An Accidental Purpose: The Impact of the First World War on University College Nottingham

Michael John Noble

Thesis submitted to the University of Nottingham for the degree of Doctor of Philosophy

June 2022

Table of Contents

Acknowledgements

This thesis would not have been possible without the support of my supervisors, Professor John Beckett and Dr Richard Gaunt. I am grateful for the support of the Manuscripts and Special Collections Department at the University of Nottingham for the studentship that financed my work. Finally, I wish to express my gratitude to my family, Michelle, Chloe and Tommy for their enduring love and support.

Dedicated to the life of John Arthur Meads, 1898-1917.

Abstract

This thesis examines the impact that the First World War had on the development of University College Nottingham. It makes the hypothesis that the college was, like comparable educational institutions, following a particular path of development by the early twentieth century and that the outbreak of war permanently altered the circumstances in which the college operated and changed this trajectory of development.

It contends that the war had significant and lasting effects on the college while it was in a relatively early phase of development, being less than forty years old by the time that the Armistice was effected, and that the occurrence of the war at this stage of the college's growth was significant. Certain developmental goals, most notably the grant of a royal charter establishing full university status, were, by necessity, placed on hold, while other ambitions, such as a proposed merger with other institutions to found an East Midlands University, were disrupted and ultimately abandoned completely.

Other impacts, which also affected similar institutions in other English towns, ultimately led to the development of a national system of higher education and research in the UK and altered the position that such institutions had in British society and its economy. The thesis examines the development of this national system and Nottingham's place in it.

Introduction

Origins

Although this inquiry is principally concerned with a highly focused period of time; the summer of 1914 to (roughly) 1920, it bears the imprint of three distinct centuries. Its earliest sections examine the educational and public research environment of the nineteenth century, the better to make a case that the responses of higher education and government in the First World War were both liberated and constrained by decisions taken several generations earlier. The bulk of the work is quite naturally concerned with the twentieth century and the half-decade that set the tone for so much of what came later. However, the origins of the thesis, and no small part of its design, owe their origins to events in the early twenty-first century.

The centenary of the war presented a significant cultural and heritage moment. In the UK, commemorative efforts were spearheaded (and to a large extent, financed) by the Government.[1] Much of the active work of remembrance, investigation and creative response took place at a grassroots level.[2] The National Lottery Heritage Fund (then the Heritage Lottery Fund), provided in excess of £94m of grant funds and made them available for local community groups to finance commemorative activities.[3] An aim of the centenary efforts was to encourage participation by newcomers to heritage and historical work, and indeed 57% of the applicants to the Lottery's flagship *First World War: Then and Now* scheme were first-timers.[4] In this model, the UK's universities took on an intermediary role. In addition to their ordinary work of researching and teaching the war, HEIs used the opportunity to expand their role as public intellectual institutions and repositories of expertise.[5]

In June 2014, I accepted employment in the History department at the University of Nottingham to project manage the Centre for Hidden Histories (CHH), one of the five First

1. Plans to mark 100 years since the beginning of the First World War in 2014 announced, Department for Culture, Media and Sport 10th June 2013 https://www.gov.uk/government/news/plans-to-mark-100-years-since-the-beginning-of-the-first-world-war-in-2014-announced [accessed 9th May 2021].
2. Jack Malan, Eugénie Lale-Demoz and Michaela Brady, First World War Centenary Programme: Legacy Evaluation, Department for Digital, Culture, Media and Sport, September 2019.
3. Karen Brookfield, 'The People's Centenary: A Perspective from the Heritage Lottery Fund', *Cultural Trends*, (2018) 27:2, 119-124.
4. The National Lottery Heritage Fund, 2019, The National Lottery Heritage Fund Response to the DCMS Select Committee Inquiry: Lessons from the First World War Centenary.
5. Jack Malan, Eugénie Lale-Demoz and Michaela Brady, First World War Centenary Programme: Legacy Evaluation, Department for Digital, Culture, Media and Sport, September 2019.

World War Engagement Centres that were established with funding from the Arts and Humanities Research Council (AHRC). In addition to Nottingham, centres, (which were each a consortium of several university partners), were headquartered at Queens University Belfast, the University of Birmingham, the University of Hertfordshire and the University of Kent. Their objective was to foster relationships between the higher education sector and grassroots organisations, to ensure that the latter were well-supported in their efforts to remember the war, brokering relationships with experts, and providing advice and training. At its root, the Engagement Centre Programme sought to encourage participants to 'ask deeper questions and confront challenges [and] broaden perspectives of the war'.[6]

My duties included acting as the first point of contact for community groups who sought support from an academic partner. On occasion, this meant fielding enquiries from members of the public who simply wished to know more about the war. One such enquiry came from an amateur genealogist in Lincolnshire. She had been researching her family and wanted to know more about her great uncle, Jacob Hardy Smith, who had served with the Rifle Brigade in France and who had been killed in action in 1916 at the age of 27.[7] Jacob had been a student at what was then University College Nottingham and so, his great niece wondered, could I recover any information about his time there?

This was a good question. It prompted me to consider not just what Jacob had done in the war years, but what his fellow students, his teachers, his friends and mentors had done. What did the universities do in the war?

Investigating this a little further, I discovered how little there was written on UK universities and colleges in the First World War and, in particular, how little work had been done on University College Nottingham. Having completed a Master's dissertation on the growth of the Leicester Secular Society in the late nineteenth century, I had developed an interest in how regional institutions develop in response to internal and external pressures and how they evolve through adaptation.[8] The period of the First World War was unquestionably one of transformational crisis. How, I wondered, did University College Nottingham transform through this crisis?

Part way through my research, the world entered a new transformational crisis, one that,

6. Arts and Humanities Research Council, 'AHRC WW1 Engagement Centres', August 2017.
7. Commonwealth War Graves Commission https://www.cwgc.org/find-records/find-war-dead/casualty-details/76358/JACOB%20HARDY%20SMITH/ Accessed 23rd February 2021.
8. Michael Noble, 'To Get a Place of Our Own: Civic Growth and the Leicester Secular Society 1840-1881', unpublished MA dissertation, University of Leicester, 2011.

like the First World War, was fundamentally a global issue, but with unmistakably local effect. Like the war, the Covid-19 pandemic centred on a core issue (albeit in this case, a disease rather than human conflict). Like the war, the pandemic triggered a ripple effect of political and economic crises. Like the war, the pandemic drove societies to questions the assumptions with which they had been living for decades. Like the war, the pandemic enriched a few and impoverished many.[9] Like the war, the pandemic had a death toll numbered in the millions.[10]

Notwithstanding the H1N1 influenza, a 'Spanish flu' pandemic that is inextricably associated with the war (and which, for many people in 2020-21, remains the principal historical touchstone for their own experience), the First World War clearly has many striking parallels with the Covid pandemic. For the present writer, this again represented both challenge and opportunity.

At the time that Covid took effect in the UK in early Spring 2020, I had been working on this thesis for twenty-six months. The chapters on the development of UCN and the impact of the war on the college were more or less complete in draft form. I was reasonably advanced in my research on the College as an instrument of war. I was looking forward to completing the project.

The restrictions imposed by the government had immediate and manifold impacts on my progress. Most directly related to the thesis was the indefinite closure of libraries and archives. There were several aspects of the thesis that I was unable to work on while lacking access to the archive. Resources included, but were not limited to, records of UCN Senate, editions of the *Gong* student newspaper and financial records. Planned visits to other archives, including Nottinghamshire Archives and those of the Universities of Birmingham and Sheffield, were put on hold.

I focused my energies on writing up the thesis using materials that were already in my possession or available online. I had made extensive transcripts of archival records prior to the lockdown and was able to work from these resources. I also used online resources such as the British Newspaper Archive, Parliamentary Papers and archive.org. I had several books

9. By October 2020, 38% of UK adults had seen their financial situation overall worsen because of Covid-19, and for 15% it had worsened a lot. At the same time, 14% had seen an improvement. Financial Conduct Authority, Financial Lives 2020 Survey: The Impact of Coronavirus, February 2021; Abay, Kibrom A. and Tafere, Kibrom and Woldemichael, Andinet, Winners and Losers from COVID-19: Global Evidence from Google Search (June 2, 2020). World Bank Policy Research Working Paper No. 9268, Available at SSRN: https://ssrn.com/abstract=3617347.
10. World Health Organisation Coronavirus (Covid-19) Dashboard https://covid19.who.int/ [accessed 17th September 2021].

that I either owned or had on loan from the library, as well as access to online journal articles. I continued to write and edit the thesis with these materials, leaving notes for myself on areas to return to and revise once I had access to offline materials again.

The changed circumstances presented by Covid and its societal effects also had an impact on my work. As the father of two young children, I had to contend with the closure of their schools and adapt to a situation in which four of us had to live, work and study in our house, leaving only for food shopping and for daily exercise. My family and I took some time to 'settle in' to the new working and living arrangements, with the worst-affected time being the first couple of weeks of the lockdown, from the closure of schools (effective 23rd March 2020) to around the 6th April. The responsibilities to set up home schooling arrangements, prepare resources such as food for an anticipated period of quarantine and arranging finances occupied a lot of time. In addition, an enforced house move, necessitated after receiving a no-fault eviction notice, added complications. The move was postponed, cancelled, and then re-commenced and involved a great deal of time and energy to manage.

However, once these early challenges were met, I was able to establish an effective working routine that balanced my research work with my other duties. This included working days, evenings and weekends.

A brief lift in restrictions in mid-2020 enabled some further progress, but closures and other limitations were re-imposed towards the end of the year. The continued closure of schools, effective from the 18 December, once again required me to balance childcare and home-schooling responsibilities with my research.

The net effect of Covid was that I finished 2020 having made less progress in my thesis than was intended in my original working plan. These were therefore the circumstances at which I reached the end of my bursary support in December 2020, at which point I was obliged to take full-time paid employment while the thesis remained incomplete. However, this, like so much else in life, presented opportunities as well as challenges.

Although my desire was to seek work in the academic sector, the limitations posed by Covid responses made this impossible. I was, however, fortunate enough to secure employment with Midlands Engine, a pan-regional agency concerned with 'levelling up' the Midlands and ensuring a robust response to the twin challenges of Covid and the UK's exit

from the European Union.[11]

A central element of the Midlands Engine approach and, by extension, of the national post Brexit and Covid reconstruction project overall, is the commissioning and review of academic enquiries into solutions to these generational crises. The scale and novelty of the challenges have prompted the government to tap into the latent expertise of the nation's universities in an effort to understand the essential nature of the issues and to suggest solutions. The parallels with the intellectual mobilisations of the 1910s are striking. While ordinary university activities were curtailed, finances limited and lecture rooms emptied, academic bodies also found that their expertise enjoyed ever more urgent demand.[12]

The 'shells crisis' of spring 1915, with its public clamour that 'something be done' to supply the frontlines with necessary equipment, has an echo in the 'PPE crisis' of 2020.[13] Both scandals revealed the lack of preparedness on the part of government and prompted swift action. At the same time, the pursuit of a vaccine drove energetic collaboration between universities, private industry and the government.[14]

Vaccines and PPE, like shells and tanks, may be regarded as the headline products of these crises. However, they represent only a fraction of the outputs of the mobilisations. Wartime academics were set the tasks of improving crop yields, solving economic problems and giving intellectual succour to the case for war. Despite some early opposition to the war, and the asking of legitimate questions about the proper role of intellectuals in it, the vast number of wartime academics -on all sides of the conflict- were committed to the pursuit of victory. The academics of the 2020s are similarly committed. Still, both generations felt duty-bound to speak out and challenge the strategy and tactics employed by states.[15]

---

11. Midlands Engine Observatory, State of the Region report, October 2020.
12. Paul Bolton, Sue Hubble, *Coronavirus: Financial Impact on Higher Education,* House of Commons Briefing Paper, No. 8954 8th February 2021; Department for Business, Energy and Industrial Strategy, *UK Research and Development Roadmap* July 2020.
13. For the PPE crisis, see Daniel Boffey and Robert Booth, 'UK missed three chances to join EU scheme to bulk-buy PPE', *The Guardian*, https://www.theguardian.com/world/2020/apr/13/uk-missed-three-chances-to-join-eu-scheme-to-bulk-buy-ppe Monday 13th April 2020 [accessed online 19th May 2021].
14. Oxford Sciences Innovation, The Backstory: Vaccitech and its role in co-inventing the Oxford COVID-19 vaccine, https://www.oxfordsciencesinnovation.com/news/the-backstory-vaccitech-and-its-role-in-co-inventing-the-oxford-covid-19-vaccine/ 23rd November 2020 [accessed 9th May 2021]
15. The Shells Crisis was precipitated by a clandestine plot to shame the then government. Field Marshal Sir John French, Commander-in-Chief of the British Expeditionary Force, colluded with Lord Northcliffe and the Military Correspondent of *The Times* to place a newspaper article blaming the recent failure at Festubert on undersupply. On the 12th May 1915, the article duly appeared, describing the lack of high explosive as a 'fatal bar to success'. This argument was then taken up by more of Northcliffe's papers, generating a public scandal that demanded government response. Cited in R. J. Q. Adams, *Arms and the Wizard: Lloyd George and the Ministry of Munitions*, 1915-1916 (London: Cassell, 1978). For the Covid-19 crisis, entire thickets of organised commentary and advice have emerged, to the extent that protest against government responses have become a crisis in itself. One of the better examples of organised and evidence-based challenges is the formation of 'Independent SAGE', a collective of UK-based academics who organised as an independent counterweight to

Given the extent of these symmetries, it would be remiss not to reflect on them in the thesis. For all its negative impact on my day-to-day work, living through a crisis of this scale has illuminated my understanding of the experiences of my predecessors and their uncertain navigation of a time of contingency and change.

The thesis is organised into six chapters, bookended by an introduction and conclusion. The core chapters follow a broadly chronological pattern but are arranged in three thematically focused pairs, covering events before, during and after the war. The first and third pair (chapters 1 & 2 and 5 & 6) mirror one another; each pair addresses a theme first at the national level and then locally in Nottingham. The central pair, which covers the war years, is the core of the thesis, examining in turn the costs and opportunities that the war created.

This introduction provides an historiographical overview of the topic, from the development of the civic university in England to the broad effects of the First World War on higher education and research and from the role played by state institutions and agencies to the current thinking in organisational history and the place of provincial colleges in the history of education. It also offers a summary of the holdings in the University of Nottingham's Manuscripts and Archives, which is the primary archive that I have used for this study.

Chapter one of the thesis proper outlines the development of the regional university college system prior to the war. It reviews the antecedents, growth and purpose of the system in the industrial north and midlands from the late nineteenth century to the onset of war. The 'seeding' of provincial institutions from the peripatetic lecture movement and the advent of external degrees is also examined. It then explores the spread of university charters and analyses the processes of reform and the intentions for the future development of the system immediately prior to the interruptions of 1914.

Chapter two examines the particular case of University College Nottingham. It addresses the founding endowment, the early close involvement of the town corporation and a review of the core purposes of the college. The chapters review the founding mission of the college, assessing how this mission was declared in the documents and literature that were prepared in its creation. It also offers an assessment of the 'living mission' of the college, as revealed by

the UK Government's Scientific Advisory Group for Emergencies (SAGE). Further information can be found at their website https://www.independentsage.org/independent-sage/ [accessed 17th September 2021].

its actual activities, reviewing which subjects were given priority, where funding was directed and the onward destination of its students. The importance of teacher training, as a pioneering example of government financing of training to support national needs is acknowledged. It then traces the development of these activities into the early twentieth century to identify the 'business as usual' conditions at the outbreak of war, examining it work in teaching and research, the campus culture and the financing, governance and accountability of the institution.

The issue of the institution's purpose is an essential question. Were colleges such as Nottingham founded to solve an economic problem by ensuring that industry had a supply of suitably trained personnel or were they created with the high moral purpose of expanding intellectual knowledge? They clearly did both, but a tension is evident between these purposes. This tension would prove important during the war years when the practical application of skill became an existential necessity.

Chapter three examines the restraining effects that the war had on the universities. It offers an assessment of the impact of losing so many enrolled students, and several members of staff, to enlistment. It does so in terms of the institutions' finances, syllabus and composition of classes. It also examines how the institutions were, perhaps unwittingly, architects of this situation and how initiatives such as the Officer Training Corps encouraged military enlistment at the outbreak of war.

The chapter then looks at the considered responses to the war on the part of government and individual institutions. This includes policy responses to the colleges' wartime financial troubles, including the extension of institutional grants. It also looks at the action taken by institutions to cut costs, economise and draw in other sources of income. Changes to accommodate students and staff who had volunteered to enlist in the military are also examined, with a focus on preserving measures such as keeping degree places open for serving students. This is assessed in the context of the plan for post-war reconstruction.

It examines the changes that took place in the college in response to the indirect impact of the war itself and the direct impact of legislation and regulatory decisions made in response to the war. The study encompasses changes to the student population, adjustments to the curriculum, the requisitioning of resources by the government and an examination of the links to other institutions such as Rolls-Royce and the local munitions factories. I investigate the processes that were used to implement these wartime adjustments, the impact of their

application and the extent to which they lasted in the years and decades that followed the war.

I ask, was it flexible and responsive? How effectively did it implement the changes? What effect did the structure have on the permanence of these changes? Was there any opposition to making these changes? Did the changes conflict with or adhere to the college's 'mission'? How big a leap from peacetime activity were these wartime contingencies? What were the college's outputs, both in terms of research and in technical expertise (in the form of trained graduates)? How had the student population changed? (By absolute number, by ratio of male to female and by social background). What were the financial implications? (Including changes to the means by which the college was funded)

Chapter four focuses on how the College was converted into an instrument of war. It assesses the changes to college syllabi and their role in producing graduates with militarily useful skills. The advent of short-term courses in subjects such as the production of explosive materials will be assessed, alongside an analysis of the relationship between colleges and other institutions such as munitions factories. The position of universities as research institutions will also be examined, with particular reference to the role of the state in directing research activity.

My goal here is to assess how far these challenges conflicted with the college's peacetime activities and the extent to which wartime contingencies fostered a break with the past. A central question of this thesis is whether the primary founding goal of the college was to offer education for the sake of a higher moral purpose or simply to advantage the national economy by providing technical and vocational training. The demands of war were, I argue, more closely allied with this second, instrumentalist purpose and I will take some time to examine whether meeting these demands represented a break with, or continuation of, the college's original mission.

Chapter five examines how these wartime innovations and adaptations became permanent after 1918 and how they influenced the further development of the university system and, by extension, the culture of research and higher education in England in the twentieth century. It outlines the government's founding of two agencies to manage its responsibilities for supporting teaching and research activities, the University Grants Committee (UGC) and the Department for Scientific and Industrial Research (DSIR) and argues that these establishments represent the formalisation of processes that had been formerly conducted in an *ad hoc* and piecemeal manner. The war, I suggest, catalysed a process that had been

underway for several decades before the conflict had even started.

The chapter then returns to UCN and looks at the immediate changes that followed the Armistice and return to peacetime. There was, I argue, a period of 'civilian demobilisation', during which the College, its staff and students undertook the process of dismantling some, but not all, of the structures that had been put in place during the war years. The removal of the war as an ongoing concern offered the opportunity for the College's leadership to return to the institutional ambitions of the pre-war years. Predominant among these was the bid for full university status, a goal which was not to be realised during that generation, but which nevertheless drove some of the key decision-making, including a proposal for a combined East Midlands University and, ultimately, the adoption of a wealthy benefactor in the person of pharmaceutical magnate Jesse Boot, who financed a fresh period of growth for the College, which saw it move to a new home at Highfields.

Finally, chapter six provides some concluding remarks and a summary of the argument, synthesising and contextualising the foregoing arguments and examining the long-term aftereffects of this critical period in the development of a modern higher education institution.

Hypothesis

This is fundamentally an institutional history, which assesses how external pressures influenced the structure and operation of a particular organisation. Expressed in specifics, it is a study of how the First World War affected University College Nottingham as an organisation and how the college and its officers responded to these pressures and examining the effects on both teaching and research. I locate the war as a specific moment on the college's trajectory of development and examine how far the structural changes prompted by wartime expediency became permanent after peace was established. In doing so, I examine the critical question of the relationship between the universities and the state to place the university as a distinctive organisational unit that can be, and was, deployed in the interests of the nation.

I make the hypothesis that the college was, like comparable educational institutions, following a particular path of development by the early twentieth century and that the outbreak of war permanently altered the circumstances in which the college operated and changed this trajectory of development.

I also contend that the war had significant and lasting effects on the college while it was in a relatively early phase of development, being less than forty years old by the time that the Armistice was effected, and that the occurrence of the war at this stage of the college's growth was significant. Certain developmental goals, most notably the grant of a Royal charter establishing full university status, were necessarily mothballed, while other ambitions, such as a proposed merger with other institutions to found an East Midlands University, were ultimately abandoned completely.[16]

Other impacts, which also affected similar institutions in other English towns, ultimately led to the development of a national system of higher education and research in the UK and altered the relationship that such institutions had with the rest of British society and its economy. The thesis examines the development of this national system and Nottingham's place in it.

University College Nottingham was one of several university colleges established in industrial towns in England during the nineteenth century. These institutions were established to meet the training needs of increasingly sophisticated industries and to satisfy the intellectual curiosity of a growing urban population. They were founded on the largesse of wealthy philanthropists, whose fortunes were of sufficient size to provide generous endowments. In Nottingham's case, the endowment was small in comparison to those of other institutions and the college was only established thanks to the decision of the town council to support the gift with public funds. Nottingham's early dependence on public money, and its concomitant close relationship with (local) government, prefigured the wider system of university-government financial and regulatory relations This makes University College Nottingham a particularly interesting case for study and one that warrants comparison of the situation in other provincial universities and colleges.

The establishment of the colleges, and their early growth, was part of a broader phenomenon in which human enquiry, particularly in the sciences, became more sophisticated. Technological advances, of the sort that drove the Second Industrial Revolution, were pursued in well-stocked laboratories and workshops by salaried technicians. This was the era of the 'laboratory revolution', during which the practice of science became more formalised, more institutionalised and more expensive. The costs of this work were such that, despite the preponderance of large industrial fortunes, the practice of science

16. A.C. Wood,
1953. *A History of the University College, Nottingham* (B.H. Blackwell Ltd: Oxford) p90

became the business of the state, a business that became all the more urgent when viewed through the lens of international competition.

By the turn of the twentieth century, state financing of science and higher education had become established. The university colleges were supported by an annual treasury grant that has started at £15,000 in 1889 and had grown to £174,500 by 1913.[17] In 1889, the UK government established the National Physical Laboratory, the Development Commission in 1909 and the Medical Research Committee (the forerunner of today's research councils) in 1913.[18] Similar efforts were underway in comparator countries, notably Germany, and the pursuit of technology shifted from a largely economic focus to one that was also a component of the arms race.[19]

For academics themselves, the international aspect was one of collaboration rather than competition. Conferences, associations and employment in other countries became an established part of the academic career and multilingualism a critical skill. This roused suspicions of academic patriotism and, on the eve of the First World War, significant portions of the British academic community were under pressure to demonstrate their loyalty.[20] The First World War would provide them with the opportunity to do so.

As a 'total war', the conflicts of 1914-18 reached into every aspect of the society, industry, economy and culture of the combatant nations. higher education and research were not exempt from involvement. Indeed, given the importance of technology and innovation, the sector had a particularly prominent role. Although the outbreak of war acted as a major disruption to every type of enterprise in Britain, higher education institutions had to contend with a particularly acute wartime experience.

The First World War represented an arms race at its most acute and urgent. For H.A.L. Fisher, the war was a 'battle of brains … a war of chemists, of engineers, of physicists, of doctors. The professor and lecturer, the research assistant and the research student have suddenly become powerful assets to the nation'.[21]

By the summer of 1914, the UK boasted 26 publicly-supported universities and colleges,

17. Treasury Minute, 11th March 1889; Report for the year 1913-1914 from Universities and Colleges in Receipt of Grant from the Board of Education. The 1913 figure comprised £149,000 to English institutions plus £25,500 to three colleges in Wales.
18. Andrew Hull, 'War of Words: The Public Science of the British Scientific Community and the origins of the Department of Scientific and Industrial Research, 1914-16' *The British Journal for the History of Science*, 1999, 32 p461.
19. Robert K. Massie*, Dreadnought - Britain, Germany and the Coming of the Great War* (London: Vintage, 2007).
20. Heather Ellis, *Masculinity and Science in Britain, 1831-1918* (London: Palgrave Macmillan, 2017).
21. H.A.L. Fisher, *British Universities and the War: A Record and its Meaning*. London: The Field & Queen (Horace Cox) Ltd, 1917, Preface.

between which were trained 23,993 students.[22] Although these institutions were formally constituted on a private basis, the state had been directly involved in their funding on a statutory footing since 1889 and on an *ad hoc* basis since before even then. Furthermore, the granting of university status was done, then as now, through the awarding of a royal charter. They were therefore in practice quasi-state institutions. When the state went to war, so did they. The war of 1914-18 provided the first major test of these new institutions, the intellectual components of the industrialised state. They had been founded to meet the needs of the nineteenth century. They demonstrated that they were capable of meeting the needs of the twentieth century too.

Analysis

The impact of the war on colleges and universities can be divided into two broad categories. Firstly, there were *restraining* impacts, which limited the capacity of the institutions to carry out their ordinary activities. These included the diminished income owing to the absence of fee-paying students who had mobilised for war and the denial of access to college facilities that had been requisitioned for war use. Secondly, there were *innovating* impacts, which prompted the institutions to adopt new activities and to adjust their ways of working in order to meet the particular demands of war and to fill a new societal role. Such impacts included a greater reliance on direct state aid and the deployment of academic expertise in the pursuit of war aims.

