrest concerning population trends (overpopulation of certain places, or by certain classes, and the threat of zero population growth elsewhere), and to urge the international scientific community to develop ‘intelligent solution[s]’ to these problems.⁶ ‘Science’ had just emerged from a significant period of debate about its value for esoteric knowledge versus its utility for public application.⁷ The latter,

6 Margaret Sanger, ed., *Proceedings of the World Population Conference*, London: Edward Arnold and Co., 1927, Announcement.

7 Graeme Gooday, “‘Vague and artificial’: the historically elusive distinction between pure and applied science”, *Isis* (2012) 103, 3, pp. 546–554, 547.

applied science, was arguably usurped as a primary focus of proper scientific efforts, and became subordinate to pure scientific enquiry which pursued knowledge for its own sake.⁸ The contraceptive lobby faced a major dilemma: it needed to create a valid field of scientific enquiry acceptable to the scientific schools for whom pure knowledge was the primary goal, and which could also be applied within contraceptive clinics for public and individual benefit.

In the early twentieth century, neither science nor medicine coexisted harmoniously with contraception. Extant social and scientific considerations made physicians, scientists and politicians wary about allying themselves with the practice. Notably, scientific dissidents believed the current tactical merger between the eugenics and birth control movements was unhelpful to the contraceptive cause, possibly diluting its altruistic potential through the affiliation, which proposed to remedy perceived social problems presented by the poor and degenerate classes through fertility control. The risk that the contraceptive movement might be burdened by association with socio-utilitarian eugenics threatened to derail its proposed alliance with scientific and medical communities.

The conveners were adamant that their conference was integral to contraception being accepted as a population regulator, and to the foundation of contraceptive science as a legitimate field of study. F.A.E. Crew, a University of Edinburgh biologist, whose research was entrenched in sex physiology, was keen to use the conference to ‘piece together all the work that is being done, to point out the gaps, and quietly and efficiently make [sympathetic] contacts’.⁹ Attendance was ‘strictly limited to persons of established scientific standing’ and most attendees hailed from nations engaged with the science of eugenics. In spite of the ideological risk inherent in this affiliation, contraception was tackled as a budding branch of scientific and medical enquiry fusing physiology, biology, chemistry, reproduction, medicine and statistics.¹⁰ The conference was a spectacular success, uniting attendees ‘in a true scientific spirit [to] discuss these great controversial questions’ regarding the nature and object of contraception, and considering how to answer them via pointed scientific investigation.¹¹

A prominent number of attendees used the opportunity of the conference to identify colleagues and to raise potential research questions which could ideally be answered through the development of a dedicated branch of scientific enquiry. In 1928 several attendees convened a committee comprising scientists and physicians to investigate scientific and medical aspects of contraception with ‘neutrality and impartiality’.¹² The BCIC aimed to address the fact that ‘contraception is widely used ... [but] there is very little medical and scientific knowledge about it’.¹³ At its inception the committee

8 Stathis Arapostathis and Graeme Gooday, ‘Electrical technoscience and physics in transition, 1880–1920’, *Studies in the History and Philosophy of Science* (2013), 44(2), pp. 202–211, 203.

9 Edith Howe-Martyn, correspondence, 18 December 1926, quoted in Borell, *op. cit.* (1), p. 61.

10 Sanger, *op. cit.* (6).

11 W.H. Welch, ‘Closing address’, 3 September 1927, quoted in Sanger, *op. cit.* (6), p. 353.

12 BCIC Memorandum on Proposed Re-organisation [c.1931], Wellcome Library, Archives of the Eugenics Society (WL/SA/EUG), WL/SA/EUG/D/12/12.

13 BCIC Sub-Committee Draft Report, 1928, WL/SA/EUG/D/12/12.

outlined a series of research programmes it believed were integral to understanding public attitudes towards contraception, to the methodologies utilized and to ensuring the quality and safety of these techniques.

Within months the committee had evolved a clear structure, accommodating four sub-committees: general purposes, finance, statistics and research. The first two were charged with administrative, publicity and fundraising tasks, and the latter were separate branches of scientific exploration. The statistics sub-committee would collect, analyse and distribute data from contraceptive clinics, and the research sub-committee was charged with ‘defin[ing] problems on which investigation is necessary ... order[ing] their urgency’, and instigating laboratory and clinical investigations of those problems in order to uncover solutions.¹⁴

This innocuous structure and research agenda paved the way for the group to define its approach to scientific enquiry. In its initial draft statement, the BCIC explained that after three years in existence the group had identified

a number of directions in which dispassionate investigation of the subject of birth control can be prosecuted. These can be grouped under two main headings. First there is the sociological or applied side of the problem ... The second main group of investigations which should be undertaken concern the purely scientific basis of birth control.¹⁵

Importantly, this agenda intended both to tackle the creation of contraceptive knowledge for its own sake, and to undertake applied research for the benefit of the public and medical professions for which the group envisioned such research would be most applicable. Contraception was unusual in regard to scientific investigation as its utility was overt and inescapable. This meant that the margin separating the BCIC’s applied and pure activities was, at least initially, deemed extremely important and could not be breached if the goal of legitimizing the latter were to be achieved. Thus the delineation between these two agendas corresponded with the structure of the BCIC’s research sub-committees.

The group maintained that only the work undertaken by the statistics sub-committee addressed the ‘applied side of the problem’.¹⁶ This work was definitively sociological, requiring mathematical assessment of the proposed patient ‘case cards’ and strategically disseminated questionnaires to reach conclusions regarding the ‘merits of various birth control methods ... [their] efficiency and success ... [and whether they] are equally valuable for members of different social and economic classes’. This work had the potential to be immediately applied for the benefit of patients and to educate the wider community. Further research proposed to use the same methods to ascertain whether the use of contraceptives had any discernible psychological or physiological impact, or compromised future fertility.¹⁷

14 BCIC Sub-Committee Draft Report, op. cit. (13).

15 BCIC Draft Statement [c.1930], Wellcome Library, Archives of the Family Planning Association (WL/SA/FPA), WL/SA/FPA/A13/5.

16 BCIC Draft Statement, op. cit. (15).

17 BCIC Draft Statement, op. cit. (15).

Only work that was centred in the laboratory was deemed pure, and the group made sure to place this proposed research definitively within the spectrum of the ‘laborious nature of scientific research, [wherein all] progress is invariably due to a long, slow, interconnected series of studies’. Thus the initial primary research focus of the committee – spermicides and spermatoxins, which will be elaborated upon – was framed as the inevitable consequence of the ‘long pioneer researches of Pasteur, Erlich, Metchnikoff and their thousands of followers on immunity to bacteria’. This strategy legitimized the emerging scientific field as the inevitable result of some of the greatest achievements in science and medicine, validating all the research it proposed to undertake toward uncovering the ‘purely scientific basis of birth control’.¹⁸

In 1930 a draft statement detailing the various avenues of BCIC-directed pure research was drawn up. This was comprehensive and included research into the ‘physiology of coition’, since the scientific and medical profession realized it was ‘surprisingly ignorant of the detailed physiology of the sexual act’.¹⁹ This prompted significant research to discover whether ‘during coitus, the uterus behaves in such a way as actively to suck up the contents of the vaginal vault’.²⁰ This was imperative to know, as it would have a significant bearing on the dependability of contraceptives, and would warrant extensive safety testing if chemical contraceptives were discovered to be ‘aspirated’ into the uterus upon orgasm. A series of trials injecting contraceptives into rabbit and dog uteri were initiated to assess risk and the ‘effects of contraceptives on the female’,²¹ and later human radiological trials were undertaken to definitively determine suction.²² Further research investigated the ‘chemistry of the female genital tract’, specifically focusing on the range and fluctuations of vaginal acidity. This later expanded to consider fluctuations in vaginal pH levels, ‘cell structure’ and ‘flora’ during the menstrual cycle.²³ A further initial line of enquiry was hormonal. The BCIC realized it was ‘quite likely ... further knowledge [would] make it possible to achieve temporary sterility by injecting certain hormones, or even administering them by mouth’.²⁴ This insight prompted the committee to fund a series of experiments to understand reproductive hormonal systems; but the group was never in a position to undertake pure or applied research into hormonal contraception. High-temperature, X-ray and ‘mechanical methods’ of contraception were all considered for investigation.²⁵ However, financial constraints and pressures meant that only mechanical methods were explored.