These impacts affected three general spheres of activity. The first of these spheres, or 'axes', corresponds to their role as teaching institutions, the second to their research mission and the third is the product of academic culture and is therefore linked to both missions.[23]

Firstly, the interruption of normal activity and the deleterious effect of wartime privation and mobilisation. The outbreak of war acted as a major disruption to colleges, as it did with all other life in Britain. higher education institutions, however, had to contend with a particularly acute wartime experience, given the large representation of young men in the student body. Particular wartime demands include furnishing the armed forces with trained, disciplined and patriotic young men to fill the junior officer positions in the vastly expanded

22. Report for the year 1913-1914 from Universities and Colleges in Receipt of Grant from the Board of Education. This figure comprised 7,756 full-time and 14,674 part-time students in England and 1,230 full-time and 333 part-time students in Wales. This represented just the students at institutions supported with a Treasury grant. The total figure, including those at private institutions, was much larger.
23. Tomas Irish, *The University at War, 1914-25: Britain, France, and the United States* Basingstoke: Palgrave-Macmillan, 2015.

army and navy. Colleges and universities, with their Officer Training Corps contingents had a particularly prominent role in meeting this need, and military mobilisation was therefore an especially onerous burden on institutions that depended on large numbers of fee-paying young men to sustain their operation.

Secondly, the mobilisation of intellect and resources. In addition to facing the loss of many of their students to volunteerism, to conscription and to death, colleges also found themselves having to adapt to meet the demands of total war. These demands meant that every public institution had a responsibility to the war effort. For research institutions, this meant the mobilisation of expertise. Modern wars act as a testbed for cutting edge technology and the First World War became a demand multiplier for innovation in weapons and medicines and other technologies that were the product of university research departments. New demands were placed on the expertise that colleges and universities could provide through research output and through direct consultation and other 'war work' carried out by academics, including full-time secondment to the Admiralty, the War Office and the Ministry of Munitions. This 'mobilisation of intellect', which also exploited academic connections to industry, was to have the most lasting and controversial impact on academia's relationship with the state and is fraught with questions over the financing, ownership and control of research and of the spirit of academic freedom and independence.

Other demands include the requisitioning of resources, such as buildings and other property and the use of college facilities to the exclusion of day-to-day educational activities. For University College Nottingham, this included the repurposing of Mapperley Hall from a male hall of residence to a Red Cross hospital.

Finally, the third axis of disruption to college and university life came as a result of the severing of international connections. The decades preceding the war had seen a flowering of transnational academic relationships, represented by correspondence and collaboration between researchers in different countries and in the direct exchange of research staff, whose careers could take them from institution to institution and across national frontiers. The outbreak of war created immediate difficulties for such relationships that had existed across the borders of the Allied and Central Powers. Contact and travel were limited, and the pressure of patriotic loyalty and suspicion of the national enemy affected once-warm relationships. The realities of war also constrained relationships between people in friendly or neutral nations; the threat of U-boat attack acted as a brake on communications and passage between North America and Europe, limiting physical contact between researchers on either

side of the Atlantic.

This suite of three challenges meant that relations between universities and the state were of significant substance during this period. The state provided essential support, made additional demands and fostered an environment of restraint that had a negative effect on academic output. These factors prompted a change in this relationship, a change that, I argue, became permanent once hostilities had ended. The period should therefore be considered of critical importance in the growth of the provincial university system in the twentieth century and of the development of University College Nottingham.

The secondary literature that supports this thesis has been largely drawn from three traditions: the history of higher education in the UK, the history of state-sponsored technical research and the history of organisations. This section provides a synthesis of the state of the literature in these circles.

The bulk of the literature on UK universities may be categorised as belonging to the history of education. The pattern of development of the individual universities and the nationwide system that they constitute tends to focus on them as institutions of teaching. Reference to their research activities has generally fallen to historians of science and technology. In considering them as education providers, a particular focus has been made on the widening circle of participation in higher education as well as the role of universities in delivering evening and vocational classes.

The commonly accepted pattern of development places the universities into three broad categories for the period under consideration here. The two ancient universities of Oxford and Cambridge, along with St Andrew's, Glasgow, Aberdeen and Edinburgh in Scotland and Trinity College Dublin were categorically universities until the middle of the nineteenth century. The advent of the extension system, by which Cambridge examinations could be taken after a course of study in a provincial location, gave rise to a new breed of permanent institutions in the larger English industrial towns which were, by the middle of the century, large enough to support this activity.

These typologies have persisted in the literature, meaning that Oxford and Cambridge, the Scottish universities, and the newer 'redbrick' institutions are regarded as distinctive categories and are treated to separate examination. This distinction makes practical sense; the size, focus, financing and composition of each constituent institution in any one category are similar enough to warrant meaningful comparison and analysis, while a comparison of, for

instance, University College Nottingham and Cambridge, or the University of Birmingham and St Andrews would be less instructive. This study acknowledges the place of Oxford, Cambridge and the Scottish universities in the British university system of the early twentieth century but focuses its analysis on the redbrick civic universities and colleges of industrial England. Indeed, the 'provincial' status of the university colleges, in both perception and reality, is a factor in my analysis.

This stratified approach is reflected in V.H.H. Green's *The Universities*, *British Universities* by James Mountford and *British Universities and the State* by Robert Berdahl which offer historical outlines of each category of institution, setting their distinctive characters in the context of their development.[24] Keith Vernon's *Universities and the State in England 1850-1939* provides a broad overview of the development of HEIs in this period.[25] *The Changing Social Structure of England and Wales* by David Marsh contains some work on the development of university education in the interwar years.[26]

Edgar Allison Peers' *Red Brick University*, published under the pseudonym 'Bruce Truscot' in 1943 was the first major work to examine the English civic university.[27] It has had a lasting legacy, not just in the longevity of the term 'redbrick' to describe the English universities that were founded in the industrial north and midlands. William Whyte's *Redbrick* borrows Peers' name for its title and follows the earlier work, adding material on the architecture of the institutions (through which some of the founders' intent may be read) and bringing the history to the present day.[28] The distinctive nature of the nineteenth century institutions is the subject of *The Origins of Civic Universities* by David R. Jones, which makes a special focus on Manchester, Leeds and Liverpool.[29]

The term 'civic university' warrants particular attention. It has been used by several authors, including Green and Jones, to refer to the cohort of new universities that were raised in the industrial towns of Victorian England. It has been challenged by Keith Vernon, who regards the term as misleading, pointing out that none of the suggested institutions were granted full charters before 1900 and raises the further objection that the term masks the role

24. Robert O. Berdahl, *British Universities and the State*. Berkeley: University of California Press, 1959; James Mountford, *British Universities*. London: Oxford University Press, 1966; V.H.H Green. *The Universities*. Harmondsworth: Penguin, 1969.
25. Keith Vernon, *Universities and the State in England, 1850-1939*. London ; New York: RoutledgeFalmer, 2004.
26. David C. Marsh, *The Changing Social Structure of England and Wales 1871-1961*. London: Routledge, Kegan Paul, 1977.
27. Bruce Truscot, *Red Brick University*. London: Pelican, 1951.
28. William Whyte, *Redbrick: A Social and Architectural History of Britain's Civic Universities*, New York, NY: Oxford University Press, 2015.
29. David R. Jones, *The Origins of Civic Universities*: Manchester, Leeds & Liverpool. London: Routledge, 1988.

of state grants and regulations in directing the colleges.

However, the term does have some merit, particularly in its adjectival attachment to the city. Irrespective of the precise circumstances of the institutions' founding and financing, they were nonetheless the product of the demands and opportunities afforded by the rise of the industrial city and, in particular, the population and plutocratic largesse that these cities supported. The idea that the colleges were the 'child of the city', to borrow a phrase from Edith Becket, was particularly pronounced in the case of Nottingham for which the local corporation was the effective founder. An assessment of this, and its implications for the role of the college in the First World War, is provided in chapter two.

All lasting institutions have a tendency to mythologise themselves, and this tendency is especially pronounced in institutions that produce written works as a matter of ordinary business. Every university has its own published histories, often written by members of staff and with an insider's eye. Such texts offer a perspective on the way that the institution regards itself, the values that it considers important and the events that are regarded as significant in its development.

For Nottingham, three memoirs were compiled by staff during the interwar period. Frank Granger's *Memorials of University College Nottingham*, Edith Becket's *The University College of Nottingham* and A.C. Wood's *A History of the University College Nottingham, 1881-1948* provide first-hand accounts of events by insiders with a close knowledge of the college and its staff.[30] More recently, the institution's history from provincial college to 'global university' has been described by John Beckett in *Nottingham: A History of Britain's Global University.*[31]

Manchester, which prides itself on being 'England's first civic university' has histories in H.B. Charlton's *Portrait of a University, 1851-1951* and *Chapters in the History of Owens College and of Manchester University* by Edward Fiddes.[32] The University of Reading's first Vice-Chancellor, William MacBride Childs, wrote on the founding of the university and has been biographised himself.[33] James Clarke Holt, who had worked at both Nottingham and

30. Frank Granger, *Memorials of University College, Nottingham*, Nottingham: Jenkins, James and Low, 1928; Edith Becket. *The University College of Nottingham.* Nottingham: Henry B. Saxton, 1928; A.C. Wood, *A History of the University College, Nottingham*. Oxford: B.H. Blackwell Ltd, 1953.
31. John Beckett, *Nottingham: A History of Britain's Global University*. Woodbridge: The University of Nottingham, The Boydell Press, 2016.
32. H.B. Charlton, *Portrait of a University, 1851-1951*. Manchester: University of Manchester, 1952; Edward Fiddes, *Chapters in the History of Owens College and of Manchester University, 1851-1914*. Manchester: Manchester University Press, 1937.
33. W.M Childs, *The New University of Reading: Some Ideas for Which it Stands.* Reading: Bradley and Sons, 1926.

Reading, also left a secondary account of the development of the University of Reading.[34] The University of Sheffield has been described in *The Story of a Modern University: A History of the University of Sheffield* by Arthur William Chapman.[35] These works could best be described as 'institutional memoir', in which an intimate recollection of the university is recounted by an insider with first or second hand knowledge of the principal events and actors. A later example is Helen Mathers' *Steel City Scholars: The Centenary History of the University of Sheffield*, which is a commemorative work that combines a thorough narrative of the university's history with illustrations and recollections.[36]

The history of universities in the war has been essayed by Tomás Irish in *The University at War 1914-1925*, which takes a deliberate 'three axes' approach, examining the loss of students and staff, the impact on research and the effect that the war had on transnational communities of scholars, axes that Irish also describes as 'local, national and global'.[37] The book focuses on the experience of elite universities in the UK, France and the United States and acknowledges the gap that this leaves with universities in Central Powers states and those institutions further down the social ladder that are the focus of my thesis. Irish also makes a well-founded criticism of the narrowness of institutional historical approaches to the topic, a trap that this thesis will endeavour to avoid.

The mobilisation of intellect is a critical element of this thesis. However, in the period under examination there was very little distinction between the mobilisation of university research activity and the mobilisation of industry. Then, as now, the relationship between the laboratory and the workshop was symbiotic. The greater part of this work has been focused on peer networks at elite institutions, such as Oxbridge, Trinity College Dublin, the Sorbonne, Heidelberg and the Ivy League. In addition to the work cited above, Tomás Irish has co-edited a volume that includes analysis of scholarly networks before, during and after the First World War.[38] This work takes an 'Actor-Network Theory' (ANT) approach to look at networks in different national territories and examines how they were variously strengthened and weakened by the war.[39] Tamson Pietsch has examined Anglophone scholarly networks from 1850 to the eve of the Second World War. Her approach looks at the

34. James C. Holt, *The University of Reading: The First Fifty Years*, Reading: University of Reading Press, 1977.
35. Arthur William Chapman, *The Story of a Modern University: A History of the University of Sheffield*. Sheffield: University of Sheffield, 1955.
36. Helen Mathers, *Steel City Scholars: The Centenary History of the University of Sheffield*. London: James & James, 2005.
37. Tomas Irish, *The University at War, 1914-25: Britain, France, and the United States* Basingstoke: Palgrave-Macmillan, 2015.
38. Irish.
39. For more on ANT, see John Law and Peter Lodge, *Science for Social Scientists*; London: Macmillan Press Ltd 1984.

dissemination of a 'British academic world' through the so-called settler universities in the dominions of the British Empire. Thomas Weber has looked at academic elites (for which, read 'social elites') at Oxford and Heidelberg, in part to examine the development of comparable cultures and connections between the two.

A broader approach is taken in the collection *The Academic World in the Era of the Great War*, edited by Irish and Eve-Marie Chagnon.[40] The chapters in this volume cover a range of international experiences, addressed through three core themes: mobilisation, rupture and demobilisation. Through a range of superficially disparate topics, including the efforts of German professors in the USA to rally their colleagues to the cause of the Central Powers, the war's 'masculinisation' of the British Association for the Advancement of Science (BAAS) and post-war efforts to agree on textbook treatments of the history of the war, the book attempts to develop a burgeoning trend towards viewing the war as a period in which scholarly culture persisted and developed, rather than being placed on hiatus.

Central to this idea is the notion that universities were more than mere collections of students and staff and that they had a 'communal identity' that fostered long-lasting bonds. This phenomenon, which we might call 'institutional capital', both shaped, and was shaped by, the role played by universities and colleges in the war. A thorough examination of this phenomenon requires consideration of what is meant by the terms 'university' and 'college' when applied to educational and research institutions. Conceiving of them as repositories of transient students and staff engaged in a transactional process of learning would be insufficient and offer only a limited understanding. These organisations had, and continue to have, persistent identities that manifest themselves in behaviours, responses and adaptiveness.

Heather Ellis, whose focus is on gendered identities (especially masculinities) in science, has addressed the issue though collective academic endeavours outside the university, most explicitly through the BAAS. She has examined how the deliberately transnational nature of academia created working networks that fostered a unique identity for scholars. Her article on Marconi's 1899 radio demonstration is an excellent introduction to her way of thinking.[41]

The organisation of state financing of the universities has been surveyed by Robert Berdahl, whose *British Universities and the State* remains the best overview of the

40. Marie-Eve Chagnon and Tomas Irish, *The Academic World in the Era of the Great War*, Palgrave-Macmillan, 2017.
41. Heather Ellis 'Marconi, Masculinity and the Heroic Age of Science: Wireless Telegraphy at the British Association Meeting at Dover in 1899'. *History and Technology*, 2016 32(2), 120-136.

establishment of the University Grants Committee (UGC).[42] Christine Shinn's *Paying the Piper* offers a more thorough investigation of the UGC from its founding to the end of the Second World War and provides a critical assessment of the interaction between the state and the higher education sector.[43]

On the general relationship between research institutions and the state, *Warfare State: Britain 1920-1970* by David Edgerton[44] examines the growth of the state 'military-industrial-scientific complex' in which universities played a central role, as does *War and Progress: Britain 1914-1945* by Peter Dewey.[45] In these works, the universities appear as a sub-sector of a larger phenomenon in which innovation has become a complex endeavour at national and international scale. It is impossible, though not necessarily desirable, to separate universities from this broader trend. Despite its focus on a single higher education institution, this thesis follows this same pattern of combined assessment.

Perhaps because of the complex nature of this phenomenon, the best works focus on a particular idea or period as an organising principle. An excellent example is R.J.Q Adams' assessment of the Ministry of Munitions through a biographical lens that has been trained on David Lloyd George. *Arms and the Wizard* analyses the development of the ministry after the shell crisis and through its period of acquisition and consolidation with a constant emphasis on the battles fought by the titular 'wizard' as he expanded the sphere of his nascent ministry, absorbing control of, inter alia, the Royal Ordnance factories and research and innovation.[46]

For primary sources, I have relied on archival collections both physical and digital. The Manuscripts and Special Collections (UNMASC) department at the University of Nottingham is the principal repository of material relating to the University College, including its official records. UNMASC's holdings comprise a wide range of material from this period in the College's history, including minutes of council and senate, registers and correspondence. This correspondence includes communication connected to the founding and early growth of the institution as well as letters directly relating to the war, such as communication from the war office.

Other archives hold material of interest. The College's relationship to other institutions

42. R.O. Berdahl *British Universities and the State,* Berkeley: University of California Press, 1959.
43. Christine Helen Shinn, *Paying the Piper: The Development of the University Grants Committee, 1919-46*. London; Philadelphia: Falmer Press, 1986.
44. David Edgerton, *Warfare State: Britain, 1920-1970*. Cambridge, UK ; New York: Cambridge University Press, 2006.
45. P. Dewey and J. Beckett, *War and Progress: Britain 1914 - 1945* London: Longman, 1997.
46. R. J. Q. Adams, A*rms and the Wizard: Lloyd George and the Ministry of Munitions, 1915-1916* (London: Cassell, 1978).

will be examined by reference to the archival material held in relevant repositories. The records of the Ministry of Munitions, War Office, Board of Education, and the Department for Scientific and Industrial Research and University Grants Committee are held at the National Archives.

As a beneficiary of public funds, details of the College's operation are also contained in reports to Parliament, which are available in full throughout the period. These items provide an insight into the pattern of decision making, including details of the decision makers, that obtained as the institution navigated the demands of the war. It includes useful information on student population, financing and compliance with regulations, both from peacetime and wartime. Comparable information is also available for the other university colleges with similar operating models. The availability of such material and the relatively standardised manner of its presentation allows for meaningful comparison across institutions and with higher education institutions overall.

This thesis is very much the product of an era of digitisation of the archival record. The Parliamentary archives described above have all been scanned and made available online. This has not only made simple access far easier and cost effective, but the ability to search for specific text has been utterly transformative. The widespread adoption of optical character recognition (OCR) software has meant that, in addition to traditional index-based searching, lengthy documents can be searched in seconds. OCR is not perfect - characters can be misinterpreted, difficult to read or fail to scan - but it has been a great boon and has given modern researchers an advantage that was unavailable to their predecessors.

This advantage is even more pronounced in digital newspaper archives, of which this thesis makes extensive use. While official records are clearly demarcated and arranged by type and topic and, in the case of statutory reports, prepared to a planned calendar, the breadth of content in newspapers and the necessarily haphazard rhythm of publication dates for any given topic means that the advent of digitisation has been transformative for researchers. I have been able to search for references to the College, its staff and students and other related matters in the local and national press, and to discover events, quotes and views that were heretofore needles in the proverbial haystack.

Chapter One: The Development of the University College System

Introduction

It is the purpose of this chapter to outline the development of the modern higher education system and assess UCN's place in it. It examines the pre-conditions that both permitted and demanded the founding of colleges in industrial towns, the goals which they, and specifically UCN, were founded to attain, and the process by which state organisation and financing of higher education and research became an established, even desirable, principle.[47] This principle would be the foundation upon which UCN and its sister institutions would find themselves as material contributors to Britain's war effort.

The chapter traces several contemporaneous and interrelated phenomena. Firstly, the development and maturation of a literary and scientific culture in English provincial towns. This culture was the wellspring from which the new colleges and universities would emerge and from which they would retain a commercial-industrial interest, sometimes at odds with their own publicity. These origins also tied them to national prosperity and security in ways heretofore unknown in higher education.

Secondly, the chapter examines the importance of science and intellectual enquiry to the national interest and the state's role as a stakeholder in training, research and development. It will explore how private industry's need to innovate and to recruit competent employees became accepted as the proper concern of the state, deserving of the attention of national policy and an appropriate beneficiary of public financing. This principle, while not an uncontested one, created the structural and conceptual basis for the deployment of college and university resources in the war effort.

These twin phenomena will be placed in the institutional context of nineteenth century reforms to the universities and the founding of new, 'civic' universities and colleges. The chapter's third concern is describing this institutional paradigm in which universities and colleges became a *de facto* branch of the state and a resource that could be drawn upon in time of national need. Naturally, a focus is made on University College Nottingham, the subject of the thesis and, as will be described, a unique case.

Finally, with a particular focus on UCN, the chapter then describes the higher education

47. Berdahl, Chapter IV.

and research environment of the years immediately prior to the war, with the intention of establishing the 'business as usual' conditions that pertained and the institutional ambitions that were entertained before the interruption of the war. It is intended that by doing so, a thorough examination can then be made of the changes that were wrought by the demands of warfare and a proper assessment can be made of the overall impact of the war on UCN and higher education more broadly.

Part One: The Intellectual Environment of Provincial England

In the years following the Restoration the English town experienced a phenomenon that has been described as nothing short of an 'urban renaissance'.[48] Supported by a 'fresh and significant phase of development in the national economy', town life broke free of the uncertainty that had characterised the Tudor and early Stuart years and came to enjoy a period of stability and prosperity.[49] This transformation was supported by several interdependent phenomena, which include the transformation of the built environment to accommodate pleasant and attractive sites of leisure, such as promenades and parks, theatres and assembly rooms, and improvements to the national transport infrastructure, most prominently in the introduction of canals and turnpike roads. These developments made commercial towns not only appealing to fashionable society but also accessible, prompting enhanced communication between the towns and regions, supporting the supply of provisions for retail and commercial purposes and, importantly, an improved platform for inter-town information exchange, through letters and newspapers.[50]

This renaissance engendered a positive type of urbanisation in which towns were able to absorb greater numbers of people without debilitating themselves financially and socially, and nurtured the flowering of a distinctive urban culture that encompassed shopping for leisure, displays of status, sporting activity and a significant increase in the number and range of clubs and societies.[51] These associations, which became 'one of the most distinctive social and cultural institutions of Georgian Britain', were diverse in both type and their range of their interests.[52] These clubs furthered relations between towns as associations forged links

48. Peter Clark, *British Clubs and Societies 1580-1800: The Origins of an Associational World* (Oxford Studies in Social History) (Oxford 2000).
49. Peter Borsay, *The English Urban Renaissance: Culture and Society in the Provincial Town 1660 - 1770*, Reprinted, Oxford Studies in Social History (Oxford: Clarendon Press, 2002) p16.
50. Paul Elliott, 'The Origins of the "Creative Class": Provincial Urban Society, Scientific Culture and Socio-Political Marginality in Britain in the Eighteenth and Nineteenth Centuries', Social History 28, no. 3 (2003): 361–87.
51. Borsay, pp20, 28.
52. Clark.

with comparable societies in other towns.

Prominent among these associations were gatherings devoted to science and literature. Scientific enquiry had been considered 'gentlemanly' since Charles II gave his endorsement of the Royal Society, and it became a fashionable pursuit for both the gentry and the 'middling sort'. Scholars continue to debate the extent to which the contemporaneous industrial revolution was driven by this private interest in scientific subjects (and indeed, *vice versa*) but there is indisputable evidence of an overlap between persons professionally engaged in industries using cutting-edge technology and those who took an interest in scientific questions as a personal pastime. Science was a respectable hobby for industrialists and it was not unusual for the professional man of the seventeenth century to be 'well-versed in scientific practices and procedures'.[53]

Members of the manufacturing and professional class met to share interests in antiquarianism, discuss scientific questions and pursue new discoveries. A learned society, the Gentleman's Club, had been founded at Spalding in 1710 following a communal reading by gentlemen of *Tatler* in the Abbey Yard coffee house, while the Lunar Society of Birmingham (c1765-1813) was first and foremost a gathering of friends with similar interests and a shared social standing.[54] Owing to the organisational capacity of their provincial elite membership, not to mention their personal financial resources, these loose groupings began to coalesce into permanent societies.[55] The Spalding Gentleman's Club moved swiftly from its coffee house beginnings to establish a formal society with minuted meetings in a 'virtually unbroken between 1724 and 1757' and attracted prominent men of learning, among them Isaac Newton, Alexander Pope and John Gay.[56] Leading Lunar Man Erasmus Darwin, who was rich in both wealth and character, helped to spread the idea around the wider region and founded the Derby Literary and Philosophical Society in 1783.[57]

This early wave of formalised associationalism flourished in the urbanised and industrial environment and, as the eighteenth century gave way to the nineteenth, these societies increased both in number and in the scale of their success.[58] A variety of scientific, literary

53. Paul Elliott, '"Food to the Mind and Rapture to the Sense": Scientific Culture in Nottingham, 1740-1800', Transactions of the Thoroton Society 82 (2005) p99.
54. Valerie Rumbold, 'Reading The Tatler in 1710: Polite Print and the Spalding Gentlemen's Society', *Eighteenth-Century Life* 40, no. 3 (2016): 1–35; Jennifer S. Uglow, *The Lunar Men: The Friends Who Made the Future ; 1730-1810* (London: Faber and Faber, 2002).
55. Elliott (2003).
56. H. C. G. Matthew, B. Harrison, and L. Goldman, eds., 'Spalding Gentlemen's Society', in The Oxford Dictionary of National Biography (Oxford University Press, 2004).
57. Uglow. p12.
58. R. J. Morris, 'Voluntary Societies and British Urban Elites, 1780–1850: An Analysis', The Historical Journal 26, no. 1

and philosophical societies were established contemporaneously in Manchester, Sheffield, Leeds, Liverpool, Bristol, Birmingham and Newcastle.[59] They boasted a middle class membership of serious minded people with thoroughgoing interests in intellectual subjects and, from the time of their founding, offered courses of instruction and gathered collections of books, artefacts and specimens that, in some cases, grew large enough to found libraries and museums and aided the transition from loosely-constituted society to permanent institution.[60]

Through this process of institutionalisation, these provincial societies began to take on their own distinctive character. Whereas previously they had been modelled on metropolitan institutions, (the Spalding Club was, for example, a deliberate attempt to transplant London coffee house culture to the Fens), for a variety of reasons, including a growing symbiosis with manufacturing and commerce, they began to establish a distinctively provincial character and, by so doing, forged an identity for their members who were in the process of becoming the new bourgeois class.[61] The success of this associational culture is the product of a confluence of factors, but none more so than the enthusiasm and capacity of this rising middle class.