Historian Graeme Gooday argues that placing emphasis upon laboratory research constitutes the first stage in the ‘domestication process ... [of a field employing] the strategic enlistment of a microscope ... as a trustworthy indoor mediator of “Nature”’.²⁶

18 BCIC Draft Statement, op. cit. (15).

19 BCIC Draft Statement of Work, 1930, WL/SA/FPA/A13/5.

20 BCIC Radiological Experiments, General Explanation [c.1932], WL/SA/FPA/A13/5.

21 BCIC Present Scope of Work [c.1929], WL/SA/FPA/A13/5; BCIC Draft Statement of Work, op. cit. (19).

22 Report to the BCIC by H.M. Carleton and H.W. Florey [c.1930], WL/SA/FPA/A13/5.

23 BCIC Draft Statement of Work, op. cit. (19); BCIC Present Scope of Work, op. cit. (21).

24 BCIC Draft Statement of Work, op. cit. (19).

25 BCIC Draft Statement of Work, op. cit. (19).

26 Graeme Gooday, “Nature” in the laboratory: domestication and discipline with the microscope in Victorian life sciences’, *BJHS* (1991) 24(3), pp. 307–341, 309.

The committee played on the contemporary delineation of ‘pure science’ to carve itself a laboratory-based niche wherein it undertook and publicized its investigations into the physiology of coition, the chemistry of the genital tract, spermicides, spermatotoxins, hormones, mechanical methods, high temperature, X-rays and hereditary effects within bounds its scientific peers would agree were unadulterated by potential practical application in contraceptive clinics. Meanwhile the ‘sociological or applied’ research was firmly confined within clinics and was, at least publicly, overtly separated from the laboratory, and hence from the committee’s pure scientific endeavours.²⁷

This separation between the BCIC’s pure and applied research and ideals was short-lived. Tensions centring on the ‘unsatisfactoriness of present methods’ quickly materialized.²⁸ Members voiced concerns that the pure investigations ‘might prove harmful to the birth control movement’ and felt some responsibility to apply scientific research to understand and improve available contraceptives.²⁹ Thus an applied focus of enquiry characterized the BCIC’s work after it amalgamated with the Society for the Provision of Birth Control Clinics, the Society for Constructive Birth Control and Racial Progress, the Birth Control International Information Centre and the Workers’ Birth Control Group in July 1931 to form the National Birth Control Association (NBCA), ‘a central organisation’ for administering and overseeing contraception in Britain.³⁰

This merger reflected fundamental challenges which had been made to the BCIC constitution the previous year. As a result of its scientific discoveries, members agreed that the committee should

- (a) Organise research with a view to discovering better [contraceptive] methods.
- (b) Investigate existing methods in order to ascertain to what extent and with what results they are practised.³¹

The BCIC can therefore be viewed as having failed in its goal of achieving pure knowledge, and had officially become adherents of applied scientific enquiry. After 1931, the committee recognized that funding research which explicitly aimed to achieve a social utility would have demonstrable positive social and public-health outcomes, especially among the urban poor who most desperately needed reliable and effective contraception. This apparent failure broadened the scope and impact of the BCIC’s research through its unification with the emerging leader of contraceptive provision in Britain.

Immediately upon amalgamation, the NBCA issued an amended constitution under which the BCIC became a ‘Special Committee’ with autonomy to direct its research and development programme. Under the auspices of the NBCA’s aim of ‘advocat[ing] and promot[ing] the provision of facilities for scientific contraception’, the BCIC

27 BCIC Draft Statement of Work, *op. cit.* (19).

28 BCIC Memorandum on Proposed Re-organisation [c.1931], WL/SA/EUG/D/12/12.

29 BCIC Memorandum on Proposed Re-organisation, *op. cit.* (28).

30 Memorandum on the Suggested Framing of Rules for the SPBCC, 1926, Wellcome Library, Archives of the Private Papers of Margery Spring Rice (WL/SA/SR), WL/SA/SR17/1–11.

31 BCIC Memorandum on Proposed Re-organisation, *op. cit.* (28).

became the prime insurer of scientific and medical contraceptive standards, and seamlessly folded the committee's original research agenda into the association's functions and aims.³²

The Approved List of contraceptives: controlling and exporting contraceptives from a position of scientific authority

From its origin, contraceptive science was intended to have both a pure application in creating and collecting knowledge for a new field of scientific study fusing physiology, biology, chemistry and medicine, and a practical 'application' providing effective, scientifically sanctioned contraceptive devices and products. The association envisioned that its research would have an impact upon medical, political and social spheres via the creation and dissemination of a sanctioned list of products, and through applying scientific findings in its contraceptive clinics.

Within three years of its foundation the NBCA instituted an 'Approved List' for chemical contraceptives.³³ This realized the BCIC's original objective 'to establish facts and to publish these facts as a basis on which a sound public and scientific opinion can be built'.³⁴ Thus the concept of ascertaining and disseminating contraceptive standards definitively emerged before the means of doing either were ever conceptualized. This primary objective of the BCIC became a shared goal with the NBCA following amalgamation.

The Approved List allowed the association to disseminate its scientific findings, and promote the base standard its tests had established, which every contraceptive product distributed by and used in NBCA clinics had to meet.³⁵ Few early editions of the list remain. In October 1937, the first known two-page list of products that 'proved satisfactory in clinical practice and harmless in laboratory examination' was compiled. The products listed were available at good chemists, and their manufacturers offered 'special prices to clinics and doctors'.³⁶ This publication was intended to combine the association, medicine, science and contraception by establishing specific standards for manufacturers to enable prescription of their products by NBCA physicians.

The earliest-known list features just fourteen products whose effectiveness and standardized manufacture could be scientifically proven to be effective by the 1930s. The

32 NBCA Amended Draft of Constitution, 1930, WL/SA/EUG/D/12/12.

33 Contradictory evidence appears in the second medical sub-committee minutes that no such list existed. In response to a chemist's request regarding advertising to the public that he stocked 'reputable ... medically sound' contraceptives, the committee discussed the 'possibility ... that a statement as to the approved contraceptives might possibly be compiled'. NBCA Medical Sub-Committee Minutes, Session One, 17 November 1934, WL/SA/FPA/A5/88.

34 BCIC Statement of Intent [c.1927], WL/SA/FPA/A13/5.

35 FPA Approved List, June 1952, WL/SA/FPA/A7/3. This is the first claim that the FPA Approved List filled a perceived gap in contraceptive product standards. It asserts, 'no contraceptive products are listed in the British Pharmacopoeia but for many years the Family Planning Association has investigated the qualities of proprietary contraceptives and made the findings available to interested enquirers'.

36 NBCA Approved List, October 1937, WL/SA/FPA/A7/5. A prior draft list dated October 1936 exists, but this copy is littered with amendments and I do not consider it the first official list.

prime means through which ‘checks on ingredients, products and waste’ could be performed were through chemistry, bacteriology and histology.³⁷ A selection of caps and sheaths were itemized under ‘Rubber Appliances’. These represented the spectrum of female and male barrier methods that had emerged since vulcanization had enabled rubber to be moulded into durable, thin but delicate sheets,³⁸ allowing the mass production of water- and heatproof condoms and caps.³⁹ The list included ‘womb veils’ and ‘female protectors’ such as a vaginal sponge dipped in vinegar solution;⁴⁰ the diaphragm, initially called the ‘Mensinga Cap’ or ‘Dutch Pessary’; and cervical caps – flexible shields, made quickly and cheaply in various sizes.⁴¹ These blocked the entry of sperm to the womb. Condoms and sheaths were promoted most ardently as the ‘check that is CERTAIN’; and worked by covering the erect penis, preventing sperm from entering the woman. The second and third sections of the list, ‘Pastes, Jellies, Etc.’ and ‘Suppositories’, featured products used in conjunction with barrier methods. Typically, these were soluble or melting pessaries, such as a ‘small cone of cocoa butter, charged with quinine’, which melted at body temperature. Other products were a spermicidal paste or jelly, applied to a cap or diaphragm or inserted into the vagina shortly before intercourse, to ‘destroy the vitality of the seminal fluid’.⁴²

The association assured that ‘all the goods mentioned here have passed the special tests of the NBCA’. Qualifying this claim, it assured that ‘as clinical evidence accumulates this list will be emended [*sic*] and/or supplemented’.⁴³ With this, a defining feature of the FPA’s monopoly of British contraception was inaugurated. The association’s list was a major focus for over three decades.

The association, as industrial and engineering firms had done decades earlier, was introducing a laboratory-supported set of testing and inspection standards. This necessitated that the contraceptive industry adopt new, scientifically sanctioned production procedures to remain viable in the industry that its goal was to dominate and direct.⁴⁴

The list was continuously amended whenever science, standards and technology allowed. It was considerably more comprehensive by 1939. From 1950 the association introduced three tiers of approval to the list. Section A featured ‘pastes, jellies and suppositories [demonstrating a] satisfactory level of spermicidal efficiency [that had] been found reliable and harmless under prolonged clinical trial’. Section B covered products that had passed laboratory tests, but were yet to undergo trials. Section C included products without adequate lab testing, but which had proven satisfactory

37 John V. Pickstone, ‘Sketching together the modern histories of science, technology and medicine’, *Isis* (2011) 102(1), pp. 123–133, 128.

38 John Loadman, *Tears of the Tree: The Story of Rubber – a Modern Marvel*, Oxford: Oxford University Press, 2005, p. 35.

39 Ann Collier, *The Humble Little Condom: A History*, New York: Prometheus Books, 2007, p. 134.

40 Clarke, *op. cit.* (1), p. 167.

41 Loadman, *op. cit.* (38), pp. 293–311.

42 George Standring and William Reynolds, *The Malthusian Handbook: Designed to Induce Married People to Limit Their Families within Their Means*, 4th edn, London: W.H. Reynolds, 1898, p. 46.

43 NBCA Approved List, *op. cit.* (36).

44 Amy Slaton, ‘“As near as practicable”: precision, ambiguity, and the social features of industrial quality control’, *Technology and Culture* (2001), 42(1), pp. 51–80, 52.

in clinic.⁴⁵ This list was the association's primary method of ensuring the availability of safe and effective technologies for the medical profession and public.

The NBCA formally implemented contraceptive effectiveness testing into its function from late 1934. The tests it employed were designed and trialled under the BCIC from the late 1920s. This work undertook a 'scientific study ... of the comparative advantages of different methods [of contraception, to determine] the possible far-reaching effects of the practice as a whole'.⁴⁶ This followed the General Medical Council Pharmaceutical Committee's assertion that Britain needed to ensure 'the effective control of the quality and authenticity of ... therapeutic substances offered for [public] sale'. The pharmaceutical committee accepted that therapeutic substances included 'prophylactic and diagnostic agents', and demanded that products incapable of chemical testing be strictly 'supervised and controlled'.⁴⁷ This call prompted the institution of the Therapeutic Substances Act (1925), through which the Ministry of Health and the National Pharmaceutical Union developed legislation to create fair drug assessment standards, enforceable through penalty if drugs dispensed were adulterated or of diminished quality or potency. Comparison was to be drawn against the 'presumptive legal standard' of quality, the British Pharmacopoeia, and the supplementary British Pharmaceutical Codex, which covered therapeutic minutiae.⁴⁸ Both manuals specifically excluded contraceptive preparations and methods, as the medical profession consistently argued that contraception was not a medical matter. The NBCA stealthily allied its agenda to the pharmaceutical union by establishing scientific contraceptive assessment standards based upon the 1925 legislation and taking the Pharmacopoeia as its model.

In the late 1920s the BCIC theorized and planned a series of tests on chemicals and preparations exhibiting spermicidal qualities. John Baker, a renowned biologist, physical anthropologist and cytologist at the University of Oxford, was engaged to carry out the task.⁴⁹ Baker agreed to undertake chemical contraceptive research and drug development, aiming to test spermicidal agents for efficacy and develop a perfect contraceptive.⁵⁰ Concurrently, an identical research project was instigated at the University of Edinburgh. This project was funded by the National Committee on Maternal Health and the Bureau of Social Hygiene in America, and its director Professor Crew appointed Cecil Voge, a recent doctor of chemistry, to undertake the study.

These two competing researchers were engaged with defining contraceptive standards by the close of the 1920s. Each developed laboratory techniques to assess the ability of a specific compound to arrest and kill spermatozoa in conditions replicating the female

45 FPA Approved List, February 1950, WL/SA/FPA/A7/5.

46 Humphry Rolleston, 'Birth Control Investigation Committee', *British Medical Journal* (1927) 2, pp. 805–806.

47 T.D. Whittet, 'Drug control in Britain: from World War 1 to the Medicine Bill of 1968', in John B. Blake (ed.), *Safeguarding the Public: Historical Aspects of Drug Control*, Baltimore: Johns Hopkins University Press, 1970, pp. 27–37, 31–32.

48 Whittet, op. cit. (47), pp. 27–30.

49 A cytologist is a scientist whose investigations focus on cytopathology, the diagnosis of disease through observation of cellular changes, or cellular biology, which is the investigation of the anatomy, function and chemistry of cells.

50 Cecil Voge, *The Chemistry and Physics of Contraceptives*, London: J. Cape Publishing, 1933, p. 224.

reproductive system.⁵¹ It was the contraceptive equivalent of the research and development of ‘chemical formulas, histological atlases, geological sections, morphological plans, charts of machine parts, and diagrams of prices and wages’ for creating a base of knowledge on which to build a branch of contraceptive scientific inquiry.⁵²

Baker’s efforts resulted in the creation of formal contraceptive standards, which directly shaped the progress and structure of NBCA/FPA programmes. This facilitated his second goal of developing the ‘ideal chemical contraceptive’.⁵³ Baker was employed to research the ‘susceptibility of sperms to poisons, including those commonly used in chemical contraceptives’.⁵⁴ This work initially focused on ‘pure substances’, but quickly expanded to consider contemporary commercial spermicidal and germicidal compounds.⁵⁵ Baker’s tests were developed exclusively using guinea pig semen, as it was cheaper and easier to access a ‘perfectly fresh supply’ from them than from humans.⁵⁶ Baker’s testing methods for pessaries were published in 1929 and within two years he claimed that tests employing human sperm were under way. His use of animal sperm was short-lived, and by 1937 Baker clarified ‘our tests are nowadays [all] done with human semen’ owing to differences in the power necessary to kill the two.⁵⁷

Baker’s test for spermicides required preparation of two batches of neutralized ‘buffered glucose saline’, which acted as a neutral substance replicating vaginal conditions. One batch was a control, and the other was used to test the spermicidal capacity of various substances. Both batches sat in a damp chamber, warmed until they reached 37 °C. The material to be tested was dissolved at various concentrations in 0.9 per cent saline. Baker aimed to discover the lowest concentration of each product that was lethal to sperm within thirty minutes. The active agent was added to the saline, and after fifteen minutes the sperm were introduced. Air was added at fifteen, twenty-five and thirty minutes, to prevent the sperm suffocating. The slides were then microscopically examined and sperm motility rated: III, II, I or 0. III indicated high motility, and 0 indicated none, with + added if movement fell between categories.⁵⁸ Providing the control tube results were III or III+, the results were recorded, and the test repeated

51 Borell, op. cit. (1), pp. 250–253.

52 Pickstone, op. cit. (37), p. 128.

53 John R. Baker, ‘The spermicidal powers of chemical contraceptives: II. Pure substances’, *Journal of Hygiene* (1931) 31(2), pp. 189–214, 211.

54 BCIC Draft Statement of Work, op. cit. (19).

55 BCIC Summary of Activities, 1930, WL/SA/FPA/A13/5; BCIC Present Scope of Work; 1930, WL/SA/FPA/A13/5.

56 John R. Baker, ‘The spermicidal powers of chemical contraceptives: VI. An improved test for suppositories’, *Journal of Hygiene* (1934) 34(4), pp. 474–485, 474.