The intellectual culture of nineteenth century Nottingham offers an interesting case study of this process of institutionalisation. A Literary and Philosophical Society was founded in 1842, which was rather late by contemporary standards. The delay was prompted not by a lack of interest (courses of scientific lectures had been popular in Nottingham since the eighteenth century) but because of the close association between the local scientific culture and the subscription library.[62]

A subscription library had existed in the town since the mid-eighteenth century, when Dr William Standfast, the vicar of Clifton, donated his private book collection for use as the basis of an 'endowed public library for the town'. Interest in this library was not great and it was superseded by the Nottingham Subscription Library, founded in 1816 and housed since 1821 at Bromley House in the centre of the town.[63] The library became the 'chief centre of intellectual life in Nottingham' and the site for non-sectarian intelligent discussion among the

(1983): 95–118.
59. Mountford p24.
60. Mountford p24.
61. Elliott (2005) p99
62. John Beckett, 'The Scientific Community in Nottingham: Bromley House to the University College', Transactions of the Thoroton Society 120 (2016).
63. Beckett (2016).

town's professional men.[64] In 1824 the Library Committee established a Literary and Scientific Society as a 'sort of sub-group' within the library, offering lectures and discussions to members on payment of an annual subscription of half a guinea.[65]

The Bromley House library, as it came to be known, was a success, recently celebrating its bicentenary. However, it was somewhat exclusive in nature. It had emerged from the circulating libraries patronised by the 'professional and business classes' and these remained the principal members of the institution. Subscriptions were set at two guineas a year.[66]

By this time, intellectual associations at the lower end of the social scale had been evident in Nottingham, and around the country, for several years. As the middle-class voluntary associations were flourishing, mechanics institutes also began to appear. These organisations had a functional intention, offering 'useful and practical instruction for artisans in evening classes'.[67] They spread, quite naturally, through the industrial towns of the Midlands and north, and in London. The success of these organisations is due in no small part to their accessibility, being both geographically close to the working and living quarters of their audience and operating in the evening hours after the factories and workshops had closed for the day. Although several of the mechanics institutes would directly beget formal colleges and universities -the London one founded by George Birkbeck in 1824 is the antecedent of Birkbeck College, University of London, while another mechanics institute was eventually subsumed into the Manchester College of Science and Technology- it was their approach to accessibility that would have a wider influence on the spread of higher education, not least in the siting of colleges in provincial towns.[68]

Plans for such an organisation had circulated in Nottingham during the 1820s but local support was insufficient to give life to the project, which was superseded by the founding of a 'less ambitious scheme' for an Artisans' Library.[69] The idea was floated again in 1837, this time with the financial support of wealthy and influential backers, such as John Smith Wright, a local banker. These contributions proved decisive and the Institute, which had begun life in rented property in St James' Street was, thanks to Wright's largesse, able to acquire its own place in 1845 and secure a permanent presence in the town.

64. Becket p10; Beckett (2016).
65. Beckett (2016).
66. Beckett (2016).
67. Mountford p23.
68. Mountford p23.
69. Wood p5.

The new institute was furnished with a library and a newsroom along with a hall complete with organ. Activities included readings from popular authors, lectures on various subjects; chemistry, botany, physiology and classes for reading, writing, and arithmetic. The Natural History Society, which was then in decline, deposited its specimens at the Mechanics, offering a hint of the universal intent of the institute and an early example of local institutions collaborating where resources demanded and where a shared purpose could be found.[70]

Inevitably, given its audience and origins, the Institute maintained links to industry but, through the breadth of its educational programme offered its members a deeper level of knowledge engagement than would be provided by simple trades training and aimed to bring to its members 'a knowledge of the theoretical principles upon which their practical work rested'.[71] This education offered a 'mental awakening, a widening of outlook, which gave promise that higher ideals and new values would penetrate into the civic life of the future'.[72] In doing so, it anticipated the dual purpose of colleges, which were intended to aid productivity while elevating the minds of the community.

The role of the institute in providing education became more prominent after 1862 with the offer of courses of lectures, funded by the Kensington-based Department of Science and Art, aided by grants from the Department of Education. These began with a series of forty lectures on inorganic chemistry with special reference to its influence in dyeing, bleaching and lace-dressing, subjects of direct interest to local industry.[73]

The success of the Mechanics' Institute was of significant importance to the establishment of UCN and set several precedents that would prove valuable to advocates of formal training provision in the town. Its Kensington lectures proved Nottingham's demand for deeper technical training and established a pattern whereby a local organisation could offer facilities and administration for courses offered by distant providers. More significantly, it exhibited some of the patterns of organisation and purpose that would prove the viability of higher education in the town.

Nevertheless, this would still be a distinctive challenge. The case for publicly funding a library or museum which, in theory at least, is open to all, was a relatively straightforward one. Financing education which, while more open than the country's elite universities, was

70. Wood p5.
71. Becket p15.
72. Becket p21.
73. Wood p7.

selective both in terms of subject and entry requirements, presented a more difficult case. There had to be sufficient public support, both in terms of approval for the endeavour and as a 'user base', and there had to be money readily available. Later in the century, this would mean public funds. However, the first endeavours relied on private money.

It was private money that supported the founding of a 'People's College' in Nottingham in 1846.[74] This initiative, led by local philanthropist George Gill, had the express aim of enabling 'the mental and moral improvement of the labouring population, clerks, warehousemen and others receiving wages or salaries for their services.' In this pursuit, the founders had the goal of 'better qualifying' the students for their trades and employment and also to 'cause them to become worthy members of the community', a dual mission which would become a recurrent theme of higher and adult education in the period.

As noted, the subscription library at Bromley House had a membership drawn chiefly from the urban middle class. Although provision for those of more limited means were made by the Public Libraries Acts in the 1850s, which allowed for municipal towns of more than ten thousand inhabitants to levy a penny rate to fund a free library or museum, the opportunity was not taken up in Nottingham until 1866 when the indebted Artisans' Library offered its collections to the council as the basis of a free library, which was opened in temporary premises in 1868.[75] The use of an existing, private collection with which to stock the library was not just in keeping with the terms of the Act, which permitted levied funds to be spent on buildings and staff and not on book stock, but also redolent of the necessity for such endeavours to be shared between public and private contributions.[76]

This 'blended funding' model would prove decisive in the founding of UCN. The free library, backed by Westminster legislation, furthered the precedent for the town corporation to take responsibility for educational and cultural activities. The precedent was deepened when, in 1867, the Mechanics' Institute suffered a devastating fire and had nowhere to accommodate its natural history collections, which were handed over to the Naturalists' Society (the successor body to the Natural History Society). However, this society also lacked the appropriate resources to house them and so fell upon the Corporation to use the penny rate to set up a free museum, which was opened on Wheeler Gate.

Itinerant lecturers had been a feature of London life from the 1720s. The economic and

74. Wood p7.
75. Wood pp7-8.
76. Becket p12.

social changes of the age meant that their work was soon heavily in demand in provincial regions.[77] In 1867, James Stuart, a Fellow of Trinity College Cambridge, was invited by an organisation called the North of England Council for Promoting the Higher Education of Women to give lectures to audiences of women who aspired to become governesses and schoolmistresses, placing his work in 'the front line in the battle for education for women'.[78] Although he was asked for lessons on the theories and methods of education, Stuart instead chose to deliver 'specific' subjects and offered eight weekly lectures on the history of astronomy, with each course of eight being delivered in Manchester, Liverpool, Sheffield and Leeds.[79] Stuart approached his task with diligence and made extensive preparations. He encouraged his audiences to take notes and provided them with written summaries, which he honed as he improved his understanding of his audience's needs. He had two aims with this, firstly to assist the pupils in taking notes and secondly to aid their understanding of the lecture.

In pursuing this second aim, Stuart also circulated reading lists and provided his audiences with printed questions, inviting them to return answers which he would correct. He expected 'twenty or thirty' returns but found that, of an audience of six hundred women, he received around three hundred answers. Correcting such a number was a large task but he nevertheless found the exercise useful as it showed him where his explanations needed to be made clearer. Of further encouragement was the general response of his audiences, who 'took full advantage of the opportunity, worked hard and were very much interested'.[80]

A Mr W. M. Moorsum, an acquaintance of Stuart's, working as an engineer at Crewe, invited the Cambridge man to repeat his lectures to the newly founded Mechanics' Institute there. The promise of a lecture on meteors was warmly taken up and, quite by chance, scheduled for the night after the Leonid shower of 1867. Consequently, having expected a gathering of 'around a score' of people, Stuart found himself in front of an audience of 1500, 'crowded in every corner'. Such demonstrable enthusiasm gave these lectures a degree of momentum and Stuart spent the following five years in what he called the 'missionary work' of the university, noting 'the widespread and real desire for some form of higher education which existed throughout the country and … the obligation there was on the two ancient

77. Uglow p37.
78. Mountford p22.
79. James Stuart, *Reminiscences* (London:1911) pp157-158.
80. Stuart p162.

universities to come forward to supply that demand'.[81]

Stuart consequently took this up with his masters at Cambridge and formalised his proposal for a 'university extension', with the support of recommendations from his clients in the north. The university appointed a committee (with Stuart himself as Chair) to review the possibilities of furthering the scheme and to seek the advice of potential correspondents in provincial towns.

A keen response to this call came from Nottingham, where a committee connected with the Mechanics Institute and comprising Mr Richard Enfield, Dr J.B. Paton and Canon Francis Morse, agreed to offer evidence to the Cambridge committee, to organise the Midlands end of the scheme and to offer financial guarantees to Stuart's work there. The enthusiasm of the Nottingham committee deeply impressed Stuart, with whom they shared the view that 'great advantage might accrue to the nation through the education of all classes being carried by the same agency'.[82]

The Nottingham men formed a circuit with partners in Leicester and Derby and, in autumn 1873, courses of lectures were given in the three towns, each with three divisions of topic and audience. These were lectures on English literature (primarily for 'young women of leisure'), force and motion (for middle class men), and political economy (for working men).[83]

This last group is worthy of particular examination. Extension lectures were attended by East Midlander 'mechanics', a term perhaps best understood as a proxy for the skilled working class in general. Such audiences demonstrated an appetite for learning and for the pursuit of subjects that fired their interest without necessarily having a practical or vocational application. The peripatetic nature of the extension movement was essential. These audiences were unable, through economic and social restrictions, to travel to attend higher educational institutions, much less to do so residentially, and so the opportunities inherent in 'having the university come to them', were manifold. More significantly for the later development of the regional university, was the proof of a receptive audience and the necessity, if such audiences were to be engaged, of education being available locally. This demand would be driven not just by individual beneficiaries, but by their potential employers. It would be answered with the founding of a new institution.

81. Stuart p168.
82. Stuart p172.
83. Becket p31.

Part Two: Technical and Professional Training and Research

The Royal Society was the seed organisation of state-directed research in Britain. Robert Hooke's appointment as the Society's Curator of Experiments in 1661 made him effectively the first professional research scientist, while the reconstruction of London after the Great Fire was masterminded by Fellows of the Society and funded by the Crown.[84] However, this was done in their capacity as private Gentlemen, rather than as representatives of the Society itself.[85] For the next hundred and fifty years, even as technology and innovation revolutionised society and the economy, science remained a privately financed pursuit.

At the beginning of the period now regarded as the Industrial Revolution, Britain lagged behind its continental rivals. The Dutch had developed sophisticated windmills and damming systems while, for all the brilliance of British individuals such as James Watt, men of invention 'still needed to study French engineering texts because there were so few English ones available'.[86]

For a variety of reasons, among them relative political stability, the availability of capital, access to coalfields, and differences in national patenting regimes, Britain then sped ahead. In the final decade of the eighteenth century Britain issued over eight times as many patents as France.[87] By the end of the Napoleonic wars, Britain was 'approximately a generation ahead in industrial technology and in the elaboration of the mechanised factory'.[88] These advantages were transferred into industrial output. The cotton industry, the salient example of the age, offers telling evidence. In 1760, Britain imported 2.5 million pounds (1.1 tonnes) of raw cotton and processed it chiefly by hand. By 1837 the numbers had grown to 336 million pounds (152,000 tonnes), the overwhelming majority of which was processed by machines under the factory system.[89]

The importance of science and innovation as a factor in this acceleration is a contested issue. Technology is a significant component of the Rostovian five-stage theory in economics and Rostow himself described 'productive gadgeteering' as the 'second general force' that set

84. Rebecca Rideal, *1666: Plague, War and Hellfire* (London: John Murray, 2017) p34.
85. Hooke, John Evelyn and Christopher Wren all submitted proposals for the rebuilding of London. Wren's suggestion was successful, and he was appointed Master of Works in 1669. Hooke was appointed as his assistant. Rideal p221
86. William Rosen, *The Most Powerful Idea in the World: A Story of Steam, Industry, and Invention* (London: Pimlico, 2011) p406.
87. Rosen p410.
88. Jeff Horn, *The Path Not Taken: French Industrialization in the Age of Revolution, 1750-1830* (Cambridge, Mass.: MIT Press, 2008).
89. David S. Landes, *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present,* 2nd ed (Cambridge, UK ; New York: Cambridge University Press, 2003) pp41-42.

the pre-conditions for economic take-off, and the shift from human and animal power to fossil energy is perhaps the defining feature of the Industrial Revolution.[90]

However, it is important to draw a distinction between pure science (defined as 'enquiry from first principles) and invention and refinement through practice. Some historians have developed a 'science first' hypothesis, by which macroinventions, such as the steam engine, drove endogenous economic growth and contend that these practical innovations were themselves prompted by advances in the pure sciences.[91] Advances were certainly made by workshop artisans, but the question hinges on how far they relied on scientific first principles, and how far they depended on practical experience.

Musson and Robinson made explicit links between the 'disinterested curiosity of great minds' in the Scientific Revolution of the seventeenth century and the applied technology of the eighteenth and nineteenth.[92] 'Millwrights and engineers', they suggest, 'learned to measure, plan, calculate velocities…studied mathematics and later on, subjects such as mechanics, hydrostatics, and hydraulics'.[93]

The opposing view, while recognising the importance of technology, suggests that science played only a minor role in productive innovation and that advances were made piecemeal 'by engineers and mechanics working on the basis of previous practical experience', rather than from principles of pure science.[94]

Even those who question the importance of science as a main force, accept that technology and innovation were important. Nevertheless, attempts to unpick the value of science in this period, which include analyses of book titles, membership lists for scientific societies and the pattern and distribution of patents, have been unable to resolve the question.[95] The diffusion and application of scientific knowledge was unsystematic and conducted by gentlemen, universities, private industry or some combination of the three in a 'haphazard process, performed by onetime wheelwrights and carpenters competing, rather than collaborating, with one another'.[96] The absence of any unifying regime, such as might be

90. W.W. Rostow, *The Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge: Cambridge University Press, 1991) p32.
91. A. E. Musson and Eric Robinson, *Science and Technology in the Industrial Revolution, Classics in the History and Philosophy of Science*, v. 3 (New York: Gordon and Breach, 1989). Chapter 1 sets out this idea in detail.
92. Musson and Robinson p10.
93. Musson and Robinson p24
94. William Ashworth, *An Economic History of England, 1870-1939* (Abingdon: Taylor & Francis, 2006) p27.
95. An excellent summary of the debate is provided in B. Zorina Khan, 'Human Capital, Knowledge and Economic Development: Evidence from the British Industrial Revolution, 1750–1930', *Cliometrica* 12, no. 2 (May 2018): 313–41.
96. Rosen p407.

provided by the state, make it difficult to trace the connection between science and innovation, except by inference.

At this time, however, practical innovation and pure science were still pursued almost exclusively in the private-commercial sphere. The spinning jenny, the Newcomen engine and the Boulton and Watt steam engine were all developed privately, as was Richard Trevithick's high-pressure steam engine, invented while he was employed at a mining company.[97] In the pure sciences, Michael Faraday made his discoveries in electromagnetism and chemistry while working at the Royal Institution.[98] However, these phenomenal advances, which had been achieved in a laissez-faire environment, could not be sustained without state intervention.

The British industrial lead, while significant, was only ever temporary and precarious. The French innovation regime, which had been kept in abeyance by the upheaval of the revolution and its bloody aftermath, was fundamentally superior in several ways, not least in the role of the state in standardisation and organisation. The *Académie des Sciences* had compiled a national '*Description des arts et métiers*' since the late seventeenth century, with the goal of standardising scientific apparatus and in the decades prior to the Revolution the French government 'explicitly took on the responsibility of educating and training engineers', founding several schools dedicated to the purpose of applied science, while the *École polytechnique* was established to impose technical standards on industry.[99]

The haphazard approach and 'micro-invention', which had fostered Britain's decisive advantage in the first hundred years of industrialisation, was ill-suited as a means of maintaining superiority in an era of sophisticated industrial-scale enterprise as the 'age of scientific invention superseded the age of intuitive invention', to the benefit of countries with formally organised technological environments.[100]

Some state-led developments were evident at an early stage. The Royal College of Chemistry was founded in 1845 with support from Prince Albert and several prominent politicians from across the aisle, such as Benjamin Disraeli and William Gladstone. The model for the institution was clearly German. Justus von Liebig provided advice on its establishment and A.W. Hofmann was appointed as its first director. However, British

97. Rosen p407.
98. Frank A. J. L. James, Faraday, Michael (1791–1867), Natural Philosopher, Scientific Adviser, and Sandemanian, *Oxford Dictionary of National Biography* (Oxford University Press, 2004).
99. Rosen p407.
100. Rosen p407.

landowners and industrialists were interested in its outputs, chiefly because of their practical application to business. Hofmann started a research programme specialising in compounds derived from coal tar and one of his students, William Henry Perkin, invented the synthetic dye mauvine.[101]

However, perhaps because of its pre-eminence in industrialised Europe, Britain, and particularly England, was 'slow to become aware of the need for technology and its concomitants, polytechnics and universities'.[102] Warnings had been sounded as early as the 1820s in Whiggish journals such as the *Edinburgh Review*, which described the deplorable want of the higher branches of scientific education [in England]',[103] but as long as Britain maintained its lead in world industry, complacency defeated all advocates of serious reforms in higher education'.[104] It would take explicit demonstrations of continental superiority and a thoroughgoing economic crisis to focus ministerial minds and demand systemic state intervention.

Until that point, Britain remained boastful of its position as the workshop of the world. The Great Exhibition of 1851 was intended to have an international, even globalist, focus in its celebration of the capacities of scientific innovation, but left little doubt that Britain was the prime locus of technology. While still planning the Exhibition, its royal impresario Prince Albert remarked that 'science discovers laws of power, motion, and transformation; industry applies them to raw matter, which the earth yields us in abundance' and claimed that such power 'becomes valuable only by knowledge' His Exhibition would assert Britain as the 'starting point from which all nations will be able to direct their further exertions'.[105]

To be sure, there was some effort at converting these ambitions to action. In 1850 the government had instituted an annual award of £1000, to be distributed by the Royal Society, 'to encourage the pursuit of research'.[106] This fund, which attracted applications from individual researchers, could be used to 'defray the costs of chemicals and instruments' but did not support the time or labours of the researcher and was a product of the age of the

101. Graeme Gooday, 'Precision Measurement and the Genesis of Physics Teaching Laboratories in Victorian Britain', *The British Journal for the History of Science* 23, no. 01 (March 1990): 25.
102. David R. Jones, T*he Origins of Civic Universities: Manchester, Leeds & Liverpool* (London: Routledge, 1988) p37.
103. The Proposals for Founding a University in London Considered. (1825). *The Edinburgh Review*, 1802-1929, 42(84), 346-367.
104. Jones p38.
105. Albert, Prince Consort, *The Principal Speeches and Addresses of His Royal Highness the Prince Consort: With an Introduction, Giving Some Outlines of His Character*, ed. Arthur Helps (Cambridge: Cambridge University Press, 2013).
106. Philip Gummett, *Scientists in Whitehall*, Manchester: Manchester University Press, 1980 p20.

gentleman experimenter, rather than an initiative of systematic research.[107]

Later on, the Board of Trade founded the Science and Art Department, to disburse the proceeds from, and continue the educational influence of, the Exhibition.[108] With an initial budget of £22,000, the Department supported museums alongside the colleges and provided for, *inter alia*, maintenance of students, inspection and examination, building grants, and scholarships.[109]

Despite Prince Albert's lofty aims, these funding schemes were insubstantial by European standards. The Paris *Exposition Universelle* of 1867 provided a means of comparison from which the first industrial nation would emerge unfavourably. The event itself was 'four times as large as any previous exhibition and was visited by ten million people'.[110] Dr Lyon Playfair, who had been a Special Commissioner of the Great Exhibition, visited the *Exposition* in his capacity of Secretary of the Science and Art Department. The declining state of British innovation and technical education was not a novelty to him. In 1852 he had given lectures in which he described the advantages that European education systems offered to their economies, remarking that 'the continental system of industrial instruction is producing results which require the most serious attention of those who would see our industry continue to enjoy that prominent position in the rapidly changing state of the world'.[111]

His experiences of the Paris Exposition gave him further ammunition for his arguments, and he duly set them out in a letter to Lord Taunton, reprinted in the *Times* on 29th May 1867. He observed that 'our country has shown little inventiveness and made but little progress in the peaceful arts of industry since 1862', compared to that experienced on the continent and that the cause of the deficiency was that 'while France, Prussia, Austria, Belgium and Switzerland possess good systems of education for the masters and managers of factories and workshops, England possesses none'.[112] Playfair recommended that the government launch an official inquiry into the situation with a view to remedying it.

---

107. 'Scientific Instruction', *The Times* (London, England), Saturday, Feb 05, 1870; pg. 10; Issue 26666.
108. 'The Estate of the Commissioners for the Exhibition of 1851', in *Survey of London: Volume 38, South Kensington Museums Area*, ed. F H W Sheppard (London, 1975), pp. 49-73. British History Online http://www.british-history.ac.uk/survey-london/vol38/pp49-73 [accessed 4 July 2018].
109. Return of Sums from Parliamentary Grants expended by Science and Art Dept. in England, Scotland and Ireland, 1852-74, House of Commons Papers, Vol. 60, No.221 1875.
110. J. Monaghan, 'Some Views on Education and Industrial Progress a Hundred Years Ago', *The Vocational Aspect of Education* 20, no. 47 (September 1968): 187–94.
111. Lyon Playfair, *Industrial Instruction on the Continent: Being the Introductory Lecture of the Session 1852-1853*. (London: George E. Eyre and William Spottiswoode, 1852).
112. 'Industrial Education' *The Times* (London), Wednesday, May 29, 1867; pg. 5; Issue 25823.

Playfair's selection of Taunton as his correspondent is further evidence of the focus on education as the field for improvement. Taunton was at that time the Chairman of the Schools Enquiry Commission, which had the explicit brief of examining those schools not covered by the earlier Newcastle (1858) and Clarendon (1861) Commissions, which had respectively investigated education for the masses and in the nine leading public schools in England. His task, then, was to review the provision of education for the middle classes, or those pupils who might expect to pursue careers in the professions and as leaders of industry; the persons charged with ensuring Britain's competitiveness. In the question of improving national industrial competitiveness, the state's first recourse would be to address the educational environment.

Taunton passed Playfair's letter to the British jurors of the Exposition, themselves experts in fields such as iron, physics, locomotives, woollens, engineering and hosiery, and asked them their opinions. In a collection of their responses, submitted as an interim report, in July 1867, the Commissioners provided expert endorsement of Playfair's critique, chiefly that the country was under imminent threat of losing ground to continental rivals, if it had not done so already, and that the principal cause of this decline was the relative poverty of technical education in England.[113] There was unanimity on the point that Britain had been suffering a relative decline since the Great Exhibition and disagreements only appeared on the degree to which the root of the problem lay in schooling, technical training or elsewhere.

Rev Canon JP Norris, former inspector of schools responded to Taunton, 'in the matter of primary education we were well abreast of those three nations, yet in the matter of higher instruction, of all that tends to convert the mere *workman* into the *artisan*, Austria, France and Prussia were clearly passing us.' (Original emphasis). Edward Huth, a Yorkshire woollen manufacturer, averred that there were shortcomings in elementary and intermediary education and that these deficiencies were of sufficient concern to warrant radical action. 'Voluntary education has done much,' he wrote, 'but the progress is too slow, and the great question is, whether compulsory education must be resorted to. This, I know will grate harshly on many an ear and so it did on mine some years ago. Seeing what it has done for other countries, and being convinced that a good general education is the great secret of their rapid strides in art and manufacture, I have entirely changed my opinion'. Huth offered a further reply to Taunton in which he recommended the establishment by Government of 'higher industrial

113. Schools Inquiry Commission. Report Relative to Technical Education, 1867, Command Papers Cd.3898.

schools…for those who are able to pay a reasonable price for the instruction they receive in them'.[114]

That the state had a duty to solve the problem, by means of organisation, finance or both, was common to several respondents. James McConnell, whose interest lay in locomotives, remarked that a movement towards state-organised training was growing in the country and agreed that 'Government should take the matter in hand and the public funds should be forthcoming to establish these technical schools, not in London, but in the districts where the operations requiring such knowledge are being carried on'.[115]

A Captain Beaumont of the Royal Engineers offered a patriotic view that foreign industrialists acquired parity with Britain by copying its technology and had then striven forward by applying theoretical knowledge to enhance practice. He recommended the founding of 'a national institution, such as the *Arts and Metiers*, where English people could study practical mechanics and the arts appertaining thereto'. The state would necessarily be involved, given the scale of the enterprise. 'Only when taken up by Government that such an institution would assume proportions sufficient to be really effective as a means of national education', he remarked.[116]

The engineer, Mr C Mallett, agreed with Playfair's assessment and claimed that he had no need of his visit to Paris to form such a view, having arrived at it 'independently' some years ago, before having it confirmed at the Exposition. He claimed to have spent the preceding twelve years circulating these opinions in the *Practical Mechanics Journal*, the *Engineer's Journal*, at the Society of Foreman Engineers of London and through his position as President of the Institute of Civil Engineers of Ireland. He was not alone among the respondents in claiming that the Britain's innovation and productivity deficit was a common topic in industrial circles. Mallett himself was a strong advocate of university training as offering an advantage to industry and that a 'vast improvement in the general and technical education system' was necessary if Britain was to preserve its advantage.[117]

Dr David Price, who had interests in the iron industry, guarded against taking the example of the Paris Exposition as being a definitive assessment of Britain's status, noting that several of the country's largest manufacturers were not represented at the event. He

114. Schools Inquiry Commission 1867.
115. Schools Inquiry Commission 1867.
116. Schools Inquiry Commission 1867.
117. Schools Inquiry Commission 1867.

nevertheless agreed with Playfair's general proposition, though he dissented from the view that education was the cause of the decline. He suggested instead that the problem lay in the failure of a 'higher scientific culture' in Britain. Like his fellow respondents, Price placed the responsibility for addressing this failure at the feet of the state. It was, he claimed, 'a reproach to the country that science is not represented in Parliament'. He lauded the work that had already been done in the public sphere, citing in particular the founding of the Royal College of Chemistry, the School of Mines and the London university colleges. Price admired the systems that he had observed on the continent. He believed that research should be 'liberally supported by the state', following the ideas of Professor Edmond Frémy of the *École Polytechnique* and recommended studying the methods of German universities, institutions he regarded as 'excellent seats of learning'.[118]

Having gathered a powerful series of arguments for state-driven improvements to higher education and research, Taunton claimed that further analysis lay beyond the scope of his Commission and recommended that a dedicated inquiry be established to examine the question with the committed focus that it deserved.[119] A Select Committee on Scientific Instruction was duly convened to address the issue.