57 John R. Baker, R.M. Ranson and J. Tynen, ‘The spermicidal powers of chemical contraceptives: VII. Approved tests’, *Journal of Hygiene* (1937) 37(3), pp. 474–488, 474. In 1936 the NBCA medical sub-committee implemented research to assess differences in semen potency between regular patients for whom chemical contraception was effective and those using products perfectly who experienced failures. This move to understand the ‘standard of ordinary semen’ warrants mention in a history of contraceptive regulation, since understanding the natural variety of semen potency meant contraceptives could effectively be targeted toward sperm with higher resistance, thus ensuring a higher margin of efficiency.

58 Baker, op. cit. (53), pp. 195–196.

thrice to confirm the outcome.⁵⁹ The lowest concentration sufficing for this was called the ‘kill concentration’. All subsequent tests were undertaken on products at half their kill concentration, in order to further rank spermicidal ability.⁶⁰

Under Crew’s guidance, Voge developed three tests to assess the safety and efficacy of contraceptives then marketed in America, Britain, Germany and Holland. The ‘rapid survey’ involved placing commensurate samples of sperm and contraceptive solution onto a slide for up to fifteen minutes to visually assess general spermicidal qualities.⁶¹ The second and third tests involved mixing sperm with the spermicide in various receptacles for undetermined time periods prior to microscopic inspection. Voge claimed in *Chemistry and Physics of Contraceptives* (1933) that all three proved satisfactory and could be utilized to assess quality until such time as ‘the medical profession will aid us’.⁶²

Neither Baker nor Voge was exclusively dedicated to standardizing current chemical contraceptives. Both men were also invested in developing a superior contraceptive. Baker, the more experienced scientist, worked these two tasks simultaneously, whereas Voge tackled them progressively. Baker determined this goal directly upon realizing that currently available compounds had ‘limited spermicidal power’. It took a decade for him to achieve his objective. Baker expeditiously achieved another of his project aims, authoring the seminal guidelines on British contraception. In 1935, he published *The Chemical Control of Contraception*, formalizing the authority of the ‘Baker test’. This work was printed two years after Voge disseminated his method, but was deemed more authoritative by the NBCA, which had funded and was already applying Baker’s findings within its clinics.

Affiliation with contraceptive science was a perilous prospect for scientific researchers. An alliance could be construed as supporting the morality or application of contraception, which in the 1930s remained undesirable for medical and scientific professionals. A promising academic career could be impeded or finished if the field remained unrecognized by the academy. Baker’s success lost him his position in the Department of Zoology. His research was not department-sanctioned and was deemed overtly supportive of the contraceptive cause.⁶³ His motives for undertaking this research were judged to be primarily monetary, and the department terminated his affiliation. The offer of an Oxford Department of Pathology laboratory allowed his work to progress. Voge’s academic research career was ruined by an affiliation with contraception. In 1938 he was dismissed when his employers, the National Committee on Maternal Health and Bureau of Social Hygiene, observed his sympathy for contraceptive practice, and alleged that his work risked becoming applied science. This firing demonstrates that even in this emerging

59 John R. Baker, ‘The spermicidal powers of chemical contraceptives: I. Introduction, and experiments on guinea-pig sperms’, *Journal of Hygiene* (1929) 29(3), pp. 323–329, 326–328; Baker, ‘The spermicidal powers of chemical contraceptives: III. Pessaries’, *Journal of Hygiene* (1931) 31(3), pp. 309–320, 313–316; Baker, op. cit. (53), pp. 192–197.

60 John R. Baker, ‘The spermicidal powers of chemical contraceptives: IV. More pure substances’, *Journal of Hygiene* (1932) 32(2), pp. 171–183, 172.

61 Voge, op. cit. (50), p. 23.

62 Voge, op. cit. (50), p. 224.

63 Baker, ‘I. Introduction’, op. cit. (59), p. 323; Baker, op. cit. (53), p. 192; Clarke, op. cit. (1), p. 188.

field, invisible, malleable but unassailable rules about the division between pure and applied science endured. Voge's contraceptive sympathies effectively ended his career. His actions had potential to jeopardize the entire field, by marking it as an applied scientific pursuit, practised for profit by those supportive of contraception. This explains why numerous contraceptive advocacy groups banded together following Voge's dismissal to fund, assert and reinforce the primacy of Baker's research and methodology.⁶⁴

From 1937, Baker's test became the standard means of ascertaining the spermicidal efficiency of chemical contraceptives for the annual Approved List. His method was consistently cited by the association as offering 'reliable and reproducible results within the limits of individual variations of semen and homogeneity of the preparations used'.⁶⁵ Baker's standard was proffered as an appropriate methodology for the British Pharmacopoeia Commission to employ during discussions regarding the transfer of oversight of chemical contraceptives to the commission in the 1950s.⁶⁶

The existence of collaboration between the association and manufacturers is demonstrated by Baker's claim that 'makers of various commercial pessaries' had cooperated with his research.⁶⁷ A meeting was called between Baker and M.V. Bowler, chief chemist at contraceptive manufacturer Gilmont Products Ltd, to discover why the association determined that 'G.P. Solubles were not so effective as other' comparable contraceptives, and 'why Dr Baker's tests gave such different results from their own'.⁶⁸ Importantly, this demonstrates that Gilmont (and perhaps other manufacturers) conducted its own tests to achieve some commonly accepted standard of effectiveness.

Manufacturers and the association worked in conjunction to meet standards due to their collocation in clinical supply. The 1939 FPA approved-product list highlighted retail, wholesale and birth control clinic pricing. Specifically, this was intended to demonstrate the tiny profits clinics made from providing the service, but more generally it aired the closeness of their collaboration with manufacturers.⁶⁹ The association and manufacturers were exploiting the observed 'rise in the mass production [and consumption] of household medical goods' to meet the needs of the British middle classes, the primary consumers of medical technologies and therapies. Historian Claire Jones argues that contraceptives informally fell into this category, and local contraceptive manufacturing flourished during the early twentieth century.⁷⁰ Although for some decades previously, consumers could become exposed to, and purchase, contraceptive devices widely, contraceptive clinics were a unique source. They were the only site

64 Löwy, *op. cit.* (1), pp. 250–251; letter, L.S. Bryant to R.L. Dickinson, 18 March 1933, Harvard Library: Countway, National Committee on Maternal Health Papers, Box 17, Folder 575; Soloway, *op. cit.* (1), p. 652.

65 The Contact Test: A Method of Measuring Spermicidal Actions, 14 April 1953, WL/SA/FPA/A7/15.

66 British Pharmacopoeia Commission Ad Hoc Committee on Spermicides Minutes, 15 September 1958, WL/SA/FPA/A7/22.

67 Baker, *op. cit.* (53), p. 189. Work on proprietary contraceptives began after the BCIC amalgamated with the NBCA and the North Kensington Women's Welfare Clinic medical committee conceived the germ of standardization and regulation in 1935.

68 J.R. Baker and M.V. Bowler, Interview Minutes, 5 February 1935, WL/SA/FPA/A7/13/1.

69 NBCA Prices of Contraceptives, 22 February 1939, WL/SA/FPA/A7/5.

70 Claire Jones, 'Under the covers? Commerce, contraceptives and consumers in England and Wales, 1880–1960', *Social History of Medicine* (2016) 29(4), pp. 734–756, 738.

wherein contraceptives were directly equated with therapeutic treatment, and sold directly to consumers at heavily discounted prices.⁷¹ Clinics needed constant supplies, bought products in bulk, and under most circumstances were willing to work with manufacturers to ensure contraceptive products met association standards.

Clinics also opened up contraception to new markets which product marketing and consumption studies do not tend to consider: the lower classes and urban poor. Though these consumers were not candidates for direct marketing, en masse they represented a significant financial demographic, especially when the NBCA/FPA was partially, and sometimes completely, subsidizing patients' purchases.⁷² The association progressively expanded its influence throughout Britain, opening new clinics across the nation. By 1937 it boasted fifty-four, and within thirteen years claimed ninety-one.⁷³ Thus new markets, with guaranteed contraceptive sales, consistently emerged through the association's efforts, giving manufacturers a strong financial motivation to pursue this alliance.

Manufacturers and the association saw value in working together to attain respectability and public trust for contraception. The NBCA/FPA's desire to set product standards was a condition most manufacturers would abide by in order to remain on the association's Approved List, and to maintain their status as preferred manufacturers. Although always intended to be more broadly applied, the list was most influential as an internal NBCA/FPA resource sanctioning contraceptive prescription. The primary means to ensure that contraceptives were sold in clinics was through acceptance on the list. This explains why Gilmont was so incensed that its products failed Baker's test, and risked being left off.

Gilmont was fierce in defending its products. Gilmont provided the association with evidence that it had 'carried out considerable experimental research work [in partnership with] hospitals, clinics and doctors', and that these collaborations had resulted in significant product improvements. Gilmont argued that if its products were unsatisfactory, completely new preparations had been developed. Gilmont complained that Baker's test assessed spermicidal efficiency, without considering the manufacturers' advised method of use. Its spermicides were prescribed as a complement to a barrier appliance, never as a stand-alone contraceptive.⁷⁴ Given that Gilmont had 'covered the requirements' of clinics, hospitals and other groups before marketing its product, its dedication to the ideal of regulation was not in question.⁷⁵ It merely queried the association's chosen method. Baker's findings caused 'grave disturbance ... in the minds of [Gilmont] Directors', and they dreaded that the results might be published before it could defend its products.⁷⁶

71 NBCA Approved List, op. cit. (36).

72 Michael Fielding, *Practical Advice on Birth Control*, London: National Birth Control Association, 1933, WL/SA/SP17/12/17.

73 NBCA Medical Sub-Committee Minutes, 16 October 1937, WL/SA/FPA/A5/88; The FPA – Past and Future: Speeches at the Annual General Meeting, 20 May 1950, WL/SA/EUG/D/12/16/24.

74 Baker and Bowler, op. cit. (68).

75 Letter, Gilmont Products Limited to J.R. Baker, 19 February 1935, WL/SA/FPA/A7/13.1.

76 Letter, Gilmont Products Limited to H. Holland, 1 March 1935, WL/SA/FPA/A7/13.1.

Gilmont appreciated the association's attempts to standardize contraceptive testing, but formally disagreed with Baker's technique. Gilmont argued that Baker's use of guinea pig semen meant that his results were not 'comparable with ... tests employing fresh human semen'. Further, attempts to replicate coital secretions were inapt, as each individual's protein concentration was different.⁷⁷ Gilmont pitted science against science to discredit Baker's methods. After 1938 it also criticized his ethics, when he, in conjunction with their competitor British Drug House, developed a new spermicide, Volpar (voluntary parenthood). Volpar, allegedly 'superior to all other chemical contraceptives',⁷⁸ was funded by the NBCA without prior notification of other manufacturers supplying products and unguarded formulas to Baker for the association's testing programme.⁷⁹ Many manufacturers took umbrage. They would work with the association as a regulator, but objected to what they saw as industrial espionage disguised as product standardization.⁸⁰

The problem was that Gilmont had developed its in-house standards of efficacy in affiliation with Voge, at the University of Edinburgh.⁸¹ In 1938 Gilmont explained that its laboratories at Edinburgh University had developed a formula which had been found efficacious by research, and had proven itself in practice, to which they had given the trade name Permfoam.⁸²

Baker derided Gilmont for using what he deemed an inferior and discredited testing procedure. He further insinuated that Voge's method was a poor imitation of his own.⁸³ In return, Gilmont alleged that the association had deliberately sidelined Permfoam and later products GP Ointment and Soluables in favour of Volpar.⁸⁴ Gilmont argued that the repeated failure of its products using the 'Baker test' constituted bias, and demanded an impartial re-examination.⁸⁵

The simultaneous development of two methods for producing or testing a scientific or technological product is not unusual. Gooday observes that divergent centres of authority and expertise commonly emerge in histories of discipline formation and contestation. Baker and Voge constitute interested expert parties in the debate over the supreme method of contraceptive efficacy testing. Their interests were undoubtedly involved, and their decisions were contingent upon financial considerations. The NBCA/FPA undertook to act as an authority 'whose utterances were not (closely) connected with their income', and in this instance utilized regulatory positioning to support Baker's technique.⁸⁶ Although this was a questionable use of its authority, the association was a recognized impartial arbiter, and had ultimately founded and funded the field. With

77 Gilmont Products Limited to Holland, op. cit. (76).

78 Letter, NBCA to Gilmont Products, 19 October 1938, WL/SA/FPA/A7/13.1.

79 Response, Gilmont Products to NBCA, 27 October 1938, WL/SA/FPA/A7/13.1.

80 Gilmont Products to NBCA, op. cit. (79).

81 Gilmont Products Chief Chemist Report on G.P. Ointment, January 1949, WL/SA/FPA/A7/13.1.

82 Gilmont Products to NBCA, op. cit. (79).

83 Baker and Bowler, op. cit. (68).

84 Gilmont Products to NBCA, op. cit. (79).

85 Gilmont Products to Baker, op. cit. (75).

86 Graeme Gooday, 'Liars, experts and authorities', *History of Science* (2008) 46(154), pp. 431–456, 446.

association support, Baker's test was confirmed superior, and won support from every group providing funding for contraceptive science.

Gilmont maintained animosity toward the association but continued annual testing to keep its products on the Approved List, in order to ensure that clinics with loyalty to its brand had unfettered access to its merchandise.⁸⁷ The Approved List never lost the support of the manufacturers, who saw value in achieving accreditation as effective, despite the spectre of doubt regarding the partiality of the regulators.

Consolidating contraceptive science through the inclusion of safety and rubber standards

In 1939 the NBCA rebranded as the FPA and concurrently accepted responsibility to establish and enforce contraceptive standards through its annual Approved List.⁸⁸ The association had become the public face of contraception and a determined regulator of contraceptive products and practices. From the late 1930s the NBCA/FPA expanded its efficacy research by adding contraceptive safety and rubber prophylactic standards to its testing activities.

The establishment of a laboratory as the ideal site of its research and testing agenda was the goal of the Family Planning Association; however, until it was in a financial position to rent, equip and people such a facility, it was at the mercy of external scientists and laboratories to achieve its research objectives. Nor was field testing an option – this did not tempt the support of many individuals or groups willing to provide a site 'for conducting experiments to apprehend or control material processes'.⁸⁹ Thus it fell to the association to envision and commission 'more elaborate and thorough investigation of the biochemistry and physiology' of reproduction, which could be easily integrated into the research agenda of a sympathetic laboratory or scientist.⁹⁰ Achieving basic scientific knowledge on the topic through pointed laboratory investigations would make the field commensurate with biological and chemical testing work that aimed to give approval to medical therapies and technologies for the guidance of physicians, health authorities, chemists, retailers and individual purchasers.⁹¹ Ensuring the safety and efficacy of contraceptive products was fundamental to the FPA's function and authority, and the laboratory was a useful site for undertaking this vital work without being seen to have direct application in contraceptive clinics, even if it ultimately did.

Harmlessness testing originated with the BCIC. The committee quickly identified a risk of chemical contraceptives directly applied into the vagina or used in conjunction with a diaphragm or cap. These could potentially cause carcinoma or sterility in

87 Approved List, March 1939, WL/SA/FPA/A7/1; Approved List, March 1940, WL/SA/FPA/A7/1; Approved List, February 1942, WL/SA/FPA/A7/1.

88 The year 1939 was when the NBCA was restructured as the FPA. The association's aims and guidelines were adapted to ensure ongoing public acceptability and applicability.

89 Graeme Gooday, 'Placing or replacing the laboratory in the history of science?', *Isis* (2008) 99(4), pp. 783–795, 788.