The Committee divided its task into two courses of inquiry. Firstly, the educational condition of three classes of industrial personnel; workmen (including foremen), managers and proprietors and secondly the relationship between technical instruction and industrial performance.

On the first point, the Committee found provision to be partial, incomplete and ultimately inadequate. At the lower end of the social scale, workmen had had such poor elementary education that they often had lost any benefit within two years of leaving it, being unable to retain their knowledge past this point. This rendered them incapable of receiving any further technical training, though, the Committee noted, the practical experience of manufacture was of far greater use to them in any case. The managerial class, who tended to leave school at the older age of 14 or 15, displayed greater retention of their education and were more suited to onward study, should it be available. Even the proprietors and managers of large industrial concerns could only boast of piecemeal study, often self-driven and the 'result of solitary reading'.[120]

118. Schools Inquiry Commission 1867.
119. Schools Inquiry Commission 1867.
120. Select Committee to Inquire into Provisions for Giving Instruction in Theoretical and Applied Science to Industrial

Education and training were provided inconsistently and with significant local and regional variation. Training was provided in mechanics' institutions, with examinations available from the Department of Science and Art, but this activity was largely confined to London and the population-dense industrial areas of Lancashire, Yorkshire and Birmingham. In other parts of the country, these classes 'scarcely exist'.[121]

Where dedicated industrial schools did exist, such as the Mining School of Cornwall, the Bristol Trade School and the Navigation School of Hull, they had to contend with financial deficiencies, with the wages of workmen insufficient to pay the fees that were necessarily charged for instruction. In other areas, financial constraints acted as a barrier to the founding of industrial schools and colleges. Although local money was available in certain cases, a subscription scheme for a school of science and art in Bradford had attracted £5000 from a single donor, this was plainly inadequate to solve the problem on its own.

The problem was structural. A reliance on voluntary and local finance made technical education dependent on the whims of regional plutocrats and the organising skills of local committees, schemes could be made available in part of the country while other areas went without and in the absence of a central authority for guidance, it was difficult for information, ideas and resources to be shared between organisers in different regions. This was not simply a case of requiring the state to provide education and training, but of it failing to provide supportive structures for private endeavour. This was evident in the discovery that two colliery proprietors from Durham, 'anxious for the establishment of a peripatetic school' in their pit regions were 'quite unaware of the existence of the Cornish School of Mines'.

On the question of the relation of technical education to industrial performance, the Committee's primary concern was for comparative economic conditions, among them the lower wages that tended to obtain on the continent. An improved level of elementary education was regarded as useful to the workman class, but the effort to improve dedicated technical training would be better directed at the managerial and proprietorial classes. Here, the question was urgent. The Committee observed that it was 'of incalculable importance economically that our manufacturers and managers should be thoroughly instructed in the principles of their arts'.[122] The scale and urgency of this task demanded state intervention and

Classes. Report, 432 432-I p.vi.
121. Select Committee to Inquire into Provisions for Giving Instruction in Theoretical and Applied Science to Industrial Classes. Report, 432 432-I p.iv.
122. Select Committee to Inquire into Provisions for Giving Instruction in Theoretical and Applied Science to Industrial Classes. Report, 432 432-I p.viii.

the Committee considered it ‘essential that Government should interfere much more actively than it has done hitherto’, to ensure that centres of training were made available in the districts most in demand of them.[123] The young men of the middle classes were in need of sites of education. The prosperity of the nation depended upon it.

Professional training also became a prominent feature of the educational culture of industrial and commercial towns. Traditionally, the old liberal professions of Anglican clergy, barristers and physicians had been served by Oxbridge and, after 1826, the London universities, but the spread of provincial medical schools in the early 19th century saw the creation of centres of training around the country. The necessities of medicine, namely that its practitioners are suitably trained, that they are sufficient in number and that they are dispersed among the population, recalls similar demands made by clerical and legal activity during the establishment of the medieval universities. As industry and the economy became more sophisticated, similar demands would be made by other professions, among them school teaching, the law and clerical occupations, creating a need for institutions to train new entrants.

Two prominent strands of development attended medical work in the nineteenth century, professionalisation and specialisation. The first of these was a phenomenon driven internally by medical practitioners concerned with their relatively low social status. The presence of a ‘large socially inferior branch in apothecaries and surgeons’, fostered concern that medicine was a profession that lacked order and respectability.[124] This respectability would be gained through the statutory regulation of training and practice. The Apothecaries Act of 1815 introduced order into the training of medical students, requiring a period of instruction in an approved hospital and an apprenticeship under a general practitioner.[125] This supported hospital experience was initially provided by the charitable hospitals that had been founded in many towns at the end of the eighteenth century, which organised the demand for trained practitioners.[126] In the decades following the Act, these were supplanted by the independent and proprietary medical schools, operated and financed by the profession itself, of which ‘almost a dozen…were founded outside London in the decade before 1834, two of which

123. Select Committee to Inquire into Provisions for Giving Instruction in Theoretical and Applied Science to Industrial Classes. Report, 432 432-I p.viii.
124. Jones p73.
125. Ernest Finch, ‘The Centenary of the General Council of Medical Education and Registration of the United Kingdom (the General Medical Council) 1858-1958 in Relation to Medical Education’, *Annals of the Royal College of Surgeons of England* 23, no. 5 (November 1958): 321–31.
126. Mountford p23.

were in Manchester while Birmingham obtained its own medical school in 1828'.[127]

Despite this, the 1841 census revealed that, of the UK's 15,000 practicing medical practitioners, around a third remained unqualified.[128] Legislative responses were sought, somewhat slowly, until the Medical Act of 1858 regulated the practice of medicine and established the General Medical Council as a regulatory body to control entry to the profession by demanding qualifications and permitting the public to distinguish practitioners who had received formal training from those who had not.

The second phenomenon was driven, at least partly, by external factors, predominantly advances in the pure sciences. New studies and disciplines, firstly in chemistry and then in physics, advanced the theoretical basis of medicine and demanded greater scientific understating on the part of its practitioners. If the first half of the century had seen the consolidation of the profession from its traditional divisions of physicians, surgeons and apothecaries, the second half saw a new branching into technical specialisms, such as pharmacy and dentistry.[129]

With good reason, the rise of scientific medicine coincided with the laboratory revolution and the expansion of pure sciences generally. The immediate effect of this was to increase the resource cost of thorough medical training, requiring access to properly equipped laboratories with technicians to run them, a resource that lay out of the reach of the medical schools.[130]

The legal professions underwent a similar process of professionalisation in the nineteenth century. The lower branches, comprising solicitors and attorneys, sought social status comparable with barristers and founded the Law Society in 1825. This organisation, which draws natural comparisons with the General Medical Council, sought to raise and preserve standards of professional conduct, not least by mandating minimal levels of qualification and training. The Solicitors Act of 1860, following the advice of the Society, established qualification levels for practitioners.[131]

The broader political developments of the nineteenth century prompted ever greater state involvement in primary, and then secondary, education. The French Revolution and political agitation of pre-Reform Act Britain had 'revealed the authority of the crowd' while the widening of the franchise (itself the result of these struggles) fostered a belief that the masses

127. Whyte p88.
128. Finch.
129. Jones p73; For a summary of the historical precedents of the traditional tripartite division of medicine see Finch (1958).
130. Jones p73.
131. Jones p74.

were actors in the national polity and, as such, required educating.[132] To be truly effective, this education, which previously had been offered in a rudimentary fashion by churches and assorted charities, needed to be placed on a statutory footing. Although a formal state system of primary education would not be established until later in the century, the government began to take a direct role in schooling in 1833 with the establishment of a Treasury grant of £20,000 to two providers of education for the working classes. The application of public funds required formal oversight and a Committee of Privy Council was established in 1839, marking a significant step in public responsibility for education.[133]

The formalisation of primary education demanded a common standard for teaching and a pool of trained professionals to fill the growing number of positions. Early provision came in the form of the 1846 pupil-teacher scheme, under which selected pupils served apprenticeships that combined paid teaching responsibilities with their own education. On completing the apprenticeship, the pupil-teacher could sit an examination for the 'Queens Scholarship' that provided a maintenance grant for further training at a college.[134] Training colleges had been established by the Church, with twenty-two in operation when the formal pupil-teacher scheme was instituted.[135] Responding to the increased need, teacher training colleges were established at this time in Norwich, Oxford and London.[136]

By the 1860s there were 34 such colleges 'under government inspection and given government assistance'. They supported 2,065 men and women trainees, of whom 1,676 had received the Queen's Scholarship. Although the colleges were operated by the churches and divided by denomination, they worked to a standardised syllabus with the objectives of preparing candidates to pass the assessment and to obtain the practical skills to work as classroom teachers. Despite this, a Royal Commission reported a 'prevailing opinion' that the principles of the training courses were unsound and that qualified teachers did not teach 'as well as they should'. Blame for this was laid at the feet of the colleges.[137]

This was to be a recurrent issue in this period and the expectations of teacher training continued to grow.[138] The 1870 Education Act increased the demand for trained teachers to

132. Christine Helen Shinn, *Paying the Piper: The Development of the University Grants Committee, 1919-46* (London ; Philadelphia: Falmer Press, 1986) p17.
133. Shinn p17.
134. Committee of Council on Education: Minutes, August and December 1846, cd 787 XLV.1 p5.
135. Malcolm Tight, *The Development of Higher Education in the United Kingdom Since 1945* (Maidenhead: Open Univ. Press, 2009) p19.
136. Shinn p17.
137. Royal Commission to Inquire into State of Popular Education in England Report. Figures given are for the year 1858.
138. Tight p19.

form the staff of the new board schools. A further Royal Commission (1888) found that the training of teachers was still inadequate and recommended that the university colleges assume responsibility for this duty, either directly or, after 1890, through a dedicated Day Training College.[139]

An additional impact of the expansion of elementary education was the increase in the pool of potential students for higher education. Although statutory provision of secondary education would not be established until the twentieth century, the widening of primary education helped more youngsters onto the 'ladder' by which they could attain scholarships to higher education.[140]

Calls for a public stake in the in the pursuit of pure science predated even Playfair's early years of disquiet about education. Nevertheless, agitators for a scientific policy shared his focus on continental competition. In 1831, the scientist and Fellow of the Royal Society, Sir David Brewster lamented the 'near perfect indifference' shown by ministers to matters of scientific interest and compared Britain unfavourably with other European countries where governments were 'building magnificent observatories and purchasing the most expensive instruments for promoting astronomy'.[141] That year, Sir David founded the BAAS to encourage British science and to lobby government for support.

Again, like Playfair, he found a more receptive governmental ear in the years following the Paris Exposition, which served as effective an alarm for the British policy environment in science as it did education. A BAAS deputation, led by the Lucasian Professor of Mathematics George Gabriel Stokes, urged the appointment of a Royal Commission to review the status of public support for scientific research. The BAAS claimed that it was 'pretty generally entertained among scientific men that the relations of the state to science were not on so satisfactory a situation as might be desired'. While they acknowledged that some public financing had been made available, through, for example the National Observatory at Greenwich and some investment in researches into explosives at Woolwich, the structure of this support required improvement.

As an illustrative example, Stokes cited the annual government grant of £1000 made through the Royal Society. This award allowed individuals to apply to the Royal Society for

139. Keith Vernon, *Universities and the State in England, 1850-1939,* Woburn Education Series (London ; New York: RoutledgeFalmer, 2004).
140. Shinn p18.
141. David Brewster, 'Observations on the Decline of Science in England', *Edinburgh Journal of Science* V, no. 1 (July 1831): 1–16. p6.

support for the costs of chemicals and instruments for research, with no funding available to pay for their time and labour. Requiring scientists to devote only their free time to their research and forcing them to eschew any investigations that demanded a high degree of time and attention was damaging to science. It was the opinion of scientific men, claimed Stokes, that the solution would take the form a national institution, founded and supported by the government. A Royal Commission could, he argued, examine the case for such an institution and explore the particular branches of science that would be of greatest benefit to the nation.[142]

The lobbying was successful, and a Royal Commission on Scientific Instruction and the Advancement of Science was established. The Commission took a broad brief, with significant overlaps with the investigations of the Select Committee. In a series of eight reports, the Commission presented evidence on elementary and secondary education, courses of instruction funded by the Department of Art and Science, training in the ancient universities and new colleges, the role of museums and collections and government sponsored research.[143]

On the question of scientific research, the Commission reported that the assistance given by the state was inadequate to meet demand. The problems, as with so much else in science and education in this period, was manifold. Endeavours were either underfunded or funded in such a way to make thorough work impossible, there was no centralising control to ensure proper sharing of resources or to prevent duplication of effort and there was no mechanism by which government might take scientific advice when preparing policy.[144] Although research *had* been funded, this had been by individual departments sponsoring scientific research to support their work or through the annual Royal Society grant.

The Commission made a series of recommendations to address these problems. These included a 'considerable' increase in the Royal Society grant and to allow the funds to be used for time and labour. In addition, direct government grants should be awarded to researchers. A more significant recommendation was for the creation of a dedicated ministry for science that could receive proposals for investigations from other departments and either direct the necessary research or refer the questions to learned societies. This, claimed the

142. 'Scientific Instruction', *The Times* (London, England), Saturday, Feb 05, 1870; pg. 10; Issue 26666.
143. Royal Commission on Scientific Instruction and Advancement of Science: Eighth Report Command Papers C.318 1871.
144. Royal Commission on Scientific Instruction and Advancement of Science: Eighth Report Command Papers C.318 1871.

Commission, was of 'primary importance'. A council of eminent scientists should also be convened to advise the government and its ministries. The commission noted that the Council of the Royal Society had done this in the past, and might be the ideal model (and even comprise the same persons) but a fully public body would be subject to greater governmental control and be better placed to acknowledge public concerns.

At the heart of the Commission's recommendations was an acknowledgement that times had changed. It acknowledged the debt owed to individuals such as Dalton, Davy and Faraday but noted that the demands of science were now such that a more concerted effort was required to meet them. Plainly, this would have to be a national effort, since, as the Commission observed, 'science requires investigations and observations over areas so large and periods so long that the means and lives of nations are alone commensurate with them'. In this, the United Kingdom was once again behind its foreign competitors, where science was pursued 'to an extent and with a completeness of organisation to which this country can offer no parallel'.[145] However, none of these proposals, either of the Select Committee or the Royal Commission appear to have gained much traction in policy and little was done from a governmental point of view.[146] Despite the weight of learned opinion in favour of an interventionist science policies, more arguments would be required before decisive and lasting action would be taken and, for governments, few arguments are as compelling as economic ones.

The urgency of the need for reform was driven not only by broader economic concerns but by developments in the practice of science itself. These developments, in both teaching and research, would increase financial and administrative demands on scientific disciplines. The middle to late nineteenth century witnessed a transformation in the use of dedicated resources for science of such import that contemporary observers and later historians have dubbed it a 'laboratory revolution'.[147] This revolution was not limited to the establishment of dedicated and well-resourced sites for experimental activity but included transformative changes in the way that science was performed. This included the formation of distinctive scientific disciplines and the professionalisation of the practice.[148]

In European and American scientific circles, the senior discipline was chemistry. As late

145. Royal Commission on Scientific Instruction and Advancement of Science: Eighth Report Command Papers C.318 1871
146. Gummett p21.
147. Graeme Gooday, 'Precision Measurement and the Genesis of Physics Teaching Laboratories in Victorian Britain', *The British Journal for the History of Science* 23, no. 01 (March 1990): 25.
148. Melba Phillips, 'Laboratories and the Rise of the Physics Profession in the Nineteenth Century', American Journal of Physics 51, no. 6 (June 1983): 497–503.

as the 1850s, scientists such as Sir William Thomson (later Lord Kelvin and one of the outstanding figures in the history of physics) would react with surprise at the suggestion that a laboratory was the proper site for physical, as well as chemical, experimentation.[149] Michael Faraday, another giant of the field, rejected the very term 'physicist', and did not consider physics to be a discipline in itself. Thomson, while an enthusiastic supporter of the role of the physical laboratory, continued to reject the term as late as 1890.[150]

As was the case with much scientific practice in this period, Germany was the pioneering nation. Germany universities had created professorships in physics in the 1830s, seminars and colloquia in the subject were established in the 1840s and dedicated physics laboratories built in the early 1860s, these advances, led by Heinrich Gustav Magnus at the University of Berlin, spread through other German universities and were soon copied abroad.[151]

Among Germany's imitators was Britain, where laboratories were founded in the universities; at Oxford in 1860 by Henry Acland, and in 1873 at Cambridge by Michael Foster. In 1879 the first British engineering laboratory was created by A. B. W. Kennedy at University College London.[152] Laboratories were founded at other institutions with sufficient resources, such as the Royal School of Mines, where the first laboratory was established by T. H. Huxley in 1873, followed in 1878 by a dedicated geological teaching laboratory by Professor Judd.[153] The new colleges then being founded in provincial towns had the advantage of witnessing this laboratory revolution as they were developed. Consequently, they had laboratory facilities incorporated into their resources and built by design in their newly established institutions. University College Bristol in 1876 Mason College, Birmingham in 1880, University College Liverpool in 1881 and University College Bangor in 1884. The end of this period may be regarded as the 'threshold by which physics laboratories were clearly an established part of academic institutions'.[154]

By 1885, it had been established that industry need educational and technical support, that this support was expensive and needed infrastructure, not least because science was becoming more formalised and resource intensive. The state, and only the state, was in a position to address all of these needs and the provincial colleges, possessing laboratories and the personnel to run them, were a 'network in being' which could be used as the basis for

149. Gooday.
150. Phillips.
151. Phillips.
152. Gooday.
153. Gooday.
154. Gooday.

national innovation.

Part Three: The Higher Education Revolution

The initiatives and movements outlined in the previous section reflect the demand, both culturally and politically driven, for education in the growing towns outside of London. While these grassroots initiatives were flourishing, reforms were under way that would break the centuries-old duopoly of Oxford and Cambridge and permit the establishment of new English universities for the first time since the Middle Ages.

Even in the twenty-first century, the European university continues to display evidence of these medieval origins. Today's oldest continually operating universities were all founded in the Middle Ages and given their advanced age, are difficult for the historian to date with precision. Their[155] original purpose was to pursue questions of divine truth while furnishing the priesthood with a cadre of educated young men. The medieval European model produced a curriculum of seven liberal arts; grammar, rhetoric, logic, arithmetic, geometry, astronomy and music, but they retained a fundamentally ecclesiastical nature for the first few centuries of their existence, relying on the established church for patronage, protection and purpose.[156]

It is striking to note the continuity between these institutions and their modern descendants. In each case, the university functions as a formally independent institution while being, in practical terms, subordinate to a higher institution; the church in the case of the medieval universities and the state for the moderns. These higher institutions were patron in the senses of both 'benefactor' and 'customer'. They not only provided the financing for the universities' activities, but also consumed their outputs, namely, trained graduates and the fruits of their intellectual enquiries. Today, we call these twin outputs 'teaching' and 'research'.

Despite these continuities, the medieval institutions were merely the distant ancestor of the modern university, which is 'essentially a nineteenth century creation', the product of an era of radical reform in higher education and research.[157] At the beginning of that century, an observer could be forgiven for thinking such reform fanciful. The United Kingdom had at that time just seven universities, the aforementioned Oxford and Cambridge in England,

155. Stefan Collini offers, as 'reasonable assumptions', 'Bologna (perhaps) in 1088, Oxford and Paris (probably) around in the middle of the twelfth century and Cambridge in (arguably) 1209'. Stefan Collini, *What Are Universities For?* (London; New York: Penguin, 2012) p23.
156. Mountford p3.
157. Collini p23.

along with St Andrews, Glasgow, Aberdeen and Edinburgh in Scotland and Trinity College Dublin in Ireland.[158] Of these, Trinity was the youngest, having been established by Elizabeth I in 1592.[159] If this situation, in which England, with a population over five times the size of Scotland had half the number of universities, seemed anomalous then it appeared to be a settled anomaly at least.[160]

There had been earlier suggestions that this condition would not hold. The Act of Uniformity (1662) required adherence to the Established church for office holders in England and, as a consequence, deprived non-conformist dons of their positions, prompting them to set up their own institutions. These new academies, among which were Morton's college in London and the Attercliffe Academy in Sheffield, offered instruction in English, history and experimental science in courses that lasted up to five years. They went into decline after 1800 through a lack of endowments and a growing sectarianism but left a lasting influence on the educational environment. Of note is that their students were drawn from the mercantile classes, as well as 'some of the nobility' and provided an alternative to Oxford and Cambridge.[161]

The formal, and indeed final, breaking of the Oxbridge duopoly in England was also driven by denominational motivations. University College was founded in London in 1826 by 'Dissenters of several stripes'. Three years later, King's College was established by Anglicans to give the nonconformists a response in kind.[162] In 1832, the University of Durham was founded, again in response to ecclesiastical needs; it was set up as a means of spending some of the money held by the Durham chapter of the Church of England and thereby preventing the reforming Whigs from taking it away.[163]

Although both London colleges offered similar curricula neither was strong enough alone to award its own degrees. Suggestions of a merger were floated in the 1830s, but the denominational division proved too great for a straightforward union of the two institutions. The solution was ingenious; the establishment of a 'University of London' to which they (and other institutions in Britain and the Empire might later) join.

158. Berdahl p20.
159. Mountford p.47
160. In 1801, England had a population of just over 8 million while Scotland had almost 1.2 million. 'Accounts of Population and Number of Houses according to Census, 1841, of each County in Great Britain, Channel Islands and Isle of Man; Comparative Statement of Population and Houses, 1801, 1811, 1821, 1831 and 1841' House of Commons Papers No. 52 Vol. II.277.
161. Mountford p23.
162. Berdahl.
163. Berdahl.

These innovations in London and Durham spurred reform in Oxbridge and provided a means of comparison that had previously been absent. For the first time, the purpose and quality of an English university could be measured without Oxbridge providing the sole standard. It had become possible to conceive of a permanent English college, even a university, outside of Oxbridge.

The growing demands for professional and industrial training had established a market for the nationally dispersed provision of education, while the breaking of the Oxbridge duopoly opened the possibilities for reform to, and expansion of, higher education. The most prominent response to these twin phenomena were the new colleges, founded in England's industrial and commercial towns in the latter decades of the nineteenth century. Between the founding of University College London and the end of the century, no fewer than nine lasting university colleges had been established in England: Owen's College in Manchester (1851), Yorkshire College of Science in Leeds (1874), Bristol (1876), Sheffield (1879), Mason's College in Birmingham (1880), Nottingham (1881), Liverpool (1882) and Reading (1892).

It is tempting to describe these establishments as part of a concerted wave of development and an intentional step towards the founding of a nationwide network of proto-universities, but that would be to mis-represent the distinctive local factors that underpinned their development and gave the colleges, at least initially, peculiarly local characteristics. Although they were to converge in the nature of their organisation and the content of their curricula, this was the result of shared pressures, rather than the culmination of an intentional plan. Indeed, although each college was founded amid declarations of rather noble and high-minded aims, the nature of their development and their relationships to one another and to the state, are more revealing.

Among the several reasons for the establishment of colleges in industrial and commercial towns, perhaps the most proximate enabling factor was the availability of private funds and the desire of the bourgeoisie to disburse their wealth through philanthropic projects.

The industrial revolution gathered significant wealth in the hands of a small but powerful generation of industrialists and entrepreneurs. Aspects of geography and the economy attached these, predominantly non-conformist, men to the grimy towns of the midlands and northern England and these towns, which had done so much to generate this wealth, became the objects of their largesse.[164]

164. Brian Harrison, 'Philanthropy and the Victorians', *Victorian Studies* 9, no. 4 (1966): 353–74.

Amid philanthropic activities that included the founding of almshouses, orphanages and large donations to hospitals lay a concern for the education of the working classes.[165] When the Mancunian cotton goods exporter John Owens died in 1846, he left a large bequest for the founding of a 'non-sectarian college' in his native town.[166] Although he had expressed little interest in this pursuit during his lifetime, he was aware of wider discussions of the necessity for such an institution and left instructions that his gift should allow young men to follow 'such branches of learning and science as are now or may be taught in the English universities', with no restriction on 'religion, condition in life, or place of birth'.[167]

A group of trustees was appointed and, after seeking advice from several established universities and public schools (though, notably, only receiving replies from the London ones), the institution opened its doors in March 1851, with a portfolio of courses that included classics, maths, philosophy and English language and literature. Applied sciences, although considered desirable, were, with the rising costs of practical work, prohibitively expensive, at least in the very early days of the college.[168]

Owens' College has come to be regarded as a pioneer institution, the first of the 'civic colleges' to emerge in the industrial towns. Its comparator institutions began to appear after a short delay and, although aspects of Manchester's design can be detected in mimic form in each of the new colleges, it is a mistake to portray this as the result of simple modelling. Each college was formed in response to the social and economic pressures that were at play in its host town and contended with its own set of circumstances.

Foremost among these factors was the availability, nature and source of financial support. During the 1870s, the Sheffield steel manufacturer and Methodist Mark Firth provided £20,000 towards the building of a college along with £15,500 in endowment, and a further £150 for a chemistry professor.[169] As an industrialist, (not, like Owens, a merchant), Firth specified that his college be used for technical and industrial instruction, more in keeping with the actual work of Owens' College, rather than its original aims.[170]

In Birmingham, the self-made pen manufacturer Josiah Mason made a colossal gift of

165. Thomas Cross. 'Sir Josiah Mason' *The Wesleyan-Methodist Magazine* (11, 1881): 820-827
166. Green p113.
167. B. W. Clapp, 'Owens, John (1790–1846), Merchant and Philanthropist', *Oxford Dictionary of National Biography* (Oxford University Press, 2004).
168. Jones p50.
169. H. C. G. Matthew and B. Harrison, eds., 'Mark Firth', *The Oxford Dictionary of National Biography* (Oxford University Press, 2004).
170. Mathers p7.