90 N.W. Pirie, 'Biochemistry of conception control', *Eugenics Review* (1952) 44(3), pp. 129–140, 139.

91 NBCA Circular, February 1938, WL/SA/FPA/A7/1.

protracted use. Contraceptive safety was also attended to in Voge's original 1930s testing plans, to allay contemporary physicians' fears about the 'medical harmfulness of contraceptive practices'.⁹² As the association provided these products to consumers daily, it too needed to investigate such claims and to discontinue selling any products that were determined harmful.⁹³ Ensuring the safety of chemical contraceptives was heavily funded from the late 1930s.⁹⁴

In its 1930 draft statement, the BCIC defined its attitude toward safety testing. Animals were to be the initial primary subjects as 'work of this nature can be done on a large scale ... and then the more important points checked on human[s]'. This view was carried into all NBCA/FPA harmlessness research.⁹⁵ Baker's chemical research initiated interest in safety, prompting collaboration with histologist Harry Carleton and pharmacologist and pathologist Howard Florey to 'explore the possibility of using experimental animals for testing the harmful effects of spermicidal compounds'. This group determined that bitches were the most appropriate animals for use, and initial research aimed to establish a testing base.⁹⁶ Baker later worked with Carleton, anatomist Solly Zuckerman, and research assistant Clare Harvey, to trial a base procedure for assessing contraceptive safety. The premise was that three medium-sized bitches would be injected daily with oestrone and ethyloleate until their 'vaginal smears showed no pus cells'. Then a contraceptive would be inserted into the vagina daily for a fortnight in conjunction with daily oestrone injections. The day following final application, the bitches would be killed and a full histology of their reproductive systems performed.⁹⁷ Later, when formal harmlessness tests were being designed, the association agreed that 'substances which appear to have no harmful effect on animals can then safely be tried out on a small scale on women in clinics'.⁹⁸

Harmlessness testing first became an NBCA medical sub-committee imperative after Carleton claimed in introducing *The Chemical Control of Contraception* (1935),

The inclusion of a paste or jelly between the os uteri and a cervical cap is to be regarded as a potentially dangerous procedure, and that women adopting this practice should not so much be encouraged by experts as warned of its eventual pathological possibilities.⁹⁹

Upon realizing that no formal consideration had been given to the potential 'harmful results' of repeated use of chemicals on the cervix over long periods,¹⁰⁰ the committee resolved to approach expert doctors regarding possible danger. In January 1936,

92 'Birth control', *The Lancet* (1930) 216(5577), pp. 147–148, 147; Contraceptives: Effect on Fertility, 1943–9, WL/SA/FPA/A7/16A. This folder is dedicated to research requests and letters regarding contraceptives causing sterility and malformation.

93 H.A.R. Binney, Meeting Minutes, 10 January 1955, WL/SA/FPA/A7/20; FPA List of Approved Contraceptives Report, 1953, WL/SA/FPA/A7/16.

94 Letter, FPA general secretary to P. Schidrowitz, 4 February 1937, WL/SA/FPA/A7/20.

95 BCIC Draft Statement of Work, op. cit. (19).

96 Letter, C. Harvey to S.C.S. Robinson, 2 October 1948, WL/SA/FPA/A7/16.

97 Harvey to Robinson, op. cit. (96).

98 BCIC Draft Statement of Work, op. cit. (19).

99 NBCA Medical Sub-Committee Minutes, Session One, 17 October 1936, WL/SA/FPA/A5/88.

100 NBCA Medical Sub-Committee Minutes, 6 October 1935, WL/SA/FPA/A5/88.

Florey, Carleton and cancer researcher and pathologist Beatrice Pullinger met to discuss these concerns. The dearth of scientifically supported research into the effects of the 'repeated application of chemicals to the cervix' resulted from two problems: 'the time lag necessary in the production of a carcinoma, [and the] sporadic nature of the carcinogenic agents'.¹⁰¹ Pullinger offered to supply a list of 'established carcinogenic agents', though stressing that this was not exhaustive as new carcinogens were constantly being discovered. She suggested the NBCA employ a statistician to investigate the matter through patient data, and also that it should commence an experimental programme.¹⁰² The latter clearly presented the greatest opportunity to undertake pure chemical and biological research into the problem, and formally to integrate safety testing into the realm of contraceptive science. Thus the NBCA medical sub-committee agreed 'it would be valuable to obtain scientific evidence to support this ... by examining women who have practised birth control for several years and who have now reached or passed through the age at which trouble is most likely to arise'.¹⁰³ The 'most satisfactory way of excluding this danger' would be to design and implement a test involving repeated application of products to monkey or bitch cervixes for a period of time to be determined.¹⁰⁴ Despite approving these ideals of safety testing, harmlessness never received wholehearted association support or funding until the close of the 1940s as its limited resources were consistently diverted to spermicidal research and testing. The FPA were 'kept busy ... war or no war', and when the workload accumulated owing to wartime pressures, its regulatory controls became somewhat malleable.¹⁰⁵

From 1948 onwards, the FPA was in a position to push for 'a series of harmlessness tests on all the chemical contraceptives on the approved list'. The association initially approached Harvey, who had previously worked in Baker's laboratory on developing a method of testing safety. She rejected Baker's proposed methodology as 'a waste of a good bitch', explaining, 'I wouldn't have taken [safety testing] on for all the gold of the Incas'.¹⁰⁶ She later forwarded tentative specifications proposing a method of applied scientific investigation employing FPA clinic volunteers. These women could be separated into groups, asked to test a product and report any irritation. If every other possible source of irritation were excluded, it could be concluded the contraceptive was the cause, and action taken. Harvey noted that for many women irritation and messiness were interchangeable and therefore the subjective nature of contraceptive preference had to be acknowledged when designing such trials.¹⁰⁷ Respected clinician and researcher Carlos Blacker agreed that fifty human volunteers having 'passed the menopause ... who would agree to insert a quinine pessary every night for a month' would provide a 'strong indication', if not actual proof, as to the general acceptability and

101 NBCA Medical Sub-Committee Minutes, 26 January 1936, WL/SA/FPA/A5/88.

102 NBCA Medical Sub-Committee Minutes, *op. cit.* (101).

103 NBCA Medical Sub-Committee Work during 1936, 1937, WL/SA/FPA/A5/88.

104 NBCA Medical Sub-Committee Minutes, 5 July 1936, WL/SA/FPA/A5/88.

105 Letter, unknown FPA member to R.W. Vemes, 4 October 1940, WL/SA/FPA/A7/1.

106 Harvey to Robinson, *op. cit.* (96).

107 Letter, C. Harvey to I. James, 2 January 1952, WL/SA/FPA/A7/16.

harmlessness of the product.¹⁰⁸ The medical sub-committee, however, determined it was safer to conduct trials on animals rather than humans. Thus laboratory-based animal testing definitively subjugated all other proposed clinic-based methods.

After years searching for an appropriate researcher and methodology, an informal discussion with Zuckerman uncovered a candidate for the work. Professor of reproductive endocrinology Peter Eckstein worked in the Anatomy Department at the University of Birmingham. Eckstein was 'willing and able to undertake such tests using rhesus monkeys' and promised to design a test to assess chemical contraceptive safety.¹⁰⁹ In June 1953, Eckstein offered to trial his proposed method before receiving association funds. He judged that this work could 'be carried out relatively easily in the framework of existing research'.¹¹⁰ Within six months, Eckstein cautiously reported that none of the three products initially tested (duro-creme, ortho-creme and ortho-gynol) 'had a marked deleterious effect on the vagina'.¹¹¹ The medical sub-committee perceived that a slow pace of progress resulted when working within the constraints of the menstrual cycle and was content as long as Volpar would receive appropriate attention.¹¹²

By the close of 1954, Eckstein's proposal to assess each product's safety by testing it on three monkeys was established. However, his research led to the discovery that not enough was known about the normal or baseline conditions of monkey vaginas to effectively discern safety.¹¹³ This caused the scope and cost of harmlessness research to expand tremendously and prompted the FPA to petition the Eugenics Society for funds, in order to avoid diverting money from actual safety testing.¹¹⁴

The Eugenics Society was well funded and shared some of the association's contraceptive goals; but it also aimed to use the practice to discourage excessive births differentially by class. The society argued that sex and contraceptive education was necessary as 'it is the right of every child to be born healthy'.¹¹⁵ But given its general promotion of contraception as a preventive health measure, the society was persuaded to provide funding for Eckstein's animal baseline tests to further FPA safety investigations.

Eckstein proposed to undertake control tests on three to four monkeys, performing vaginal histology and biopsies of each over several months of their normal menstrual function to establish a solid baseline for testing and assessing safety.¹¹⁶ Following preliminary testing, one of the sixteen purchased monkeys would have the arbitrary amount of two millilitres of a given substance inserted directly into the vagina once daily for no less than sixty days. During this period, four biopsies would be taken: one prior to commencement, two at different stages of application, and one at

108 Letter, FPA general secretary to C. Harvey, 14 January 1952, WL/SA/FPA/A7/16.

109 Memorandum on Harmlessness Tests for the Eugenics Society, October 1954, WL/SA/FPA/A7/16.

110 Letter, FPA general secretary to P. Eckstein, 5 June 1953, WL/SA/FPA/A7/16.

111 Letter, P. Eckstein to I. James, 7 November 1953, WL/SA/FPA/A7/16.

112 Letter, M. Jackson to P. Eckstein, 12 November 1953, WL/SA/FPA/A7/16.

113 Telephone note from M. Jackson, 28 April 1954, WL/SA/FPA/A7/16.

114 Memorandum on Harmlessness Tests, op. cit. (109).

115 Eugenics Society, *What Is Heredity?* [c.1934], WL/SA/EUG/J/17.

116 Letter, I. James to P. Eckstein, 29 April 1954, WL/SA/FPA/A7/16; telephone note from Jackson, op. cit. (113).

conclusion.¹¹⁷ Collecting biopsies from three or four untreated animals at the same intervals would constitute a control test.¹¹⁸ The Eugenics Society supplied £300 to purchase and house sixteen animals, and to fund three rounds of testing for nine months with regular ‘progress reports’.¹¹⁹

Eckstein’s first formal report was submitted in November 1954. It relayed the results of three products tested: three out of four monkeys tested remained perfectly healthy, while the fourth recovered once treatment stopped and experienced no ongoing effect. Vaginal inspections revealed that the epithelium thinned and slightly cornified, and was more easily traumatized by invasive inspection. However, biopsies showed ‘no evidence of any harmful effect’.¹²⁰

Eckstein’s second report, which succeeded the base tests, was submitted in 1955. Seven contraceptives were tested, with the Volpar range taking precedence. Eckstein discovered that Volpar products were not detectable for a full twenty-four hours after application. This was required to adhere to the testing method he had devised; subsequently, the standard test was modified to assess Volpar’s safety to apply one millilitre of the product twice daily.¹²¹ The results were promising and all monkeys tolerated the contraceptives well, some for as long as seven months. All monkeys experienced diminished haemoglobin and red blood cell count; their periods tended to be heavier and longer, and some became irregular. Previous safety findings were borne out and eight of nine animals showed ‘no significant lesions on vaginal biopsy’. Finally, two animals were killed and their entire reproductive tract excised and inspected. ‘No pathological condition of any part of the necessary reproductive tract’ was revealed.¹²² Eckstein’s tests were considered successful, and were applied to all products submitted for Approved List inclusion from 1956. Any product not yet tested for safety was relegated to Section B.¹²³ An effective scientific method was thus defined to assess the chemical, biological and medical effects of contraceptives and an acceptable standard of safety defined and enforced.

Concurrently from the mid-1930s, another means through which contraceptive science was validated was being established and defined: the chemical assessment and standardization of rubber prophylactic quality and manufacture.¹²⁴ This research began under fermentation chemist and rubber refinement pioneer Philip Schidrowitz. In 1935 he produced *Tentative Standards Specification A*, the first rubber contraceptive

117 Results of a New Series of Harmlessness Testing on Monkeys, 8 October 1955, WL/SA/FPA/A7/16.

118 Memorandum on Harmlessness Tests, op. cit. (109).

119 Draft letter, I. James to P. Eckstein, October 1954, WL/SA/FPA/A7/16.

120 Results of Harmlessness Tests in Monkeys, November 1954, WL/SA/FPA/A7/16.

121 Results of a New Series of Harmlessness Testing, op. cit. (117).

122 Results of a New Series of Harmlessness Testing, op. cit. (117).

123 Letter, E. Mears to M. Jackson, 30 October 1959, WL/SA/FPA/A7/16.

124 The medical sub-committee approached Voge in his capacity as a ‘rubber expert’ in 1934. He presented the committee with proof of the shoddy practices and products that were being sold on the open market, claiming that ‘only 55% [of condoms sold] were useable’. He explained the difficulties that prevented mass access to caps; they had to be handmade overseas and were very expensive, costing ten shillings per item. This interaction with Voge likely encouraged the association’s interest in standardizing rubber goods. NBCA Medical Sub-Committee Minutes, Session Two, 28 July 1934, WL/SA/FPA/A5/88.

standard, provided by the NBCA to manufacturers in December of that year. These guidelines were updated and amended in May 1937.¹²⁵

Historian Amy Slaton contends that the establishment of manufacturing and product standards had been a feature of the industrialized world since the turn of the twentieth century. Within the first decade a detente had been reached between scientific experts and their clients in manufacturing and government. Technical skill and authority could be fused to fundamentally change and expand industrial manufacturing capacity wherever engineering and technology intersected with mass production.¹²⁶ From 1900, Slaton argues, standards and specifications were increasingly common, constituting a 'technical and legal communication' assuring quality. This benefited scientists by creating new domains necessitating scientific influence and authority, and benefited manufacturers through the establishment of public trust in their products and brand. Standards defined the optimal quality, grade and/or size of a product, and specifications often incorporated standards, to define the parameters of a product or a method of practice.¹²⁷ Slaton further contends that manufacturers increasingly appreciated and embraced the potential benefits of intercompany regulation, whereby technical knowledge could be shared and investigative labour used most efficiently without duplication. This was primarily through the foundation of 'private, proactive, centralised' bodies, willing to define and police standards and specifications for industrial products and practice.¹²⁸ Rubber contraceptive products were no exception to these engineering and manufacture conditions, and their standardization and regulation in Britain were a task the NBCA/FPA was eager to effect.

From 1935 all the major contraceptive manufacturers – London Rubber Company; Lamberts Prorace Ltd, later Lambert (Dalston) Ltd; Burge, Warren and Ridgely; Ortho Pharmaceutical Ltd; and Prentif Ltd – engaged with the association and attempted to adhere to the specifications laid down regarding washable sheaths, condoms/thin sheaths, diaphragms and cervical caps. Initially these standards directed that all must pass inflation tests, though it was never specified how far they were to be inflated or for how long. Elongation tests were defined as a 900 per cent increase in length prior to break.¹²⁹ There was also a test of tensile strength, and a visual assessment to ensure the product displayed no flaws or splits.¹³⁰ Additionally, artificial ageing was undertaken by boiling each product at 70 °C for between thirty and seventy-two hours depending on the thickness of the rubber. All tests were then repeated to ensure no significant degradation over time.¹³¹ As a condition of Approved List inclusion, Schidrowitz's tentative guidelines insisted that dating was imperative; all rubber

125 Letter, P. Schidrowitz to FPA general secretary, 12 June 1939, WL/SA/FPA/A7/20.

126 Slaton, *op. cit.* (44), p. 55.

127 Slaton, *op. cit.* (44), pp. 58–59.

128 Slaton, *op. cit.* (44), pp. 59–60.

129 This specification was later revised to '800% before ageing, and 720% after ageing' by Schidrowitz to reflect a new conviction that this expectation was too high. NBCA Medical Sub-Committee and Ad Hoc Sub-Committee Minutes, 20 May 1937, WL/SA/FPA/A5/88.

130 Memorandum from P. Schidrowitz, 22 February 1937, WL/SA/FPA/A7/20; FPA general secretary to Schidrowitz, *op. cit.* (94).