£200,000 to establish a college that bore his name. The size of this gift gave the Birmingham college significant advantages and would, in time, and with the assistance of Joseph Chamberlain, help it to become the first independent civic university in over twenty years.[171]

Like Firth, Mason intended to mould his college after his own desires. His gift was made with the explicit and specific exclusion of literary and arts subjects, a prohibition that was perhaps understandable in a self-educated industrialist, though no less advisable for all that. The restriction was removed after lobbying from Mason's own advisers amid the pressure of conforming to the requirements of London matriculation and degree exams.[172] It is telling that even an endowment of this impressive size (ten times the amount that was used to found the college in Leeds), could not protect the wishes of its donor against the realities of educational demand or the tendency of nationwide initiatives to foster conformity.

Despite the frustration of Mason's personal directive, single benefactors remained influential in the development of colleges. University College, Bristol was established as a limited liability company in 1876 without a major benefactor. This handicapped the nascent college until the 1890s when money from the Wills tobacco fortunes enabled expansion.[173] University College Nottingham did not receive major donations until the 1920s when Jesse Boot appeared as its benefactor.

The Yorkshire College of Science in Leeds had no such benefactor and had to rely on public subscription and far lower sums of money. Having sought £60,000, the College of Science Committee had to be satisfied with a mere £20,000, a paltry sum in comparison with Birmingham and a figure that would lead to an environment of financial precariousness in the College's early years.[174] Most, however, had a combination of moderate single or consortium donations and public appeals. This was the case in Liverpool.

Although the provincial colleges rose independently, the common circumstances of their origin and, for some, contemporaneous evolution into chartered universities, gave them a certain 'family likeness'.[175] These similarities encompassed the nature of their organisation, with each one boasting a comparable type of constitution, as defined in charters and statutes and similar procedures for internal governance, as well as similar entrance requirements and the structure and content of their courses. Although these commonalities were simply the

171. Jones p18.
172. Jones p18.
173. Jones p17.
174. Jones p56.
175. Mountford.

natural product of likenesses in origins (or ‘outright copying’) they were to have an ongoing effect on the relation of the institutions to one another and would enable them a degree of interoperability that permitted, in their first decades, federalisation and later on, the establishment of a nationwide system for higher education and research in which each institution could remain formally independent while capable of meaningful operational interaction with its fellow HEIs.[176]

It is important to stress that the similarities were due to the common ground of origin and not a concerted 'university college movement’. They were ‘far too haphazard in their origins’ and the motivations of those involved in their foundation were multifarious and complex.[177]

This had a significant impact on the relationship between the institutions. Their similarities were not something that they had designed, but a phenomenon that they had to discover. Berdahl suggests that their divergent histories meant that universities did not have a sense of unity and that this only started to change in the early twentieth century. The First Congress of the Universities of the British Empire was held in 1912 and Committees of Vice-Chancellors began to convene around this time.

It was the war that finally brought common interest. Universities had been ‘much disintegrated’ during the war. The pressing needs, shared by all such institutions, provided the catalyst for a ‘university system’, via the UGC. Recipients of grants were effectively placed in the same category as one another and had to consult one another too.[178]

Many of the reforms to higher education were legislative in origin and, as the nineteenth century progressed, the state was impressed upon to take an increasingly interventionist role in the development of universities and colleges, particularly in issues of finance. As with the founding of the new university colleges themselves, this took a piecemeal character and should be seen as a series of responses to changing circumstances rather than the progress of a committed policy. Indeed, from the earliest times, the state showed a disinclination to get involved. In the UK especially, it was considered ‘undesirable for the state to intervene and that the proper agents of this sort of reform were private-philanthropic’.[179]

However, changing national and international circumstances, along with an increased sophistication of colleges and universities, were to outstrip the capacity of private finance.

176. Vernon.
177. Mountford.
178. Berdahl.
179. Berdahl.

Public financing, firstly in an *ad hoc* fashion and, after the establishment of the Treasury Grant in 1889, in a statutory manner, became an essential component of funding for colleges.[180]

A central motivating factor was the increasing capacity of foreign rivals to exceed British industry. A complacent Britain had played host to the world at the Great Exhibition in 1851 but over the following decades fears grew in Whitehall, in boardrooms and in colleges that the country's economic pre-eminence was at risk. The issue was not that Britain had ceased to be productive, or even innovative, but that the rate of progress in other countries was growing. Officials were persuaded to cast envious eyes over the educational, training and research regimes in France, Prussia and Switzerland where the state took a more interventionist role and where, it was claimed, theoretical knowledge augmented practical experience, giving manufacturing a small but growing advantage. Arguments that were made in the abstract during the 1860s and 70s took on an acute status in the 1880s when the economic effects of the 'long depression' seemed to confirm that the threat was genuine.

The public financing of higher education was an expression of the state's need for the fruits of teaching and research, but it was also an expression of the need for larger and more secure streams of income to sustain local colleges. These motives worked in an interdependent manner, each supporting the other in making a broad case for state intervention. The core of this case was that having been established, the colleges were meeting or, with some assistance, were *capable* of meeting, the needs of the nation at large. These needs included maintaining national prosperity and competitiveness (for which an acute demand was identified in the 1880s) and in supplying the demands of other public policies, most notably in providing training to the teachers were required to operate board schools. A second, though hardly less important, element of the case was the inability of the colleges to meet this demand through private financing alone.

It is significant that public financing of higher education and research was made in response to an explicit argument of national need. Funding was provided not because higher education made Britain wiser in any general sense, but because it made the country richer, more competitive and more secure in its dominance over its rivals.

Albeit in a small fashion, national financing of higher education predates even the

180. . Treasury Minute, March 1889, appointing Committee on Appropriation for University Colleges in Great Britain; Memorandum, with Report; Treasury Minute, July 1889. House of Commons Papers Vol. 59, No. 250.

reforms of the nineteenth century. Robert Berdahl traces the earliest national educational grant to 1706, when existing Scottish commitments fell to the Treasury as part of the Act of Union. Although these grants were grandfathered to Parliamentary vote in 1831, they remained negligible in amount and a fossilised quirk of broad constitutional changes rather than evidence of intentional policy.[181]

A similar, though more historically significant, quirk was evident in state support for the administrative costs of the University of London, made from 1839 in recognition of the University's role as examining body for institutions designated by the government. This role, which led to the University being described as the 'Board of Examiners for the Empire' was intended to provide cover for the University acting as examiner for the rivalrous UCL and KCL.[182] It was an academic anomaly that nonetheless established a special administrative relationship with the state and set a precedent by which university institutions could fulfil a responsibility to the state in return for financial and administrative support. With the government assuming responsibility for the university's central administration, buildings and structural repairs, it set a further precedent with national government that would be mirrored at the municipal level with the founding of University College Nottingham forty years later. Colleges were also eligible for grants from the Science and Art Department, which had been founded after the Great Exhibition, though, as we have seen, this was piecemeal and merely part of a dispersal of funds that were also made to museums and other cultural institutions, rather than a systematic programme of research financing.[183]

In the early 1880s the Aberdare Committee on Welsh education recommended the founding of a college in Wales, with further such colleges to be established once intermediary education has reached a sufficient standard to prepare students for higher education. This would only be possible with direct state support. As the commissioners noted, 'towards the maintenance of the colleges, recourse shall be had to parliamentary grant. In no other way, indeed, so far as we see, will it be possible to maintain them'.[184] These recommendations were followed and University College Wales, Aberystwyth was granted £4000, with similar amounts awarded to Cardiff and Bangor Colleges on their founding.[185]

181. Berdahl p48.
182. Berdahl p24.
183. 'The Estate of the Commissioners for the Exhibition of 1851', in *Survey of London: Volume 38, South Kensington Museums Area*, ed. F H W Sheppard (London, 1975), pp. 49-73. British History Online http://www.british-history.ac.uk/survey-london/vol38/pp49-73 [accessed 4 July 2018].
184. Committee to inquire into Condition of Intermediate and Higher Education in Wales. Report, Minutes of Evidence, Appendix Command Papers C.3047 C.3047-I p.lxvi.
185. Berdahl p50.

Wales was undoubtedly a special case. Until the founding of Aberystwyth College, there had been no provision for higher education in the principality and, despite the enthusiasm of its founders, had 'failed to attract students in sufficient number', a situation that the commissioners attributed to the remoteness of its location.[186]

However, financial challenges were facing even those colleges with larger populations on which to draw. Owens college requested national aid in 1852 and 1872. This was denied. At the same time, and perhaps taking advantage of the changed economic atmosphere, the masters of the new colleges began to agitate in favour of greater public support for their work. By the mid 1880s, several colleges had erected buildings, recruited staff and admitted their first students (in Manchester's case, several decades before) and had therefore shifted from a foundational phase to an operational one. They were reaching the limits to which private donors and endowments could support the expansion of colleges, both physically and in the scope of their teaching and research work. This would require larger and more reliable support of a type that could only be provided by the state. Arguments in support of state financing flourished, with university and college leaders making strong, multi-part cases that, rather smartly, given the underlying mood, included the threat of foreign competition.

Writing to the *Times* in March 1887, Benjamin Jowett, the Master of Balliol College, set out the case for statutory support of university colleges, which he claimed had become the 'centres of educational hopes and interests to a whole district' that nourish 'the seed of national intelligence'. Jowett's primary argument in favour of the university colleges was that they were able to provide education to those otherwise unable to acquire it and that, given the precariousness of their finances, it was right for the state to support them, particularly as the country's neighbours were 'going ahead of us in technical skill'.[187] Jowett was a man of the ancient universities, but he was supported in his cause by Henry E. Roscoe, who had served as Chair of Chemistry at Owens College and was in 1887 Member of Parliament for Manchester South, who noted that the question was 'vital to the industrial and commercial supremacy of this country.[188] Roscoe's argument was supported in a leading article in the same edition, which claimed that 'our artisans are so much in need [of instruction] to enable

186. Committee to inquire into Condition of Intermediate and Higher Education in Wales. Report, Minutes of Evidence, Appendix Command Papers C.3047 C.3047-I p.xviii.
187. B. Jowett, 'The Claims Of University Colleges', *The Times* [London, England] 3 Mar. 1887: 10. The Times Digital Archive. Web. 9 Apr. 2018.
188. Henry E. Roscoe. "The Claims Of University Colleges." *The Times* [London, England] 5 Mar. 1887: 15. The Times Digital Archive. Web. 9 Apr. 2018.

them to carry on the struggle for existence against foreign rivals'.[189]

In May 1885 the issue was discussed at a national meeting of university college principals, held in Southampton. The leaders of the colleges in London, Birmingham, Newcastle, Nottingham and Southampton each put his name to a circular, making public the case for support. A separate, but again concerted, effort was made by Manchester, Liverpool and Leeds, operating jointly as the Victoria University. In 1889 the government accepted the arguments and made available an annual sum of £15,000 for the support of the university colleges with a Committee on Grants to University Colleges established to administer and control these funds.[190]

In the six decades to 1903, Nottingham had seen the provision of scientific pursuits coalesce from a small-scale, hobbyist (though not unenthusiastic) endeavour, to a permanent, professionalised and institutionalised system. It followed wider patterns of development that saw new colleges spread and thrive in industrial towns and the formation of distinctive urban cultures of institutionalised educational and intellectual activities that remain extant today. It was a step forward from the earlier phases of association and formalisation and achieved a new position of permanence. Nottingham was therefore, comparable to other towns and cities in England, but in the role of the local authority, it anticipated the use of public funds, public oversight and public conflict that would characterise the production of science from that point on.

University College Nottingham emerged from a culture of education and improvement that had been nurtured in the town for several decades. Its primary organisational innovation was to rationalise these disparate activities and bring them under the jurisdiction of a single administrative authority. This mirrored similar processes that were taking place in other large town at the same time, and which resulted in a national pattern of university college institutions that carried on several of the functions of full universities.

These developments were made possible by the blending of public and private money. It was an age of philanthropic capitalism and several wealthy individuals elected to use their fortunes to establish seats of learning in an effort to secure admirable legacies. However, the rising cost of research drove the necessities of support out of the pockets of even the wealthiest plutocrat and, as the twentieth century dawned, an increasing need for public

189. Leader, *The Times* [London, England] 3 Mar. 1887: 9. The Times Digital Archive. Web. 9 Apr. 2018.
190. Shinn p23.

financing was evident in the sector. This would lead to questions and debates over the extent to which the financing of research and education implied control of it. This question would continue to be debated in the 1900s and 1910s and would receive an acute test during the First World War when the state had an urgent need for the fruits of research and research institutions had an increased reliance on state support.

By the end of the nineteenth century, an identifiable wave of new university colleges had been founded, chiefly in large industrial cities, and, as the twentieth century dawned, had become successful and sophisticated enough to demand the Royal charters that gave them the right to confer their own degrees and to describe themselves formally as universities. These new institutions were established in order to meet a demand that Oxbridge could or would not supply. The ancient duopoly was still classics-minded and little more than a 'finishing school' for the upper classes.[191]

These colleges were the outcome of the intellectual vigour and enterprise of the provinces and were among the chief institutional products of the Victorian industrial city. They were founded to serve a ‘provincial, bourgeois constituency’ and reflected the educational concerns of this commercial and professional class.[192] The role of such men in these enterprises, and the siting of the colleges in the ‘philistine’ towns of the north and midlands earned the disdain of traditional cultural elites and the Arnoldite liberal educators of Oxbridge and the public schools, but, as we have seen, there was a lively and productive intellectual culture in provincial towns, driven by non-conformists, who had been excluded from traditional higher education.[193] These founders had a 'vision beyond what was of immediate utility’ and were a concrete expression of the desire to provide a ‘morally enriching’ education to provincial youngsters.[194]

Education for its own sake had been the driving force behind the literary and philosophical societies and the extension lecture schemes and continued as part of the programme of activities for the colleges. Middle class women were prominent in this regard; social and familial constraints made it difficult for them to travel far from home and they therefore created a permanent local demand.[195]

Despite the justified protestations that the new colleges had a proper interest in liberal

191. Green.
192. Whyte p111.
193. Vernon p95.
194. Mountford.
195. Vernon p96.

education, their growth and spread was driven principally by utility. In this, they can be regarded as a response to two related demands; the formalisation of professional training and the increasing need for advanced technical instruction and applied research that was then being conducted by specialist research institutes in Germany and France.[196] This work was significant source of income for the colleges, a justification for their existence and, crucially, set a precedent for state financing of higher education. Perhaps more significantly still, meeting these demands helped to establish the colleges as vectors of national competitiveness.

196. Paul Vallance, Chapter 2 'The Historical Roots and Development of the Civic University', in John B. Goddard et al., eds., *The Civic University: The Policy and Leadership Challenges* (Cheltenham, UK Northampton, MA, USA,).

Chapter Two: The Origins and Growth of University College Nottingham

Introduction

The early history of University College Nottingham can be divided into four distinctive periods, with each one representing a different phase of development.[197] This section has been structured to reflect the first three of these phases, with sections that examine events in Nottingham and further afield in each one. The fourth phase, which covers the war years themselves, forms the bulk of the thesis and will be addressed in subsequent chapters.

The first section covers the years from around 1820 to 1881, a period that may be considered the 'prehistory' of University College Nottingham. During this time, the wave of educational and cultural initiatives described in Chapter One took root in Nottingham, responding to, and ultimately creating and sustaining, a culture of education that provided the impetus for the founding of permanent colleges, aided by the breaking of the long-standing English university duopoly of Oxford and Cambridge. Nottingham saw several educational initiatives in these years, including the founding of the People's College, the Mechanics' Institute and the School of Art. Towards the end of this phase, plans were established to found a permanent college in Nottingham, with private and public finance.[198] The establishment of UCN and particularly the involvement of the council, is examined in depth. This period ends in 1881 with the formal opening of UCN.

The next period covers the years from 1881 to 1903, when the College begins the work of educating its students and establishing itself both as a local institution and as part of a nascent system of similar colleges in industrial towns in England. Permanent operation created new challenges for these colleges, which struggled to assert an identity and purpose, finding roles that were sometimes at odds with the declared aims of their founders, and facing financial uncertainty.[199]

In this period, longstanding concerns about the country's capacity to compete with foreign rivals were given a new urgency by economic recession and the colleges found a new purpose in raising productivity. Calls were made from several quarters (not least the colleges themselves) for the government to provide financial support to the colleges When, in 1889,

197. Wood.
198. Becket.
199. Green.

an annual Treasury grant was instituted, it brought with it some financial security but also a new relationship with the state itself.[200] UCN, which had been founded and maintained with public funds was perhaps pioneering in this, but the years were no less difficult.[201]

The period was also innovative in terms of college organisation and governance. There were experiments with federalisation, in which several colleges would aggregate into a single institution. The Victoria University, which comprised Owens College in Manchester, University College Liverpool and Yorkshire College in Leeds, was perhaps the most successful example.[202] This trend, having been intended to combine the powers of growing institutions, would be later considered by UCN. However, in the final years of the nineteenth century, a more pressing concern was its relationship to the Council. UCN also aimed to strengthen its position and was able achieve a charter of incorporation, establishing it as an independent institution.[203] The awarding of this charter, in 1903, caps this section.

The next period (1903-1914) took UCN from the awarding of its charter to the outbreak of war. This section describes the college's ordinary operational conditions during the Edwardian era, examining its governance, finance, curriculum and demography of its students. It also assesses the college's expectations for further development and reform and its ambitions, both realised and thwarted. The first decade of the twentieth century saw a flurry of Royal Charters being granted to select colleges, converting them into full universities with the authority to award their own degrees. UCN was, however, unable to secure this status for itself, creating a distinction between it and comparable institutions in Birmingham, Manchester and elsewhere.[204] In these terms, these were perhaps years of disappointment for UCN, but they were also years of development and growth. A particular innovation was the establishment in 1909 of a contingent of the Officer Training Corps (OTC), giving students the opportunity to receive military training.[205] The militarisation of higher education is a further example of how colleges contributed to the aims of the state and looks, with admitted hindsight, ominous. The section, and the chapter itself, concludes at the end of the 1913-14 term, and the eve of war.

Part One: The Idea of a College 1820-1881

200. Berdahl p51.
201. Green pp116-117.
202. Jones.
203. Wood p43.
204. Wood p44.
205. Becket p53.

The nineteenth century's culture of education had, from an early stage, fostered calls for a permanent college in Nottingham. A.C. Wood dates the earliest such call to December of 1851, when Hugo Reid, one of the guest lecturers at the Mechanics' Institute, 'pleaded for a "collegiate institution" in Nottingham, where men and women past school age might be educated up to the age of 21-22'. Also present that evening were Richard Enfield and Alderman Louis Heymann, who would repeat the call in 1867, following the re-opening of the Mechanics Institute after a fire, expressing the hope that the Institute might 'become the future university of the operatives of Nottingham'.[206]

The founding of such an institution had a natural logic. The educational and cultural atmosphere of late nineteenth century Nottingham had proven the demand for higher education while the multifarious efforts of each committee, society and institute had established the personal and organisational infrastructure necessary to provide it. However, it would take an acute catalysing event to realise a permanent institution. Such an event occurred early in 1875 in the form of letter from Enfield to S.G. Johnson, Town Clerk of Nottingham.[207]

In this letter, Enfield presented himself as the agent of an anonymous friend who would be prepared to provide an endowment of £10,000, the income from which would be used for the remuneration of lecturers.[208] This gift would be conditional on the town corporation erecting a building which could then be used, rent free, for the hosting of the lectures. Further conditions were set. Firstly, that the building must be raised within a year, secondly that the chosen site must satisfy both the Syndicate of the University of Cambridge and the donor himself, and thirdly, that the lectures there given must be authorised by a syndicate of Cambridge and Oxford.

The ideal building, Enfield's letter suggested, would comprise a lecture theatre for 500-600 people, two classrooms seating 150-200 persons, a small room for a library, a chemical laboratory, and residence for one resident lecturer. Furthermore, the building should be planned with a view to subsequent extension.[209]

This intervention was received with interest by the corporation and a series of

206. Wood p7.
207. University of Nottingham Manuscripts and Special Collections (UNMASC) UCN/E/1 Letter from Richard Enfield to S.G. Johnson esquire, Town Clerk of Nottingham; 4 January 1875.
208. The identity of the donor has never been formally revealed. A.C. Wood makes the claim that it was the son of Alderman Louis Heymann, who had a known close association with Richard Enfield.
209. UNMASC UCN/E/1 Letter from Richard Enfield to S.G. Johnson esquire, Town Clerk of Nottingham; 4 Jan. 1875.

negotiations were commenced via a subcommittee established for the purpose of reviewing the proposal. These negotiations are recorded in the public archives and provide an insight into the motivations of the engaging parties and the purposes for which the college was founded.

The use of public money to support higher education and research, and the implications that this had for state direction and control, would be a theme of increasing importance in England and Wales generally. In the early case of University College Nottingham, the issue was born of necessity, rather than a particular philosophy of public-private collaboration. Although it had men of means and evidently a population sufficient to sustain higher education, Nottingham lacked the advantages of larger towns like Manchester, Birmingham and Liverpool. Its local industry, lacemaking, 'did not produce the vast fortunes which lay at the disposal of the Lancashire shipping and cotton magnates or of the great iron and steel masters' and its philanthropic class had somewhat shallower pockets than major donors such as Charles Beyer, Josiah Mason and Mark Firth.[210] Hence the need for the Corporation to become involved.

Early discussions concerned the location of the proposed building and the Corporation, quite naturally, began by examining land that was already within its purview. It appears that consideration was given to several of the open spaces that had been left under the control of the Corporation by the Enclosure Act but in response to the Council's enquiries, Edwin Patchitt, Clerk to the Enclosure Commissioners, advised that erecting permanent buildings on any of these sites, Sherwood Street, the Meadow Parks and two pieces of land on St Ann's Hill, would be a 'violation of the express understanding upon which they were allotted to the Corporation and a breach of that good faith which one public body ought ever to keep with another'.[211]

Thoughts then turned to the idea of using Nottingham Castle, which had already been leased to the Corporation by the trustees of the Duke of Newcastle for a term of 500 years. The proposal for the use of this site, which would 'form one of the most attractive features of the county', offered several advantages. Firstly, the capacity for further extension, which had been a stated aim in Enfield's letter. Secondly the appropriateness of a location 'so rich in historical associations and which presents so noble a site as an appropriate home of literature

210. Wood p23.
211. UNMASC UCN/E/1/2 Letter from Mr Patchitt, Clerk to the Enclosure Commissioners to S.G. Johnson esquire, Town Clerk of Nottingham; 16 Feb. 1875.

and science'. Thirdly, the ease of access from the districts of Nottingham, Radford, Basford, Lenton and Beeston and the closeness of the market and the railway stations, 'from which communications extend to every place of any importance in the Midlands Counties'. Fourthly, cost. The use of any site nearer to town would require the costly pulling down of existing buildings and would add an estimated £20,000 to the project. Finally, the remoteness of the Castle from the town's business district, made it a location where 'quietude would reign and the whole place that within its own walls, would always have the classical air of a university'.[212] Despite these manifold advantages the donor declined the suggestion on the grounds that the Castle site was 'not sufficiently central'. He did, however, offer to extend the deadline by which the building should be ready 'from one year to two'.[213] The committee continued its process of shortlisting, looking for more central venues, but with the need for a quiet, educationally appropriate location remaining on their list of criteria.

While discussions were under way on the siting of the proposed venue, related negotiations were had over the division of financial responsibility. These negotiations would prove decisive. It was on this question that control of the proposal, and of the ongoing operation of the College, passed from the donor to the Corporation and where, as a result, the College became a public concern, rather than a private one.

Central to this transfer of initiative was the question of where the authority for steering the project should lie. The Committee expressed concern that, by following the plan set out in Enfield's letter, the Council would be taking responsibility for a scheme 'without adequate control in its management', which would be unacceptable given the expected immediate and ongoing financial commitment.

The Committee also raised objections to extensive control remaining in the hands of the donor, who, once the enterprise was under way, would 'contribute only a portion' towards it. Further objections were made to the requirement that the new building be subject to the approval of the Syndicate of Cambridge, on the grounds that it was a 'distant body', and such power should properly reside with the local authority.

The issue of control was also central to the plans for the management of the College. An initial draft of the management scheme consisted of a board formed of 'persons chosen by the Council from their own body; persons chosen by the town and neighbourhood; the Donor; the

212. UNMASC UCN/E/1/4/2/1 University Extension: Reasons for the Choice of the Castle Site 26th Feb. 1875.
213. UNMASC UCN/E/1/4/3 Letter from Richard Enfield to S. G. Johnson, Town Clerk, Nottingham, 5th March 1875.

Chairman and Vice-Chairman or some other member of the school board, the Head Master and Second Master of the High School and persons chosen by the voluntary subscribers of the lecture fund'.[214] Objections were raised on the grounds that the Donor and the Council, as the sole funders of the scheme, should control its management. Furthermore, it was undesirable for management to become too complicated, thereby obscuring public understanding of where responsibility lay should the project fail. Concerns were raised about the inclusion of the lecture fund donors, an uncontrolled caucus that could 'carry the committee' if it became too numerous.

The common theme to all these objections is the disinclination on the part of the local authority to share responsibility with, and relinquish control to, other agents and individuals. Through these negotiations, a scheme that had been commenced by a private individual, was increasingly becoming a public enterprise. From this point on, the initiative was with the Council, rather than Enfield's man, who simply assented to the Council's objections. Although he would continue to be involved in the development of the College, this would chiefly be in areas directly touched by his money. He would have the right of approval to specific lectures given in Language, Literature, History or Science that would be financed by the £10,000 donation. Should the College scheme fail, he would have an interest in the design of the building, and he would be granted, in the person of his agent, a seat on the management board. Control of the enterprise and primary responsibility for its financing would from here on in lie with the Council.

A scheme was drawn up, with the Council in formal control. The donation was to be used to finance building work while the operating costs were to be met directly from Council funds at the rate of £400 per annum. The operation of the college would be the responsibility of a management board, consisting of thirteen Councillors, five persons chosen by the Council from the town and neighbourhood, the donor, represented by Mr Enfield and persons chosen by the voluntary subscribers to the lecture fund in the proportion of one to every £50, to a maximum of four persons in total.[215] Of a board totalling no more than twenty-three members, eighteen would be Councillors or their direct nominees.