131 Letter, P. Schidrowitz to FPA secretary, 14 January 1938, WL/SA/FPA/A7/20.

products should be stamped with a date of manufacture and/or expiry. Early tests recommended that product approval be ‘subject to dating’.¹³²

A significant scale of testing was instituted and conducted from September 1935 onwards. This schedule met little objection except from London Rubber, which forwarded detailed criticism of the stringency of the proposed testing procedures in February 1937. The manufacturer dropped its objection upon notification that its products had ‘stood the test quite well’.¹³³

The dating standard proved most contentious for manufacturers, but that seemed resolved by late 1937. All manufacturers of products on the Approved List agreed to adhere to a maximum three-year expiration date; some products were given shorter life-spans owing to Schidrowitz’s results. Following a meeting opposing the association’s decision ‘that the 3 years’ guarantee could not be lengthened’, manufacturers agreed to alter packaging to reflect this resolve.¹³⁴ The NBCA/FPA, cognizant that a change from a five- to a three-year rubber life span could prove ‘damaging to [a manufacturer’s] reputation’, circulated a letter to retailers explaining the urgency of this new standard.¹³⁵

Due to necessity, contraceptive standards were relaxed during the war. Rubber goods were assessed on the understanding that manufacturers had ‘had to resort to [a lesser] type of rubber’.¹³⁶ Published results of rubber testing undertaken between 1942 and 1948 acknowledged this deterioration through the caveat ‘having regard to the present circumstances [this contraceptive] may be regarded as reasonably satisfactory’.¹³⁷ In 1940, Lamberts Dutch Caps were twice submitted for testing and failed abysmally. The FPA cautioned Lamberts that their present manufacturing standards were inadequate, and the company agreed. Wartime shortages meant that the established manufacturing and quality standards were impossible to maintain. So the association ‘decided to leave [Lamberts products] on the list’ based solely on their ongoing satisfactory performance in clinic use as half of its dual-method standard prescription.¹³⁸

The following year London Rubber ceased dating. It feared that products made with the inferior-quality wartime rubber would not be saleable if the dates of manufacture were publicized. This was contrary to the arrangement the association had negotiated with manufacturers, whereby it would constitute the primary consumer of these goods and would then distribute them to the public if its standards of manufacture and quality were met. The association removed undated London Rubber products from its newly printed Approved List, and chided the company by ‘put[ting] pen through the [London Rubber] Co. Caps *and* their address’ on the already ‘rolled off ... copies’.¹³⁹

132 Letter, H. Holland to P. Schidrowitz, 30 October 1941, WL/SA/FPA/A7/20; letter, P. Schidrowitz to S.C.S. Robinson, 18 October 1948, WL/SA/FPA/A7/20; Results of ‘Dutch Cap’ Test by P. Schidrowitz, 28 April 1949, WL/SA/FPA/A7/20.

133 Memorandum from Schidrowitz, op. cit. (130).

134 NBCA Medical Sub-Committee Minutes, 16 October 1935, WL/SA/FPA/A5/88.

135 NBCA Medical Sub-Committee Minutes, op. cit. (134).

136 Letter, FPA acting secretary to P. Schidrowitz, 17 October 1941, WL/SA/FPA/A7/20.

137 Results of ‘Lambutt’ Cap Test by P. Schidrowitz, 30 April 1942, WL/SA/FPA/A7/20.

138 FPA Medical Sub-Committee Minutes, 20 May 1940, WL/SA/FPA/A7/1.

139 Letter, R.W. Vemes to H. Holland, 3 April 1941, WL/SA/FPA/A7/1, original emphasis.

Annual rubber testing occurred throughout the 1940s, but the practice was not formalized until 1954.¹⁴⁰ After 1950, increasingly stringent testing and quality standards were imposed as the FPA devoted itself to establishing and policing rubber standards.¹⁴¹ It was acknowledged that the FPA was undertaking 'successful work in this field' and that its method was worth applying to other products and industrial organizations.¹⁴² The FPA agreed in principle that its current laboratory testing methods were not ideal, but acknowledged they were 'still in the process of answering questions' of method, approach and scope. In 1953, the FPA instituted higher standards for rubber goods via Schidrowitz's 'Specification of Tests &C. of Rubber Goods'. Inflation tests were formalized with a 'minimum diameter at maximum point of inflation' and a standardized time frame of fifteen minutes for thin prophylactics and washable sheaths. The quality of the material pre-/post-ageing had to be sufficient to hold 1,500/1,200 pounds, and elongation at break must surpass 800/720 per cent. Ageing methodology was submersion at 160 °F for thirty hours. For caps, the product must stretch over a smooth mandrel to at least three times its size without tearing and a seventy-two-hour ageing test was required for assessing long-term usability. All products needed to include a manufacture date and date of discard.¹⁴³

In addition, cap and sheath sizes were officially assessed and standardized. The caps and diaphragms were a particular topic of debate concerning ideal spring tension, as many proved too tight and snapped upon particularly vigorous folding or removal. Eventually the FPA was persuaded that current spring tension in caps between 45 and 72.5 mm were sufficient,¹⁴⁴ but should be increased for those up to 95 mm at 2.5 mm gradations.¹⁴⁵ Washable sheaths were agreed to fit into three sizes, small (< 6½ inch), medium (7 inch) and large (> 7½ inch), and those standard sizes all shrank half an inch.¹⁴⁶ All clinics were alerted that medium was the agreed standard and other sizes were to be dispensed only in 'exceptional circumstances'.¹⁴⁷

The setting and policing of minimum rubber standards for contraceptive products in laboratory practice marked the completion of the three primary programmes of contraceptive science. The association and its direct offshoots and affiliates pioneered this field of enquiry that endeavoured to comprehend and regulate contraceptive methods and products from the 1920s. Throughout the 1950s, the FPA continued to rely on and improve its tests. Over the decade, methodologies became increasingly elaborate to

140 Letter, FPA general secretary to A.R. Reid, 18 March 1954, WL/SA/FPA/A7/20.

141 Letter, R. Edwards to I. James, 17 October 1953, WL/SA/FPA/A7/20.

142 Edwards to James, *op. cit.* (141).

143 Approved List of Contraceptives: Specifications of Tests &c. of Rubber, August 1953, WL/SA/FPA/A7/20.

144 Letter, FPA general secretary to A.R. Reid, 14 October 1955, WL/SA/FPA/A7/20. The standardization of cap sizes was first attempted in 1935, when the medical sub-committee deemed Prentif Dumas cap sizes unsatisfactory. The committee suggested 'Messer's Prentif possess themselves of a set of the ordinary Dumas Caps sizes small, medium and large, as made by Lambert, and use them as their standard'. NBCA Medical Sub-Committee Minutes, 13 January 1935, WL/SA/FPA/A5/88.

145 Telephone message from I. James, 8 January 1954, WL/SA/FPA/A7/20.

146 Test for Contraceptives on the Approved List, 25 October 1954, WL/SA/FPA/A7/20.

147 Test for Contraceptives on the Approved List, *op. cit.* (146).

persuade official government regulators to oversee rubber goods and chemical contraceptive standards. Allying contraceptive science with scientific testing practices implemented by the British Standards Institution to assess rubber goods, and the Pharmacopoeia Commission charged with judging chemicals, was the final great goal in the association's long-term regulatory mission. This was achieved in the early 1960s following extensive collaboration and negotiation by the association with each group.

Conclusion

This article has charted the establishment of contraceptive science as a pure and applied field of scientific enquiry and investigation during the mid-twentieth century. It has demonstrated that the BCIC employed a malleable interpretation of 'scientific' enquiry to exploit contemporary academic tensions regarding researchers' motivation when undertaking both pure and applied scientific contraceptive research. The committee, in association with the NBCA/FPA, manipulated these tensions to forge a place for pure laboratory-based chemical, biological and histological investigations into contraceptive quality, safety and efficacy. Over the same period, these groups undertook applied scientific investigations into the effectiveness and acceptability of products through in-clinic trials, in an ultimately unsuccessful effort to delineate practical function from a pure research agenda. The advent and consolidation of the Approved List of contraceptives was achieved through the development of biological and chemical testing to assess and rank chemical contraceptives. This list became a standardizing tool that the association could employ to regulate the quality, efficacy and safety of contraceptives manufactured and sold in Britain in the mid-twentieth century. Finally, this article has demonstrated that the field of contraceptive science was founded and consolidated by the NBCA/FPA through the expansion of its chemical, biological and physiological lab testing to forge its position as the official contraceptive regulator, and primary disseminator.

This article is the first attempt to incorporate the origins of contraceptive science within the broader history of the early to mid-twentieth-century academic and applied scientific endeavours. It has charted the BCIC and NBCA/FPA's concerted interactions with scientists willing to engage with cutting-edge research, who risked professional hostility if their venture was unsuccessful. It introduces scientific, technological and medical history to contraceptive science in the years preceding hormonal contraception, after which the 'scientific' nature of contraceptive research went unquestioned. It challenges future researchers to ask questions about when and how an inquiry becomes scientific and who or what makes it so.