So it was that the College became the product of the Council, which was responsible for its upkeep and which, though its inbuilt majority on the management board, had control of its

214 UNMASC UCN/E/4/1 Scheme of Organisation of Nottingham University College 7 Jan.1879.
215. UNMASC UCN/E/1/15 Further Report of the Committee Appointed to Advise the Council with Reference to the Offer of an Anonymous Donor to Invest £10,000 for Public Purposes Under Certain Conditions 18th October 1875.

operation. The enterprise was launched. Nottingham was to have its College and it was to be a public organisation.

An immediate effect of this 'municipalisation' was that other civic concerns could be addressed under the same scheme. While the plans for the donation were being considered, and with suspiciously convenient timing, the Free Library and Museum Committee reminded the Council of the 'want of accommodation in every part of the Library and Museum', which had temporary rooms, 'admitted to be totally inadequate'.[216] Even more conveniently, the necessities of the Library and Museum, namely a lecture theatre, classrooms and a laboratory, were within the donor's designs for the college. Warming to their theme, the Committee further observed that 'the accommodation which is afforded for the Public Analyst at the Municipal Offices is very inadequate'. Their efficient solution was to 'bring into one place the Municipal Laboratory and the proposed new laboratory to be built for the University Extension Scheme'.[217]

One formal proposal went even further and suggested a combined block of public buildings comprising the Sessions and Police Courts, the Free Library, Museum and University, and the Town Hall and Municipal Buildings at an estimated cost of £220,000-£230,000. However, it was not considered desirable at that time for the Town Council to reside in the same location as the educational buildings.

Setting the library, museum and college on the same site, however, was deemed appropriate and land was finally selected on Shakespeare Street in Horse Fair Close, which, being under the control of the Corporation already, was available at no cost and would meet the other criteria set by the donor. As with the earlier proposal of the Castle, this site offered among its advantages the possibility of 'striking and attractive architecture' that would, by combining the three purposes, create a 'centre of educational influence'.

Combining the library, museum and college was therefore more than merely a scheme to exploit the donation to solve other accommodation problems and to make efficiencies in the public provision of learning and culture, it was an expression of ambition. What started out as a scheme to supply a few rooms for lectures became a multi-purpose public institution, even an embryonic university. Indeed, it was the germ of a particularly modern type of university which, with its attached free library and museum of natural history, could flatter itself that it

216. UNMASC UCN/E/1/6Borough of Nottingham Report of the Public Buildings Committee 30th September 1875.
217. UNMASC UCN/E/1/6 Borough of Nottingham Report of the Public Buildings Committee 30th September 1875.

offered benefit and betterment to an entire town, not merely those who were able to enrol as students. More significantly, it cast in stone the idea that an expansive seat of education and research could effectively belong to the public, a Victorian idea that would become an issue of some consequence in the twentieth century.

In a period during which colleges were founded in several towns, what made Nottingham unique was this early and intensive involvement of the town corporation. In this, Nottingham may be considered pioneering and set a municipal precedent for the later governmental interest in higher education and research. In 1881, 'what the state did not yet venture to undertake, that a municipality dared to do'.[218]

However, the support of the Council was contingent on it having 'adequate control' of the College. In practice, the control held by the Council was considerably more than merely 'adequate'. The five non-council members were appointed and included prominent personalities such as Dr Paton, Dr Ransom and Mr Rothera, but in some years, as few as two names were appointed. The presence of the lecture fund representatives soon lapsed, partly in consequence of the reduction in value of this income compared to other sources. An affiliation with Oxford and Cambridge in the early 1880s came with a requirement for representatives of these universities on the board but this proved to be in an absentee capacity for the simple practical reasons of distance and of suitable Fellows necessarily having more pressing duties elsewhere.[219]

In budgetary terms, and therefore in all practical terms, the College was effectively a department of the Council and appeared in Council records among 'such matters as gas, water, public baths, parks and burial grounds'.[220] To be sure, the College would not have existed without Council support but its resulting place on a public balance sheet carried with it certain risks. Chief among these was the question of return on investment. Councils serve at the pleasure of their publics and, while the progress of students is relatively easy to measure, through exam results and destination, the focus of topics and selection of academic subjects is of a less tangible quality and not always easy to justify to 'men brought up to believe in in the sharp and prompt discipline of the purse strings'.[221]

The view that the councilmen were shrewd custodians of public money was by no means

218. Becket p43.
219. Wood p33.
220. Wood p33.
221. Wood p34.

universal. Mr Alfred Wootton, a lace manufacturer, standing for council election in St Mary's Ward claimed at a hustings that the composition of the council with a large majority, had led to extravagance in expenditure. The chairman at this meeting suggested that it was not so much a contest of Conservative vs Liberal as economy vs extravagance. He had been told that the cost of UCN had been £120,000, which was a very 'great and serious matter for the town'. The building was 'scarcely large enough to meet its requirements' and was too elaborate in design. Wootton claimed that a plainer building, of twice the size, could have been erected for half the cost and would have served the ratepayers better.

Thus, the immediate impact of the use of public funds was that a high degree of accountability was required and positions on the college council were given *ex officio* to members of the corporation. The relationship between the college and elected government was close from the outset. This had an effect on the management and purpose of the college, which 'was the child of the corporation, dependent on a body whose point of view is industrial, rather than scientific'.[222] In this, the College might be seen to have had an instrumental purpose, somewhat at odds with the elevated, liberal-educational ideals of which its founders liked to boast.

The new college had three explicit aims at its foundation. Firstly, to carry on the extension scheme that had been offered in Nottingham. Secondly, to further the teaching of technology and thirdly to prepare students for residence at one of the older universities.[223] This already suggested a broader purpose than that intended by the donor, whose stated goal was merely to ensure the continuation of the extension lectures. The provision of education, like the founding of the College itself, expanded in the delivery and, like the founding aims of the College, reveal something about what the goal of the College actually was. Education was offered then, as it is now, with the intention of achieving an ulterior purpose. The question was, what should that purpose be?

On the one hand, education was a good in and of itself. The initiatives to increase the availability of education in the industrial towns were product of the Victorian zeal for personal and collective improvement (and, relatedly, of the horror of a descent into dissolute lifestyles). The earliest organised educational initiatives were led by churches and radical reformers, who saw education as a core component of their wider mission, whether religious

222. Becket p40 (Becket attributes to this the fact that, as of 1928, UCN is alone among such institutions in having no representation of its teaching staff on the Court of Governors).
223. Wood p20.

or political in nature. In this view, instrumentalist education, such as training in the skills required by industry was, at best, a mere by-product of reforming education and at worst a distraction that threatened to undermine this higher purpose. It is a Thomas Arnold-esque ideal that holds the object of education to be to produce a morally upright, temperate and responsible citizenry whose teachers pursue knowledge with the pure aim of satisfying human curiosity.

Against this view is the harder-edged Gradgrindian objective of providing education as a means of increasing economic capacity. The primary motivation is exceeding the competition, whether a rival business or a rival nation. In peacetime, the effectiveness of such scholarship would be measured by the increase in profits, in a time of war, it would be measured by victory.

The distinction between the two aims was a symptom of a deeper question about what the guiding purpose of the institution should be; whether to provide a morally uplifting education or to coldly meet the needs of industry and employment. The aims are not mutually exclusive in a single institution and both purposes were present in University College Nottingham from the outset, but the degree to which one purpose was favoured over another provided a tension and debate about the benefit that the ordinary ratepayer received in return for their investment. It is a debate that would recur, indeed, still recurs, in discussions of public financing of research and academic freedom. It was addressed, in part, by the Haldane Commission and would face a particularly acute test at the onset of war. Nottingham, with its distinctively public funding model, encountered this debate early on in its development. It can be detected in the negotiations about where control of the institution should lie.

The duality of purpose was recognised by the Mayor of Nottingham, Edward Gripper, whose address on the opening of the College expressed the view that it would ’strengthen and develop not only the intellectual vigour but the material welfare of this prosperous town’[224]

The ‘idealised purpose’ model was the one held by the college’s memorialists of the mid 20th century. Edith Becket stressed that education offered a 'mental awakening, a widening of outlook, which gave promise that higher ideals and new values would penetrate into the civic life of the future', while Frank Granger described the College as the ‘home of savants...men whose profession it is to pursue scientific research without immediate reference

224. ‘The Opening Ceremony’ *Nottingham Post*, Thursday 30th June 1881.

to practical advantage'.[225]

Part Two: The College in Operation 1881-1903

At its opening, University College Nottingham was divided into two departments, Arts and Science. It had four professors, each one chairing a subject area, Arts; Physics, Mathematics and Mechanics; Chemistry and Metallurgy and Natural Sciences. Three of the Chairs were Cambridge men, a fact that A.C. Wood attributes to the existing link between the town and the extension lectures and also on the emphasis on science.[226]

The professors were supported by six lecturers and demonstrators for the government science classes that had been transferred from the Mechanics' Institute. The staff were thinly stretched and, as a result, it was only possible for education of the most elementary kind to be given. In the early years, Wood notes, the College performed 'the functions which we associate with secondary or grammar school education rather than with a real academic institution', taking students from the age of 14 for the first two years before the age requirement was raised to 16 and offering a programme of study that was largely consistent with that of a twentieth century secondary school.[227]

Although this fell short of the 'university type' education that had been proposed for Nottingham, it should be seen, not as evidence of deficiency but of the institution responding to the necessities of its environment and perhaps also of the admirably elevated ambitions of the founders. While higher education was a laudable goal, the general national provision of secondary education was inadequate for the purposes of preparing youngsters for it and would remain so until the twentieth century.

However, what the College was able to contribute was the preparation of students for external examination and onward study. Students who completed a course of lectures and classes were entitled to take an examination for a Cambridge certificate. Certification in six extension courses qualified a candidate for a Vice-Chancellor's certificate.

A formal affiliation with the universities of Oxford and Cambridge gave Nottingham a role in the 'ladder', by which students might ultimately qualify for a bachelor's degree. A three-year course of study at Nottingham, would, on the passing of the relevant local examination, permit a student to skip the first three terms of residence at one of the ancients.

225. Frank Granger, *Memorials of University College, Nottingham* (Nottingham: 1928) p4.
226. Wood p25.
227. Wood p26.

This was an initiative more symbolic than practical as very few of Nottingham's students had the means to take advantage of the scheme. It is likely that those with sufficient resources would have taken the shorter route of attending the full university from the outset.

Nottingham's relationship with the University of London proved a stronger one. Nottingham's role in this partnership was initially to prepare students for matriculation at London but a responsibility for preparing students for formal London degrees became increasingly prominent. The first degree awarded to a Nottingham student was Henry T. Saville's BA (1884). Louise Appel was awarded a BSc in 1886-7. Higher degrees soon followed, with Cyril Shelbourne's MA (1897) and, in 1894 the institution's first claim to a doctoral degree was made in the name of E.H. Barton, one of the physics lecturers.[228] These successes represented a trickle, rather than a flood, but they proved the capacity of the institution, and its students, for this level of success.

Reflecting again the economic environment in which it sat, the College enjoyed great success in technical and commercial training. Appropriately for Nottingham, this work began with classes in lace and hosiery. Support for an expansion of technical training was sought from the Drapers Company of London, which supplied £300 per annum for five years, along with £200 for equipment for teaching mechanical engineering.[229] Further donations from Mr Jacoby of the town council and from the estate of Mr F.C. Cooper enabled the College to establish in 1883 a school for the teaching of joinery, fitting, turning and foundry work.

The end of the decade witnessed a brief industrial depression in Britain and with it, once again, rose the spectre of foreign competition. A case was made for British training as deficient in resource and output, when compared to that of France or Germany and that radical steps would be required to close the gap. The Technical Instruction Act (1889) operated on a similar basis to the Library Act in that it empowered local authorities to levy a penny rate for the provision of technical training. In a near-rerun of the efforts to establish the College, local individuals and agencies lobbied the Council to avail itself of this opportunity to improve provision. Again, private money acted as the spur for public funding: the Drapers Company offered £4000 to the scheme and Mr Cooper's trustees added a further £5000, prompting the Corporation to find an additional £6000. These funds provided for the construction of dedicated buildings, representing the first extension to the College originally

228. Wood, p26
229. UNMASC UCN/E/3/7 Letter from W. Sawyer of the Drapers Company to S.G. Johnson, Nottingham Corporation; 24 May 1882

hinted it in Enfield's letter, along with equipment, materials and staff including a new Chair of Engineering.

Training in coal mining appeared at the end of the 1880s and reflected the broad catchment area for the College, which expanded beyond the immediate environs of the town (and the jurisdiction of the Council) into the wider East Midlands. This endeavour, which began as a series of lectures, was consolidated at the turn of the century into a formal course to prepare students for government mining certificates. Agricultural training was also briefly offered, again with the benefit of the Technical Instruction Act, but in 1900 this role was transferred to the Midland Agricultural and Dairy Institute at what would one day become the Sutton Bonington campus of the University.

White collar training was also provided for, with the development of a commercial department, established with the support of the Nottingham Chamber of Commerce. Here, students were taught subjects such as bookkeeping, mercantile law, shorthand, commercial arithmetic and modern languages.

The most significant branch of vocational training was that of elementary teachers. This, like so much else in this period of the College's history, began in a small way with 'a few evening classes on the science of teaching and school management' but developed into a formal Department of Education.[230] The Cross Commission of 1888 had recommended the training of teachers at university institutions rather than dedicated training colleges and, in 1890 day training colleges were established at universities, including at Nottingham.

From the very beginning, the College was predominantly an evening institution. The first enrolment in 1881 consisted of 381 day students, compared with 623 in the evening. Of the day enrolment, a comfortable majority (287:94) were women.[231] These divisions were indicative of the College's catchment, primarily working-class men whose responsibilities precluded their attendance in daytime.

However, the outputs of a college are not like the operation of gas, water and other utility services. For this reason, the blended funding system, while necessary for the launching of the College, brought with it difficulties of mission that lasted through the first phase of the College's life. The committee of management, on which the academic staff had no voice, expected value for its money and 'had an inadequate appreciation of the conditions needed

230. Wood p31.
231. UNMASC UCN/S/1/1 Register of Students in Science and Art Classes; 1881-1886

for academic work'.[232] The effects of this are best illustrated in the unhappy case of the Rev. John Frederick Blake, who was appointed the first Professor of Natural Sciences. In addition to this role, he was also expected to act as curator of the natural history museum, duties for which he was given no assistance.[233]

Despite his best efforts, Blake found the workload too great. However, when he came to dispute his income, he discovered that his £400 p/a was (so far as the Council was concerned) made up of two separate payments: £250 by the College Committee and £150 by the Museum Committee. On complaining at his workload, Blake found that the museum portion of his duties was simply hived off and the £150 used for the employment of a separate curator. This left the unhappy Blake with his £250. The council increased this to £300, which meant a pay cut of 25% and leaving Blake earning three quarters of the amount of his fellow Chairs.

Blake, who was apparently something of an abrasive figure, took out his frustrations on Mr JW Carr, his successor as curator. He refused to hand over the key to the building and did not desist until the Town Clerk intervened personally. This was not the end of the matter. The young and enthusiastic Carr took inspiration from other museums and attempted to re-organise the collections. His efforts at rearranging the invertebrates were the final straw: 'it would destroy the scientific character' of the collection, according to an enraged Blake.[234]

Blake left the College at the end of the 1880s and, following a gap of five years in which the Chair was vacant, he was replaced as Chair of Natural Sciences by Carr. In direct contrast to his predecessor, Carr remained mentally an entomologist and a museum man. Although he remained in post from 1893-1927, and did well in his insect-based work, he did less well in botany, offering lectures that ran suspiciously close to the textbooks, word-for-word.[235]

The late 1880s offered a turning point. Firstly, a Board of Professors appointed, with a plan for the professoriate to take turns as Principal. The first office holder was Frank Clowes, the chemist. The board was given an observer's seat on the main committee but enjoyed no voting rights and control remained with the local authority men.

A more significant breakthrough came with the institution of the central Government grant in 1889. This assistance, provided to all new colleges, helped Nottingham a great deal.

232. Wood p26.
233. UNMASC UCN/E/8/12 Professor J.F. Blake's report on the arrangement of the Museum, with reference to a local collection; Mar. 1882.
234. UNMASC UCN/E/8/17 Letter from Professor J.F. Blake concerning a dispute with the museum committee; 5 May 1885.
235. Wood.

The grant came, inevitably, with the requirement to open itself to government inspection. Here, Nottingham did well. Reports were excellent and central funding steadily increased. Then came the strings. Unhappy at the involvement of the local authority (effectively doubling the use of the public purse), the inspectorate recommended that the central funds be made conditional on the College being given formal independence. This was achieved in 1903 when the College was chartered as an independent institution and the age of the local council was brought to an end.[236]

Part Three: A Chartered College in a Sea of Chartered Universities 1903-1914

In the very early years of the century, the atmosphere at UCN was characterised more by what was happening at other colleges than by anything taking place at Nottingham. Mason's College was chartered as the University of Birmingham in 1900, Manchester and Liverpool each received a charter in 1903, thereby fracturing the nascent Victoria University and leading to Leeds seeking its own charter in 1904. Sheffield followed suit in 1905.[237] The way ahead for Nottingham seemed obvious.

There were, however, significant differences between the situation at UCN and other colleges. At the time of its incorporation, the City Council noted that at its founding, 'sums amounting to about £13,000' had been subscribed from external sources. Since then, no further donations had been made and 'practically the whole expense of the college had fallen on the Council', in contradistinction to other colleges, for which 'the local benefactions had been very large'.[238] This situation, it was alleged, was the result of the Council's involvement, which left 'little inducement for the citizens of Nottingham to make large donations or endowments, because they were aware that whatever needs the College had would be supplied by the Council'.[239]

1906, which saw the College celebrate its twenty-fifth anniversary, was seized as a moment to push the case. Frank Granger, the Professor of Classics, provided a series of articles in the local press, in which he set out the case for the establishment of a university in Nottingham as 'simply following out its natural development'.[240] Granger offered a multi-pronged argument, encompassing the history of Nottingham and the very meaning of the

236. UNMASC UCN/G/1/2/2 Printed copies of Charter of Incorporation; 27 Aug. 1903.
237. Wood p44.
238. *Nottingham Evening Post,* Monday 2nd March 1903 p6.
239. *Nottingham Evening Post,* Monday 2nd March 1903 p6.
240. *Nottingham Daily Express*, Tuesday 23rd October 1906 p4.

word ‘university’. His argument was bolstered by a claim that UCN was ‘already a university in the technical sense…performing the functions of a university in all respects, so far as the preparation for examinations is concerned’. Gaining the authority to confer degrees was, he averred, ‘of much lesser importance than the actual work which the college is now doing the preparation of students for their examinations’.[241] For Granger, the chief innovations of university status for UCN would be to make it ‘the home of research’ and a ‘university for the working man’. The 1903 charter did not ‘contemplate research as one of its objects’, the free movement of thought and speculation being only really available ‘only under the shelter of a university’, while, given Nottingham’s demography and economy, be driven by its relationship with, and capacity to serve the needs of, its parent town.[242] These themes were explored in some follow-up articles, in which Granger offered his case at some length. It was here that he presented his critical objective in addressing his readership, the need for additional support. Acknowledging the ‘contribution made by the city’, Granger expressed the view that this was ‘no adequate reason for the serious lack of gifts towards endowment’.[243] The institution was in need of an astronomical and meteorological observatory, which would also benefit ‘independent workers’ in the locality, while the physics department had a ‘pressing need’ for additional classrooms.[244]

Granger’s extensive case for support did not meet with universal welcome. An Edward Dean Marriott wrote to the newspaper to express his disdain for the proposals, which he described as a ‘joke’, requiring the ratepayer to cover the £50,000 costs, and which, contrary to Granger’s assertions, would not offer any real benefit to the locality. Indeed, laying temptation for the workman to ‘leave his bench for the struggle to attain a degree in the arts’, was a cruel act and evidence of Granger’s heartlessness. To support the claim that there was no demand for higher education for working men, Marriott referred to the case of a local manufacturer, Ernest Jardine, who had offered to pay college fees for ‘hundreds of youths in his employ’ had not received a single positive response.[245] In a later letter, Marriott suggested that ‘the only advantages that might accrue from Granger’s amazing scheme were the elevation of the status and the increase in pay of the professors’. ‘It was’, wrote Marriott, ‘no part the duty of the poor Nottingham ratepayers to provide university careers for the sons of wealthy men far and near, or enter into competition with other towns and cities in the

241. *Nottingham Daily Express*, Tuesday 23rd October 1906 p4.
242. *Nottingham Daily Express*, Tuesday 23rd October 1906 p4.
243. *Nottingham Journal,* Tuesday 30th October 1906 p5.
244. *Nottingham Daily Express,* Tuesday 6th November 1906 p5.
245. *Nottingham Daily Express,* Friday 30th November 1906 p8.

provision of such facilities.[246]

The impression of the College administrators as self-absorbed and profligate was not helped by a crisis that emerged in 1910. The Board of Education found some inconsistencies in the reports that the College was obliged to submit as a recipient of the Treasury grant. Single students in the natural sciences who took three subjects were counted as three separate individuals, effectively making a triple count that inflated the figures. Although a junior member of staff spotted the error, the issue passed the Registrar's notice, the figures were submitted, and the standard grant issued on that basis. Although this was an error, rather than deliberate fraud, the 'culpable carelessness' of the Registrar, and by implication, the Principal, was a matter of 'grave import'. The two men were compelled to resign, and a series of administrative reforms were forced upon the College.[247]

Naturally, these changes began at the top. W.H. Heaton, the Professor of Mathematics and Physics was appointed as Principal and his fellow physicist, Thomas Porteous Black took the position of Registrar. Serious consideration had been given to appointing an outsider as Principal, so the decision to select a Nottingham man reflects a desire to apply incremental change, rather than root-and-branch reform. Certainly Heaton, whose initial term of one year ultimately became nineteen, operated under a 'mandate to go slowly and cautiously'.[248]

That is not to say that significant changes were completely off the agenda. The Board of Education's post-crisis inspection of the College found that its teaching was 'of a quite elementary character', that the evening classes were below the standard of a degree or diploma and that too many under sixteens were admitted. In short, the College was producing work better suited to a school than a college. The Board recommended more differentiation in academic work. Chairs of History, Economics and Geology were appointed. The raising of the minimum age to sixteen and the removal of day matriculation classes saw the number of day students fall from 607 in 1909-10 to 421 in 1910-11, with a further fall of evening students the following year (1,718 to 1,302). Such drops were costly, but necessary. Such reforms prevented the College from 'slipping back into a mere technical institution' and made talk of reconstitution a plausible, if distant, ambition.

The pursuit of a charter to grant full university status was the dominant ambition of the College in the first years of the twentieth century. The leadership of the College noted, with

246. *Nottingham Daily Express*, Wednesday 5th December 1906, p8.
247. Wood p54.
248. Wood p55.

understandable frustration, that rival institutions had been so elevated, despite poorer performance. Sheffield, for example, had successfully trained thirty-two students for external degrees in the five years before it gained its charter. With a rapid increase, UCN had managed 20 a year on average from 1895 to 1913.[249] The East Midlands lacked a university of its own, in contrast to other industrial regions of England and, given UCN's capacity, the argument for university status seemed a straightforward one. 62 percent of its day students were from the wider East Midlands outside the immediate Nottingham area, lending credence to the idea of an East Midlands University.

These then, were the three related factors that dominated the College's institutional thinking into the second decade of the twentieth century. A concern to demonstrate financial propriety, a drive to improve relations with other local institutions and, lying behind both of these interests, the desire to emulate other provincial colleges and emerge as a full university. Any assessment of the College's responses to the demands of the war must be made under their light.

249. Wood p60.

Chapter Three: The Impact of the First World War on the College

Introduction

On the eve of the war, University College Nottingham was in reasonably good health. It had 1,919 students on its roll, over three quarters of whom (1,598) were registered for evening classes. A similar division was found between male (1,615) and female (304) students. 310 (97%) of the 321 day students had come from secondary schools, while just 877 (55%) of the evening students had done so. 79% of the day students and 61% of the evening students came from within a radius of 30 miles. Seven students were from abroad.[250]

Across all divisions, 184 students were studying for their first degrees, 441 were taking diplomas, 1,223 other undergraduate courses and 31 were engaged in postgraduate work. Over the preceding two academic years, 57 students had earned a degree, including two that had been awarded Master of Arts.[251]

The students enjoyed the services of their union, established to 'organise the corporate life of the college' and to support the administration of clubs for cricket, football, tennis, hockey and swimming. The union also offered societies for Christian unions, literary and philosophical interests, folk dance, naturalism and engineering. The male-only Officers Training Corps contingent was joined that year by a Voluntary Aid Detachment of the Red Cross for women students.

The College was divided into sixteen departments, employing 15 full time heads of department along with two part time heads. There were 36 full time and 42 part time lecturers. In addition to their responsibilities to their students, these academics provided courses of extension lectures on subjects such as 'the development of the string quartet', 'the world's cotton crops' and 'the Piltdown skull and the antiquity of man'. These lectures were popular, attracting an average attendance of 90. The English, Historical, Classical and Workers Educational Associations were headquartered at UCN, as was the Society of Chemical Industry

The College took an income of £24,000 for the year, of which just over seven thousand

250. Reports for the Year 1913-14 From Those Universities and University Colleges in Receipt of Grants from the Board of Education Cd 8137.
251. Reports for the Year 1913-14 From Those Universities and University Colleges in Receipt of Grants from the Board of Education Cd 8137.

pounds was directly connected to the teaching of students, either as student-paid fees or via training payments, such as the £197 from Nottinghamshire County Council to support mining classes and £1,845 from the Board of Education for training schoolteachers.

It is impossible to provide an exact figure for the number of students that were liable for military service, either as volunteers or, after 1916, as conscripts. The various factors, age, health, lack of essential home duties, are too individualised to answer in the aggregate. However, of the 1,031 newly enrolled students in 1913-14, 705 were men of military age, to say nothing of the returning students.[252] With so much of the College's income contingent on the delivery of education and so many of the students of a type for which military service was plausible, the College was particularly exposed to risk once the war started.

This year was emblematic of a period of relative financial stability and growth that characterised British higher education in the early 1910s.[253] UCN was emerging from the financial scandal of 1910, having implemented the reforms recommended by the Board of Education. New professorships had been made in economics, geology and geography and history, the minimum age for entry had been raised to sixteen and day matriculation classes had been abandoned. The Board's actions had been 'sharp, but beneficial' and prevented the institution from dropping 'back into the ranks of the smaller, purely technical institutions'.[254] It was a valuable warning. From an administrative viewpoint, UCN was strikingly similar to the provincial universities with which it took a share of the Treasury grant. Its portion of that grant represented 23 percent of its income, comparable to the figures for Bristol (26 percent) and Liverpool (28 percent). Its income from student fees (30 percent) was only slightly higher than Bristol (22 percent), Leeds (24 percent) and Liverpool (26 percent). In student population, UCN was only a whisker behind the University of Sheffield, which, in 1913-14 had 349 full-timers to UCN's 263.[255] With the unpleasantness of the scandal behind it, and with a refreshed leadership, the College was able to plot a course for the years ahead and plan for a future in which it might join the ranks of the universities proper.

Part One: Loss and Absence

The staff at the College were, like the students, generally male. A fair number were of

252. Reports for the Year 1913-14 From Those Universities and University Colleges in Receipt of Grants from the Board of Education Cd 8137.
253. John Taylor, *The Impact of the First World War on British Universities* New York, NY: Springer Berlin Heidelberg, 2018 p19.
254. Wood p57.
255. Taylor p24.

military age and, thanks to initiatives such as the Officer Training Corps and other reserve, auxiliary and territorial activities, a small, but significant number had interests or outright obligations to take up military service on the commencement of war. Before the end of September 1914, nine members of staff are recorded as having been 'called away to the war', including three men (two Frenchmen and a German) whose service was doubtless demanded by the conscription and reserve systems then at work in those countries.[256] By the middle of November a further four men had answered the call.[257]

Although the new absentees included the support staff Mr A.V. Hurd, a stoker, and Mr G. Cassidy, the gardener at Mapperley Hall, most were understandably in academic roles. The three foreign staff were language teachers, and they were joined in their absence by Mr W Smalley, a chemistry lecture assistant, Mr JA Sutton, Lecturer in Sanitary Law, Mr. W. Inchley, Lecturer in Engineering and Dr Radcliffe, Lecturer in Music. The second cohort included Mr Lambourne from Chemistry, Mr Piper from Engineering (who had been planning to cover Inchley's absence) and Dr Thomas Porteous Black, formerly a physics lecturer but, since 1911, the College Registrar.

The College Council agreed from the outset that the staff who took military service would be paid an active service allowance to make up the difference between their college salaries and army pay. For this, each case was taken on its own terms, with the Council finding it 'impossible to lay down a definite rule'.[258] In practice, this meant that the allowances ranged from around £5 per week for the manual staff to £150 or £160 per year for academic and administrative staff such as Inchley and Black. Not only was there an absence of an overall rule, but individual allowances were subject to change. Inchley and Black had their payments increased to £170 and £200 before the end of the year.[259] The connection between these allowances and the individual's army pay is established by a note from February 1915; Black's promotion to the rank of Captain and his concomitant increase in army salary prompted him to request that the College reduce his allowance accordingly. This, the College duly did.[260]

This correction was prompted by Black himself, a mark of his signature forthright honesty, but it would have been received with some relief by the Council, which had set a

256. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 22nd September 1914.
257. UNMASC UCN/G/4 Meeting of the University College Finance Committee 10th November 1914.
258. UNMASC UCN/G/4 Meeting of the University College Finance Committee 10th November 1914.
259. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1914.
260. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd February 1915.

precedent that was proving difficult to follow. A strong indicator of the difficulties came in the approach to filling the vacated roles. At the beginning of the war, the duties were given to temporary staff recruited for the purpose.[261] However, as the war lengthened, absences grew more numerous and more expensive, alternative approaches were tried.

Black's College duties were covered by the Assistant Registrar, Mr Shimeld, who continued to perform his own role and was awarded a bonus of £25 in recognition of his additional responsibilities.[262] By early 1915, the use of overtime and bonus payments, rather than 'backfill', had become standardised. The work of an Engineering Department labourer who had enlisted was covered by a colleague who was paid an extra 2 shillings per week in respect of the extra work.[263] The assistant hall porter was awarded a weekly war bonus of 5 shillings per week during the absence of the Head Porter, Mr Goode.[264]

In the words of the College's memoirist, Frank Granger, it was Goode's departure that 'emphasised, more than anything else, the suspension of the old order'.[265] This had a practical as well as a sentimental dimension. As the war continued, and particularly from 1916 when young men were compelled, absent any good reason, to serve, the cost of servicing war bonuses and allowances took its toll on the College finances. When, in September 1916, Mr J G Garrett, Lecturer in Mining, was called up on active service the Council agreed to pay his salary until he obtained his commission but insisted that the question of any subsequent allowance be referred to the Finance Committee.[266] That the allowance was not granted 'automatically' heralded a shift in policy that revealed some of the strain that the war was causing.

A meeting of the Finance Committee in November 1916 sought to address several aspects of ongoing expenditure. S.H. Piper's allowance was almost halved while Lambourne's was cut completely. In both cases, the personal circumstances of the men allowed the College to relieve itself of the burden. Piper, like T.P. Black had been, now held the rank and salary of Captain. Lambourne's situation is more obscure. He is known to have held the rank of Flight Lieutenant (equivalent to an Army Captain), but the Council noted that his circumstances 'did not require any allowance being made at this time'.[267]

261. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd September 1914.
262. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 26th January 1915.
263. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th April 1915.
264. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 1st June 1915.
265. Frank Granger, *Memorials of University College, Nottingham*. Nottingham: Jenkins, James and Low, 1928 p22.
266. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 26th September 1916.
267. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1916.

If the allowances paid to men such as Lambourne and Piper could be revised, it was natural that later cases were subject to means testing from the outset. Mr Everard L. Guilford, lecturer in history began training with the OTC in May 1916, in the certain knowledge that he would be expected to take a commission that year.[268] The question of his allowance was examined at length. The Council asked the Finance Committee to look into his private means, in particular his wife's expected situation during his absence, and to make recommendations on any allowance. Guilford was interviewed and the College authorities satisfied that his circumstances warranted that he be paid his full salary until he obtains his commission.[269] On his taking a commission, the matter was considered again, and he was awarded an allowance of £80 per year during his service.[270] Guilford survived the war and returned to his old position in January 1919, earning a full salary of £200.[271]

The absence of staff naturally created gaps that had to be filled. The policy that protected their income also ensured that they would have a job to return to, once their war service was complete. In the early days of the war, cover was to be provided by the temporary filling of vacant posts.[272] This, however, was an expensive option and, in the case of work that required specialist knowledge, not always an easy one. It was soon abandoned in favour of asking remaining staff to work longer hours to cover for their absent colleagues. This was not a cost-free solution, staff undertaking additional duties could claim additional recompense while the extra effort strained individual and corporate capacity. A Council minute of the 27th April 1915 explicitly states 'no backfill' for the absence of a labourer from the Engineering Department, and that his colleague be given an extra two shillings per week in respect of the additional work. This is a contrast to the situation the previous September when similar absences prompted 'temporary filling of posts'.[273]

The issue became more severe after the introduction of conscription in 1916. Requests were made individually by departmental heads and considered by the Finance Committee. Applicants included academic and support staff alike; Mr G. Horsley, a chemical lecture assistant, was given a five-shilling war bonus, backdated to the previous October and the same amount was awarded to Mr W.E.Fox.[274]

268. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd May 1916.
269. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 19th December 1916.
270. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 27th March 1917.
271. UNMASC UCN/G/4 University College Nottingham Finance Committee 28th January 1919.
272. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd September 1914.
273. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th April 1915.
274. UNMASC UCN/G/4 University College Nottingham Finance Committee 21st November 1916.

Professor Kipping, whose Chemistry Department had to cope not only with the absence of Dr Lambourne but also the pressures of additional war work (see Chapter 4), requested war bonuses to be paid to Dr Caven and Dr Prideaux for the extra work that they were conducting.[275] They were awarded £25 *per annum* each, backdated to the beginning of 1916.[276] The Engineering Department, which had, in the person of Professor Charles Bulleid, similarly released a key individual to civilian war work, was granted an additional £50 for Professor Robinson to perform additional duties.[277]

As with so much else in the College's response to the demands of wartime, there was a shift from an *ad hoc* approach to a standardised one. In the autumn of 1916, the Finance Committee agreed to consider war bonuses to all staff, male and female, receiving less than £180 and women members of the staff receiving less than £180 be considered. This was not an automatic payment, the Registrar was instructed to advise on the individual financial position of such staff, but it does signal an attempt to shift the onus from the staff to the College itself.[278] By April 1918 at least 85 members of staff were in receipt of some form of war bonus.[279]

Even then, war bonuses were occasionally denied. A Mr E.A. Smith requested extra pay in May 1917 but was turned down, as the Council considered that he had 'only spent a small proportion of his time' in additional duties.[280]

Despite this flicker of selectivity, the overall policy of allowances reveals an organisation that based its decision-making on the need expressed by the individual as much as it did on its capacity to pay. Allowances were offered generously at first then, when finances were straitened, means tested without being fully abolished. It was an important policy that showed a commitment to service (effectively, the College subsidised the war effort), and to the staff. Indeed, it is notable that where savings did have to be made, the College's immediate response was to switch to offering overtime in place of making temporary appointments, rather than remove the service allowance. It is evidence of the high regard that the policy commanded, as well as a sense of duty.

The introduction of systems of attestation and conscription in 1916 also prompted action

275. UNMASC UCN/G/4 University College Nottingham Finance Committee 21st November 1916.
276. UNMASC UCN/G/4 University College Nottingham Finance committee 16th February 1917.
277. UNMASC UCN/G/4 University College Nottingham Finance Committee 5th December 1917.
278. UNMASC UCN/G/4 University College Nottingham Finance Committee 21st November 1916.
279. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 16th April 1918.
280. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th May 1917.

by the College. Members of staff who intended to serve were instructed to inform the College before doing so, and cases considered by the Council.[281] This was intended to prevent further loss of talent, particularly in cases where individuals were engaged in war-related work. The College supported such persons in seeking exemptions or deferrals. The matter was taken seriously and at some cost to the College, which retained the services of Fox and Manning, a local law firm, to act on behalf of applicants. Early appeals were made on behalf of men from scientific and technology departments, John G. Garrett and Professor W.M. McMillan (Mining), Professor C.H. Bulleid (Engineering), Edmund B. R. Prideaux, (Chemistry), Mr A Wilkinson, (Physics) and Professor H.H. Swinnerton (Geology). Students John W. Ingham (Chemistry), Arthur Warren (Physics), Arthur E. Truman (Geology), and Wilfred Hodgkinson and William H. Turner (Engineering) were also supported in appeals.[282]

Swinnerton, McMillan and Wilkinson had their appeals renewed in early 1916, alongside Mr C. Hayes, a student and Professor John Todd, the Chair of Economics. The three professors were all members of the Scientific and Technical Consultative Committee, and it seems that contribution to the war effort was a primary factor in College-assisted exemptions.[283]

This was by no means an exclusive rule. In June 1916 the Board of Education notified the College that they were prepared to submit to the Army Council applications for postponement of teachers other than those conducting classes in Science and Technology, but the only such application from UCN was made on behalf of Mr E.P. Barker, a lecturer in Classics, and only for his postponement to the end of the college session.[284] This was granted, but the College immediately sought a further postponement for Barker, to last until the end of the year.[285]

Although these deferments were generally granted, moves were made to limit their number. In March 1917 the Board of Education issued a letter to educational institutions to instruct them ‘to place no obstacle in the way of Teachers volunteering for National Service’ but accepted that employers would retain the opportunity to appeal against their removal. UCN was requested to act accordingly.[286]

281. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th February 1916.
282. UNMASC UCN/G/4 Meeting of the University College Nottingham (Military) Sub Committee December 1915.
283. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th February 1915 and Senate, 25th January 1916. For more on the role of staff and students in war work see Chapter 4.
284. UNMASC UCN/G/4 Meeting of the University College Nottingham (Military) Sub Committee 3rd March 1916.
285. UNMASC UCN/G/4 Meeting of the University College Nottingham (Military) Sub Committee 23rd June 1916.
286. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th March 1917.

The College also sought to take advantage of the early return of personnel who had completed military service. A Sergeant Derrick, who had been an assistant lecturer in Chemistry before the war, was discharged from the Army after suffering wounds.[287] Following a period of convalescence, he was granted free admission to the laboratory and a new position as chemical storekeeper was found for him on the recommendation of Professor Kipping.[288]

The Armistice promised the release of more staff from military service. Although the national process of demobilisation would take some time, certain individuals made early returns. A Mr W.E. Carrier returned in November 1918 and was given employment in the Registrar's office.[289] This appears to have been a simple case of early release, but in other cases, the College took a more active role. At the suggestion of Professor McMillan, (Mining Department), an appeal was made for the early release of Mr J.C. Garratt, who had been serving as a junior officer, one week after the Armistice.[290] Garratt, a single man in his mid-twenties, had been the subject of a College appeal for deferment in December 1915.[291] This only delayed his inevitable call-up and, by the end of 1916 he was in training preparation to being given a commission.[292] Garrett's case was a clash of competing demands. His mining expertise was required by the College, but also by the military authorities, who sent him to the tunnelling section to lead parties in trenching and mining. His early return appears to have been the best compromise that the College could obtain in these circumstances.

Of course, some of the absences, of staff and student alike, became permanent. A particularly consequential loss was that of Dr Thomas Porteous Black, who was killed at Suvla Bay Gallipoli on 9th August 1915. Black, who had first come to UCN in 1907 as a demonstrator lecturer in Physics, had served since 1911 as College Registrar, an appointment made during the reforms that followed the financial scandal.[293] He was successful in this role and was regarded by his contemporaries as capable administrator, responsible, in the words of his Principal, for the 'great extension and advance of the activities of the college'.[294] Black had also been critical to the foundation of the East Midland Educational Union and was heavily involved in the early years of the Nottingham contingent of the Officer Training

287. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 19th February 1918.
288. UNMASC UCN/G/4 University College Nottingham Finance Committee 12th March 1918.
289. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Finance Committee 28th January 1919.
290. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 19th November 1918.
291. UNMASC UCN/G/4 Meeting of the University College (Military) Subcommittee December 1915.
292. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 26th September 1916.
293. See Chapter 2.
294. *Nottingham Evening Post,* Wednesday 17th November 1915.

Corps. He was just as accomplished as a man of science. Educated at Gordon's College, Aberdeen and at Queen Elizabeth's Grammar School, Darlington, he won a scholarship to Durham University, where he took a B.A, a B.Sc. and an M.A. and undertook research in radioactivity. He won a further scholarship that enabled him to study at Strasbourg (then part of Germany) and take a Ph.D. in Physics.[295] While there, he published scientific research in the German language.[296] He continued publishing after his arrival at Nottingham, collaborating with Dr Edwin Barton on a physics textbook.[297]

His loss was therefore keenly felt. In practical terms, the work of the Registrar passed to his assistant, Mr J.E. Shimeld, who had been covering his superior's duties since the latter's departure, was formally made Acting Registrar in October 1915, the status being applied retroactively to June of that year.[298] Shimeld would ultimately be given the Registrarship as a permanent position and hold it until his retirement in 1938.[299]

On the personal side, Black's death was marked by a series of touching obituaries and tributes. Frank Granger described him as one of the College's 'most successful teachers', a brilliant scholar and a 'man of great business ability; regular, unwearied, of even temper and ingenious in meeting difficulties'.[300] His life and work were to be memorialised through a scholarship, for which £300 was raised by subscription.[301]

It was unfortunate for higher education that it shared with the armed forces the same broad field of appeal. Young men, intelligent, committed and ready to expend effort filled lecture halls in peacetime and, when the call came, filled recruitment halls with the same youthful vigour.

Military mobilisation was an especially onerous burden on institutions that depended on large numbers of fee-paying young men to sustain their operation. In the first six months of the war, male teaching staff was reduced by 9.2% and the number of full-time students fell by 30%. In some of the larger institutions the loss of students was as high as 50%.[302]

The absence of students was as apparent at Nottingham as anywhere else. By 1917, the number of day students had fallen to 283, nearly all of whom were women. Evening students,

295. *Aberdeen Press and Journal* Tuesday 24th August 1915.
296. Thomas P. Black, 'Über Den Widerstand Von Spulen Für Schnelle Elektrische Schwingungen'. *Annalen der Physik* 324, no. 1 (1906): 157–68.
297. *An Introduction to Practical Physics for Colleges and Schools* (London: Edwin Arnold, 1912).
298. UNMASC UCN/G/4 Special Committee of the Council, University College Nottingham 25th October 1915.
299. Wood p66.
300. *Nottingham Journal,* Tuesday 24th August 1915 p2.
301. *Nottingham Evening Post* Wednesday 17th November 1915.
302. Report of Board of Education for the Year 1913-14 (Cd. 7934).

who had been a much larger cohort in any case, fell to 1144 in 1916.[303]

In October 1917, news came of the death of former student John Arthur Meads. Meads, who was 24 years old, had entered UCN 1908, taking a BSc Honours degree in Chemistry in 1912. The son of a Derbyshire railways blacksmith, Meads was evidently a bright student, who had advanced both educationally and socially through the winning of a series of scholarships. He won a scholarship to aid his studies at the Derby Municipal Secondary School, where he gained the Derbyshire intermediate scholarship, which took him to UCN. In his first year he matriculated the first division before embarking on degree studies in mathematics and chemistry. Academic work was his metier, and he gained a scholarship for research, comprising £150 a year, tenable for two years in Germany, where he hoped to gain a Ph.D. War made this impossible, and he joined the colours instead.[304]

In addition to being an excellent student, Meads was enthusiastically involved in student life. He enrolled in the Officers Training Corps and played for the College's first XI in both football and cricket and, as a member of the football team, won the South Nottingham Cup in 1914. He was also Secretary of the Students' Union, which is likely how he came to meet fellow student Dorothy Gladish. Dorothy, who was studying History, was also on the Union Committee and was editor of the Union magazine, the *Gong*. John and Dorothy married in early 1917, while John was at home recuperating from injuries sustained on the Western Front.

John was commissioned as a Second Lieutenant in the Nottingham and Derby (Sherwood Foresters) regiment in 1914 and was posted to the front line in spring 1915. He was an excellent soldier, receiving Mentions in Dispatches and, in 1916, the Military Cross. His MC was awarded for his gallantry in leading his men in a bombing attack, the action which gave him wounds of such severity that he was forced to take several months' convalescence at home and was even given the option of leaving the army for civilian employment. He chose instead to return to France. Having already gained the rank of Captain, he received a posthumous promotion to Major, backdated to ten days before his death.[305]

Part Two: Administrative Implications

303. Report of Board of Education for the Year 1916-17 (Cd. 7934).
304. *Nottingham Evening Post*, Saturday 15th January 1916 p6.
305. UNMASC UCN/G/4 East Midlands Special Collection Periodicals, 'Meads Obituary', *The Gong* Vol VIII, No 1 March 1918 p12.

These conditions, in Nottingham and its sister institutions, prompted an official response. In the autumn, Sir William McCormick, Chairman of the Advisory Committee on University Grants, wrote to the institutions under his remit to enquire into the effects that the war was having on them. He offered no assurance of assistance but expressed his intention to make inspection visits to support his investigation. The colleges, though happy to provide information expressed the view that it was too early to come to a settled conclusion. McCormick duly agreed to postpone his visits.[306]

However, the demands of government overtook him, and he was urged by the Chancellor of the Exchequer, David Lloyd George, to send to the Treasury any requests for additional funding before the end of January. He, and the Colleges for which he was responsible, responded with alacrity and a memorandum was duly submitted for the Treasury's consideration.[307]

A little over a month later, the Treasury confirmed that a supplementary grant of £145,000 would be made available to the colleges and university on application with details of their precise deficits.

Despite its losses, UCN elected not to apply for the supplementary grant.[308] This seems to have surprised McCormick, who having expended a great deal of energy in securing the funds, was now forced to write to the Principal to ask why no application had been made. He invited representatives of the College and the City Council to London to discuss the matter in person. The Nottingham men, comprising Principal Heaton and Alderman Manning, told McCormick that the College's accounts were in credit and 'actuated by the patriotic desire not to increase the burden of the country during this time of financial stress', it was intended to use this, rather than any additional funding to make up the shortfall.[309] While this was no doubt true, their patriotism masked certain anxieties. Heaton and Manning also expressed their intention to refrain from making an application, lest it prejudice the calculation of the ordinary Treasury grant.

Tellingly, they also explained that, as the sum had accumulated prior to the recommendations of the Advisory Committee in 1912, it was not subject to the restrictions applied in the wake of the financial scandal.[310] This appears to be the heart of the issue.

306. Taylor p103.
307. Taylor p103.
308. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th July 1915.
309. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd October 1915.
310. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd October 1915.

McCormick was a figure of central importance in the College's quest to attain a charter and the desire, post-Symes, to display prudent financial practices must have loomed large in the minds of the College authorities. On receiving McCormick's assurances that not only would the supplementary grant be considered completely separately from the grant-in-ordinary, but that his strong recommendation was for UCN to make an application, Heaton and Manning readily agreed to do so.[311] McCormick's word was his bond and the College's share of the Treasury grant was unchanged.[312] The government also communicated its approval of the College's efforts to make appropriate economies 'without adding to the heavy burdens falling upon the Treasury'.[313]

The Nottingham and Midland Board of Legal Studies recommended that the College's law classes be suspended in early 1915, owing to the large number of students undertaking military duties. The College was assured that, under the circumstances, this would not likely prejudice future applications for a grant from the Law Society.[314]

Such proposals were not new, though they had been handicapped by the financial scandal of 1910. In April 1914, however, a renewed effort was launched. A deputation, led by the Duke of Portland in his capacity of President of the College, made the case to Joseph Pease, the President of the Board of Education. Without making any commitment and reminding the College men of the weaknesses of UCN's private income, Pease arranged for the Chairman of the Treasury Advisory Committee to visit the College to undertake an assessment. The visit was arranged for that autumn.[315]

McCormick's inspection was one of the first casualties of the College's war. The immediate demands on government made the autumn of 1914 an unfavourable time to pursue the issue. Officially, this was a postponement.[316] In practical terms, it became a cancellation. The cause was not fully abandoned, and meetings of the East Midland University Society continued, acknowledging the 'tremendous task' that lay before them, not least in persuading the local population to support the scheme.[317] The topic was a recurrent one, enthusiastically taken up at meetings of the Court of Governors and repeated in the local press every

311. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd October 1915.
312. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 24th April 1916.
313. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd November 1915.
314. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 24th November 1914.
315. Wood p59.
316. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th October 1914.
317. *Nottingham Journal,* Tuesday 2nd March 1915 p6.

December on the presentation of the College's annual report.[318]

Part Three: The Culture of War and the College

The academic world, like the rest of the population, demonstrated widespread support for the war, particularly after question of Britain's involvement was settled. Although there were pockets of dissent, chiefly in Cambridge and centred on the pacifist activities of Bertrand Russell and the Union of Democratic Control (UDC) and the No- Conscription Fellowship (NCF).[319] Where disagreements did emerge, they were generally concerned with the form of support to be provided for the war and the degree to which the universities should take a lead, 'distinct from other sections of society' rather than the fundamental question of the correctness of the war itself.[320]

The depth and breadth of this support fostered punitive attitudes towards staff and students who expressed personal moral objections to the war. At Bristol, although Roger Solton, lecturer in History was permitted to apply for leave of absence to work with the Ambulance Unit of the Society of Friends in lieu of military service, the Senate passed a resolution forbidding any member of the Fellowship of Reconciliation to teach at the university and effectively proscribed it and any other organisation that it deemed to be 'for the discouragement of military service'.[321]

In such matters, UCN reflected its sister organisations. A strongly patriotic spirit was defining attitude among the staff, at least in their public lives. The single notable exception was Robert Acheson Sheldon, lecturer in Electrical Engineering. Sheldon, a Quaker, was 36 years old when conscription was introduced and being of military age, was compelled to declare himself a conscientious objector. He approached the College authorities to request that they endorse his appeal for exemption. Sheldon's wish was that, should he join the Friends' Ambulance Unit or other approved service organisation, he be given parity of treatment with his colleagues who had joined the military services and his position kept open for him until the end of the war. Given the extent of the College's support for staff in arms, this was not, on the face of it, an unreasonable request. Nevertheless, the Council declined to endorse his appeal, agreeing instead that the question of his treatment would 'be taken into

318. *Nottingham Evening Post*, Tuesday 19th December 1916 p3.
319. Irish p70.
320. Taylor p65.
321. Taylor p65.

consideration should the necessity arise'.[322]

If the Council had harboured any secret hopes that the necessity would not arise, they would have been short-lived. Sheldon was successful in his appeal to be excused military service and accepted the role of stretcher bearer with the Society of Friends' War Victims Relief Committee. Once again, he asked the College if, given his frontline service, he might be eligible for an allowance, in line with his enlisted and commissioned colleagues and, like them, be granted the confidence that he could return to his College work once the war was over. The matter was referred to the Financial Committee.[323]

It seems plausible to regard the Council's actions as driven by embarrassment. Having failed to kick the issue into the long grass, they then attempted to divert it to a sub-committee that seemed likely to dismiss the application with the unanswerable logic of finance. The policy of providing financial support to staff on active service was a relic of the eager days of September 1914, when the College's accounts had been in better health and when the numbers of staff in uniform had not yet been swelled by conscription. The largesse of that era was such that the College felt able, not only to make up the salaries of commissioned staff, but to fill their positions with temporary staff. The College even felt content to make charitable donations that might aid the war effort. By the time that Robert Sheldon came before the Committee, those days had long since passed.

For those reasons, not to mention the inference that could be taken from the Council's efforts to push away the problem, it is striking to note the sympathetic view taken by the Finance Committee. Their recommendations were that, if Sheldon resigned his position for war duties, he could be provided with a bonus of £50, his pension premiums to be met by the College for a further month and that, on the conclusion of the war, he be entitled to apply for his former position.[324]

This fell short of the full allowance paid to active service staff, but it was a generous offer in the circumstances. Nevertheless, even with the sanction of the financial committee, the Council considered it unacceptable. The offer was rescinded, and Sheldon informed that he was to be dismissed.[325] In response, Sheldon asked that he at least be permitted to resign. This compromised was accepted.[326]

322. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd May 1916.
323. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 23rd January 1917.
324. UNMASC UCN/G/4 University College Nottingham Finance Committee, 16th February 1917.
325. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 27th February 1917.
326. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 27th March 1917.

Sheldon's views are unrecorded, but he wrote to the College in June 1917 to update them on his activity.[327] Although the College did not record what this work was, it is known that he served with the Friends' War Victims Relief Service in France from April 1917. According to records held by the Library of the Society of Friends, Sheldon was initially stationed at Sermaize before moving on to work at Bettancourt in a convalescent home for child refugees. It is believed that he worked there alongside his wife, Gladys, who he had married in 1912. Robert and Gladys finished their service with the FWVRS in September 1918. He did not return to UCN.[328]

The Sheldon affair, though a tiny episode in the history of the College at war, nevertheless illuminates the attitudes that had taken root among the College leadership. As noted, the first reactions of the Council are suggestive of embarrassment, or at least of hoping that the problem might simply go away without a fuss. The contrasting generosity of the Finance Committee reveals not only the truism that organisations are not monoliths of opinion but also that the Council's snap decision to fire Sheldon (his resignation already having been implied by his seeking work with the Friends' Ambulance) and to dismiss his request to return in peacetime was motivated by little other than spite. Indeed, the later decision to permit Sheldon to resign is redolent of the benefit of a cooling-off period. The letter that Sheldon sent from France has been lost, but the fact of its being sent testifies to his desire to prove that he was hard at work, performing duties that were as dangerous as they were essential. He perhaps wanted to challenge any remaining view that he was a shirker or a coward and remind the College that, unarmed though he was, he was nevertheless in the heat of battle. Of all the players in this episode, it is he who emerges with the most credit.

During that first academic term of the war, the editors of the College student magazine, the *Gong,* elected to reprint a poem by Owen Seaman, the editor of *Punch*. The poem, 'To the Shirker: A Last Appeal', which was originally published in Seaman's own magazine and then displayed in poster form around the country, was produced after Seaman had attended a secret meeting of twenty-four prominent writers at the War Propaganda Bureau, at which figures such as J.M. Barrie, John Masefield, H.G. Wells and Seaman himself were impressed upon to 'support the war effort with their pens'.[329] Seaman's poem centred on the argument

327. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 26th June 1917.
328. Library of the Society of Friends, Record of the Friends' War Victims Relief Service.
329. Andrew Palmer, 'Friend With the Musing Eye: Persuasion and Dissonance in 'Call to Arms' Poetry of the First World War' in David Owen and Cristina Pividori, eds. *Writings of Persuasion and Dissonance in the Great War: That Better Whiles May Follow Worse*. DQR Studies in Literature, volume 61. Leiden ; Boston: Brill Rodopi, 2016. p140.

that since conscription was ultimately a possibility, young men would be advised to volunteer while service was still a matter of choice, lest they forfeit their 'right to rank on Memory's shining scrolls'.[330] This was by no means an unfamiliar argument for that period of the war, or indeed for people at the College. The Chair of History, Professor Reginald Dolley, had offered the same reasoning at a public rally the previous month.[331]

Nevertheless, the reprinting of the poem in the *Gong* was not well received by the student body. Three male students Wallace H. Lock, Robert Wilford and A.W. Wilkinson, wrote a letter of complaint that was published in a later edition. The students 'utterly condemned' the decision of the editors and expressed the view that, while *Punch* 'with its duty to "perform"', might be an appropriate organ for such material, the *Gong*, which was intended simply to 'amuse the hardworked student' was certainly not. In addition, *Punch* was available to any male student who wished to read it, with copies in the Men's Common Room, and Seaman's poem also being placed on public display. In this light, the decision to reprint *Shirker*, in a magazine with a readership chiefly comprised of young men, was nothing other than a provocation.

The insult, the complainants noted, was deepened by the fact that such incitement was unnecessary. Every male student at the College would have already given careful consideration to his duty and to the question of volunteering. To suggest otherwise was an affront.

Although the editors published the letter, they let their opposition to it be known. It was published alongside an account of the war experiences of William Inchley, who had been called up in the Special Reserve of Officers.[332] His account was characteristic of the early war, with postcard-like descriptions of his journey to France, tales of excellent evenings at the Hotel D'Opera, games of rugby surrounding partly censored details of combat. The explosion of a high explosive shell which killed 12 and injured 22 Territorials was 'an awful sight, the bits of humans had to be scraped up off the road'. 'But' added Inchley, 'such is war'. The interplay of stoic duty and jolly outing provided a marked contrast to the complaint

330. 'To the Shirker: A Last Appeal', in *Punch, or the London Charivari*, v147, issue 3857, Wednesday 11th November 1914, p390.
331. *Nottingham Evening Post*, Monday 4th October 1915 p.3. For more on Dolley's role as propagandist, see pages 143 and 144.
332. William Inchley, 1893-1915, had been at UCN since 1907. He was the author of two textbooks, *The Theory of Heat Engines* and *Steam-Boilers*, which came to be regarded as standard works. He was also joint author of *Elementary Applied Mechanics* and published his research in several papers. The unhappy sequel of his account of the high explosive attack was that his own death came by the same method in December 1915. Obituaries, *Proceedings of the Institute of Mechanical Engineers*, 1916 p125.

about the poem, a disparity that appears to have been intentional on the part of the editors.

This combative intention was underscored by direct editorialisation. A line from the complaint, 'but every male student of University College, Nottingham is a well-educated and deep-thinking man, fully alive to his responsibilities', was treated to a sardonic footnote, 'this statement has been passed by the Censors, but they take no responsibility for its authenticity', a plainly unnecessary piece of mockery.

The stark position of the *Gong* was made harsher by the fact that fully half of the editorial team were exempt from military service by reason of their sex. The magazine's the editor, Nina Brameld was female, as was the publishing secretary, Miss J.J. Fovargue and two of the five general committee members. It should also be noted that the committee included Dorothy M. Gladish, who was in a romantic relationship with John Meads, a fellow graduate who had volunteered at the start of the war, and who would be widowed by him before the Armistice.[333] Her opinion on the issue is not known but may be reasonably inferred.

The three students who had complained about the poem were, by contrast, eligible for military service. More than that, it is evident that two (and possibly all three) of them actually did serve. Robert Wilford and Arthur William Wilkinson saw active service as junior officers in the Yorkshire Regiment. They were both killed in action in 1917, Wilkinson in July and Wilford in November. They were both 23 years old.[334] Wilford's grave registration record shows him as having earned a BA from the University of London, which suggests that, far from seeking to avoid the war completely, he had elected to complete his studies first. This, it is reasonable to say, is entirely consistent with the view, expressed so strongly, that young men like him did indeed give 'careful consideration to duty'.

333. . Sarah Edwards, 'Meads [Née Gladish], Dorothy May (1891–1958), Historian and College Principal'. *Oxford Dictionary of National Biography* Oxford University Press, 2018. For John Meads, see pages 98 and 99.
334. Second Lieutenant WILFORD, ROBERT, Commonwealth War Graves https://www.cwgc.org/find-war-dead/casualty/1757871/wilford,-robert/; Second Lieutenant WILKINSON, ARTHUR WILLIAM, Commonwealth War Graves https://www.cwgc.org/find-war-dead/casualty/555309/wilkinson,-arthur-william/ [both accessed 8th June 2020].

Chapter Four: The College as an Instrument of War

Introduction

Despite the challenges that the war brought to it, Nottingham, like other colleges and universities, found that the demands of wartime created new roles and responsibilities. It had been evident, even in peacetime, that higher education and research organisations held resources that would be of particular use in wartime. Consequently, there is evidence of Nottingham mobilising for war from the early autumn of 1914.

However, as the First World War swiftly developed (or degraded) into stalemate and attritional warfare, it generated unprecedented demand for civilian resources. In this analysis, the 'shells crisis' of 1915 marked a turning point; a crisis which made publicly undeniable a fact that had been understood privately by officials for some time: the Great War was a 'battle of brains'.[335]

This chapter argues that the war was therefore the first major test of the capacity of the nationwide academic infrastructure that had developed in the UK over the preceding half-century. It bolstered the argument that these quasi-public institutions were a *de facto* arm of the state, while raising still-unanswered questions about academic freedom. Furthermore, the necessity of taking a role in the war economy marked a profound change in the financing of research in the UK, prompting a shift from *ad hoc* patronage financing to a formalised system of state-sponsored and state-directed research, mediated by dedicated national agencies.

Part One: The Militarisation of the College

It was a day many months in the planning. Crowds, drawn from the town's rich and poor classes, thronged the streets in anticipation of the arrival of the King and Queen. The town's less salubrious dwellings had been dutifully covered in curtains, the better to disguise their dingy walls. The local regiments, quite naturally, put in an appearance. The Yeomanry and the Robin Hood Rifles, resplendent in Lincoln green, were bound to keep the peace of the

335. The Shells Crisis as a turning point is discussed in Chapter 2 of Tomás Irish, *The University at War, 1914-25: Britain, France, and the United States* (Basingstoke: Palgrave-Macmillan, 2015). The Fisher quote comes from his preface to the American edition of *British Universities and the War: A Record and Its Meaning* (London: The Field & Queen (Horace Cox) Ltd, 1917) pxiii

crowd. These duties were not onerous and, aside from the arrest of a single suffragette, found in possession of a number of inflammable materials, the people of Nottingham offered their warmest welcome to the King and Queen.

The[336] Nottingham contingent of the Officer Training Corps were expected and had been allocated a space in Sherwood Street. The detachment was practically at full strength, its numbers bolstered by a number of old cadets, including Second Lieutenant Jesse Marson Atkin, who had returned to stand with their former unit. The officers, led by Captain Samuel Trotman, included the adjutant, Captain Forster of the Royal Fusiliers, distinctive in his busby and Lieutenant Thomas Porteous Black, who combined his OTC duties with his position as Registrar of the College.

At around 10:15am, with the Royal party not expected to arrive until midday, the unit took the opportunity to observe a short ceremony. Cadets Gould, Horlington, Peck, Shaw, and Smalley, who had recently accepted commissions, were to be presented with their ceremonial swords. The presentations had been intended to the made by the College Principal, Professor W.H. Heaton but as he was unwell and also required in the delegation in the Market Place, Captain Trotman, acted in his stead.

'This is', said Trotman, 'rather an auspicious and important occasion for us…it shows that we are making bonds between the College and the world which are of an enduring nature'. In language that was unmistakably that of the pre-war age, the Captain paid tribute to the young men as the 'first fruits of the united efforts we have been making to establish a new and officially recognised roll of honour in this College'. His words were pregnant with hope. He hoped that this roll of honour would be inscribed with 'the names of those men who have learned, during their student days, that self-sacrifice is of some value in life, and who have heard and answered the call of patriotism'. He hoped that they would 'make University College, Nottingham known throughout our land not just as the home of good students, but also of men who are imbued with the spirit of self-sacrificing public service which has made the greatest empire the world has yet seen'.

Addressing the young commissions directly, Trotman once again spoke of hope. He hoped that they bear their swords for 'the honour of their country' and that they 'never have to draw them except in peace'. However, should fate prove less fortunate, he hoped that they would 'bear their parts as officers and gentlemen' and that the OTC motto, *Pro Patria et*

336. . 'King and Queen at Nottingham', *Daily Telegraph*, Thursday, June 25th, 1914, p11.

Alma Matre 'will ever be heard where the fight is fiercest, and the danger is greatest'.

With the ceremony complete, the men of Nottingham's OTC took their places among the townsfolk as the Royal carriage carried the King and Queen to the Market Place. Their ears rang with Trotman's words of hope and thoughts of the future. The newly commissioned officers had their careers to look forward to. For their more junior comrades, the OTC Annual Camp was just a month away.

The OTC Summer Camp commenced on Salisbury Plain later that summer as planned. Nottingham's cadets were joined by fellow cadets from the Universities of Birmingham, Manchester, Leeds, Sheffield, Bristol and the Royal Agricultural College, Cirencester. Together, they formed No. 2 Battalion. The University of London formed No. 1 Battalion. The cadets were given training and treated to tactical demonstrations by Captain Forster and Major C. Christie, along with demonstrations of the supply of ammunition the treatment of casualties in battle. It was, according to one report, shaping up to be the 'most successful camp we have ever had'.

The gap between the Royal visit to Nottingham and the making of the OTC summer camp was a mere month. It was, however, perhaps the most significant month of the twentieth century. The cadets arrived on Saturday 25th July, two days after Austria-Hungary sent its ultimatum to Serbia. Germany issued its ultimatum to Russia the following Thursday. One week into the Salisbury camp came the declaration of war by Germany on Russia, Britain ordered the mobilisation of the Royal Navy.

The camp was broken up early on the 3rd August, 'owing to the imminence of a general mobilisation of the army'. It would be the last camp attended by Nottingham's OTC until 1921.[337] For the remainder of the war, Nottingham contingent OTC had more than sufficient work to do at home.

The passage from College to Colours had been a smooth one even in peacetime. The Nottingham contingent of the OTC was founded in April 1909 at the behest of the students themselves. It was well-attended from its inception and, by 1913, there were 106 cadets on the roll. Cadets were given military training, including drill, fieldcraft and weapons training and attended an annual camp alongside cadets from other OTC contingents. The OTC had been established with the explicit aim of preparing young, officer-class men for service in the

337. G.J. Eltringham, Nottingham University Officers' Training Corps 1909-1964 (Nottingham: Self-published, 1965) Appendix C, p63.

reserves and territorial forces, with commissions available to cadets upon their passing of an examination. The securing of a commission was regarded as a successful outcome for the contingent; each one was recorded in College literature and celebrated in ceremonies, such as the one on the day of the Royal visit in June 1914.

The Commanding Officer from 1909-1920 was Captain Samuel Russell Trotman who approached his task with single-minded zeal. Trotman was one of those Edwardians who had been persuaded that the national enemy was Germany, with open conflict an inevitability. He was so convinced of this that he insisted that German be spoken at home, the better to know his enemy.

In peacetime, the OTC enjoyed a quasi-independent status within the College. It was established on the authority of the college council and supervised by a dedicated committee drawn chiefly from College staff.[338] Membership was originally limited to current and former students of the College and, although this was later extended to include old boys from the High School, this was on the understanding that 'a majority' of the cadets should be College students.

However, the contingent was not permitted to draw from College funds. Although the College lent support in-kind, notably by aiding the OTC's fundraising efforts and allowing cadets to take leave of absence from their studies to train, it was financially separate from its parent organisation. Additionally, while some members of staff, such as the Registrar, Thomas Porteous Black and Mr S.H. Piper, lecturer in Physics, served as officers with the unit, Trotman was not employed by the College. A chemist by training, he had been Science Master at the Nottingham Boys High School, where he had trained the Cadet Corps and, from 1893 he was Nottingham City and Public Analyst, a position he retained throughout the war.

The first, and lasting, impact of the war was the administrative fusing of the OTC with the College. As with much of the College's wartime activity, this began in an *ad hoc*, reactive manner before taking on a more strategic aspect as the war went on and demand increased.

On the outbreak of war, Nottingham OTC continued its ordinary work and, like its fellow contingents in other colleges and universities, supplied the military with fresh recruits, much as it had done in peacetime. By November, 103 Nottingham cadets had taken commissions, a figure that would reach over 1500 by the end of the war.

338. UNMASC UCN/G/4 Minutes of the Senate of University College Nottingham 24th May 1909.

While this was going on, a more intensive role was also sought for the organisation. In September, the College Senate recommended that a dedicated course on Military Science be established. This course would be run by the OTC man Piper, alongside his duties in the Department of Physics, a doubling of roles that prefigured much of the College's approach to war work.[339] However, Piper had accepted a commission in the regular army and was unavailable. In November, it was agreed by Council to appoint Trotman to the role, with an honorary Professorship and seat on the Senate. He was duly despatched to devise the course and report back to the dedicated military sub-committee that had been established to superintend this work.[340]

Trotman completed his proposal within a fortnight. It comprised four distinct schemes. Firstly, a course in basic military science, open to all students and other members of the OTC. Over three hours of lectures and two afternoons of practical work each week, its students would be given instruction in core (land based) military skills such as map reading, bivouacking, tactics and military engineering. Secondly, Trotman proposed an advanced course, to be launched in 1915 for students who had successfully completed the basic course. Once a cohort of students were ready for the advanced training, the two courses would run concurrently, suggesting a continual recruitment to the basic course.

Thirdly, 'special courses to meet the national emergency', which would be arranged from time to time as a yet more intensive course, occupying 'practically the whole day' for the students expecting to obtain commissions.

Fourthly, courses for those unable to undertake military duties. Although the principal aim of the project was to meet the urgent demand for officers, persons unable to take military positions (for example for reasons of age or special circumstances), they would be permitted to take the classes, should it be convenient to do so.[341]

Trotman made a fifth recommendation, this one concerning himself. He was grateful for the proposal to elevate him to the Professoriate but chose to decline the privilege, asking instead to be regarded merely as 'Honorary Director of the Department', with a seat on the Senate. The question of his status could be revised at a later date.

The denial of the honour has been described as 'characteristic' of Trotman's tendency to

339. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 22nd September 1914.
340. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham, 24th November 1914.
341. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1914.

selflessness and personal austerity.[342] Trotman himself declared that 'the knowledge that my efforts have been appreciated by those whose approbation I highly esteem will be quite sufficient recompense'. However,[343] this may be falsely modest.

His course had the explicit aim of preparing candidates to 'handle a company of infantry', betraying its inclination towards the training of potential officers, as opposed to private soldiers. This of course reflected the traditional role of the OTC as preparation for commission and may be considered a proper use of Colleges resources. However, the extending of the training to men not eligible for full military service was pure Trotman. Acknowledging the role of the College in teacher training, not to mention his own career as a teacher and military man, Trotman intended his new course to take those students intending to become school masters and giving them 'such instruction in the Department as will enable them to train others'. The potential of this was such that he even suggested offering a similar course in the evenings.[344] Indeed, for a man like Trotman, this type of training was so advantageous that to limit its scope to an instrumentalist preparation for a career would be to downplay its benefits. He advised the Council that he saw 'no reason why military science should not be encouraged as a study for the educated classes, since it develops very highly the power of logical thinking, resource and self-reliance, the value of which is difficult to over-estimate'.[345]

Trotman had crafted his course in his own image, exercising all of his opinions and worldview, making him a professor in all but name and, despite his 'honorary' status, giving him significant influence in the College beyond anything that might have been conferred by a mere title. For the remainder of the war, the OTC and the military science course were the children of Trotman.

Captain Trotman not only personified the direction of the OTC, but he also became the focus for its institutional blending with the College, largely as a result of his astonishing work ethic. His work as city analyst occupied only a portion of his time and his private consulting practice formed the basis of his income. He continued to honour his several commitments during wartime, often rising at 4am to carry out laboratory work, leaving for the College at 7am and working on OTC duties until 5pm, sometimes returning to the laboratory in the evening. It was a total commitment. Mrs Trotman performed clerical work for her husband's

342. Eltringham p24
343. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1914.
344. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1914.
345. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1914.

professional practice and supported his efforts with the OTC, the couple standing *in loco parentis* for their young charges and even opening their home at Lucknow Drive to use as a temporary headquarters in the initial weeks of the war.[346]

This may not have been the full extent of the couple's commitment. Trotman personally paid for some of the costs of running the operation, to a not insignificant extent. In his history of the Nottingham OTC, G.J. Eltringham reports claims that this expenditure, combined with the fall in his consultancy income, meant that Trotman's personal liability was 'at least £1000'.[347]

For all the depth of Trotman's commitment, this was clearly unsustainable. However, the first steps to relieve his personal burden were also taken at his own initiative, with institutional support coming only later. In a sign of the expected permanence of the new arrangements, not to mention the unsuitability of using his private home as a military headquarters, Trotman took on a property in Bilbie Street, for the use of the OTC. In October 1914 the Council agreed to contribute £25 p/a to its costs, noting, by way of justification, that the location was also used 'partly for College purposes'.[348]

Although further financial support was provided by the College, this was of a minor nature. A grant of £50 was made in the first year of the war, and some allowances were made to officers. From June 1915, Lt. A.E. See and Sgt. Maj. A.H. Franks were given an allowance of 5/- per week for extra services rendered to the OTC.[349]

By September 1915, it was plain that these *ad hoc* arrangements were not sustainable (even the sober-minded Trotman described the Corps as being 'in danger of extinction') and that, if the contingent was to continue to fulfil its wartime duties, a more formalised settlement needed to be made.[350]

A formal request was submitted by the Military Training Committee to the War Office that month. This letter set out the contingent's achievement since 1914; over 500 cadets had been trained with enrolment numbers never dipping below 150 at any one time and daily training had taken place ceaselessly since 25th July 1914. Despite the suspension of ordinary camps, the contingent had also 'frequently held camps and extended operations'.

346. Eltringham, p23.
347. Eltringham p23.
348. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th October 1914.
349. UNMASC UCN/G Minutes of the Council of University College Nottingham 7th July 1915 /4.
350. Letter from Capt. S.R. Trotman to Maj. C.J. Scovell, quoted in G.J. Eltringham, Nottingham University Officers' Training Corps 1909-1964 (Nottingham: Self-published, 1965) Appendix B.

These successes were made while the Corps had been facing additional costs because of the war. The immediate withdrawal of the Adjutant and Sergeant Instructor on the outbreak of war left the contingent 'without expert and clerical assistance at a time when they were never more urgently required'. In addition, the 'sudden breaking up of camp in July last entailed considerable expense which had to be paid out of the annual grant'. 'Moreover', continued the letter, 'so large an amount of clerical work has been undertaken on behalf of the War Office and in connection with the Contingent that it became immediately necessary to obtain an office and a permanent orderly room clerk', while 'large sums have been expended in providing a Headquarters on our training ground and in equipping it with the apparatus necessary to the efficient training of our cadets'[351]

That the Corps had continued at all was entirely due to goodwill; all staff, with the exception of the Commanding Officer, had given their time voluntarily and, while support had been given by the Council of the College at its own expense, 'the tax on its finances and resources was a heavy one' and the Committee considered it doubtful that 'the present arrangements can be continued indefinitely'.

After setting out this general case, the Committee made three specific requests. Firstly, reimbursement for expenditure incurred at the outbreak of war. Secondly, that a grant be placed at their disposal to enable us to provide a suitable instructor to instruct recruits and thirdly, that pay and allowances for two officers may be credited monthly to the contingent funds. Additionally, and perhaps curiously, given the circumstances, the Committee requested permission to increase the size of the establishment to three platoons.[352]

This letter opened a dialogue between the College and the War Office that would occupy the autumn and winter of 1915. In reply, the War Office queried the Contingent's calculations. Bertram Cubitt, the Assistant Under-Secretary of State for War, noted that in the contingent's annual statement of accounts, 'the expenditure on the annual camp for 1914 was but slightly in excess of the receipts'.

In response to the remaining items of expenditure, Cubitt pointedly drew the Committee's attention to paragraph 109 of the Officers Training Corps Regulations, which requires WO sanction to have been obtained *before* any capital expenditure of this nature was incurred. However, he requested full particulars of the expenditure in order to consider reimbursement.

351. UNMASC UR/1025/34/1 Letters to the University College Nottingham from the War Office regarding military affairs.
352. UNMASC UR/1025/34/1 Letters to the University College Nottingham from the War Office regarding military affairs.

The War Office was more accommodating of the Contingent's request for personnel. 'It may be possible', noted Cubitt, 'for the Department to provide [an instructor for recruits]', while sanction was immediately given for pay and allowances for two officers of the contingent for the remainder of the term, with the possibility of further such funding in subsequent terms.[353]

The Committee replied with an explanation for the discrepancy in the claim for the annual camp expenditure and a revised set of figures that included the rent and fitting up of office (£28 and £35 respectively), the building and fitting of the headquarters at Bulwell (£250) and the cost of special camps (£412).

The rush of the war's first year was blamed for the departure from protocol. It was the 'pressure of the work and the confusion caused by the withdrawal of the permanent staff by whom all the office work was conducted' that made it 'impossible to wait till sanction had been obtained for expenditure for hire and fitting up of an office'. The building of the dedicated headquarters on the Corps' training ground was essential, and again conducted with necessary speed, 'erected and fitted up within three weeks of the day when they were found to be indispensable'. Indeed, even this may not be sufficient, and the committee feared that 'a further increase in accommodation may soon be necessary'.[354]

The letter continued with the statement that Trotman had applied for a grant for special camps and having failed to receive any reply, provided the funds himself, despite holding the view that the War Office might reasonably have assisted.

Furthermore, the Committee requested 'that officers of the OTC who are devoting their whole time and energies to the important work of training of officers should be treated like other officers in the matter of allowance. There are many out of pocket expenses inseparable from their work: the work also is of a very exhausting nature, and they feel that they have earned the right to be regarded at least as equal to the cadets they have trained.'

The matter was brought to a close just before Christmas when the War Office confirmed that they were unable support the request for £412 for the special camps but were able to provide £63 in respect of the office and £250 on the new headquarters.

On the question of the granting to OTC officers of allowances as well as pay while instructing cadets, the Committee was reminded that it was 'a rule of general application that

353. UNMASC UR/1025/34/1 Letters to the University College Nottingham from the War Office regarding military affairs.
354. UNMASC UR/1025/34/1 Letters to the University College Nottingham from the War Office regarding military affairs.

Officers Training Corps Officers employed on these duties receive the pay of their rank only' and the Army Council was unable to make an exception to this rule for Nottingham.

In January 1916, the Acting Registrar made a final appeal for financial support for Trotman, basing his case on his Trojan work ethic and personal sacrifice. Trotman, he wrote, 'has devoted, since the outbreak of the war full time to the Training Corps work. often extending until late in the evening with lectures, and…has lost in fees considerably over £600 during the past year owing to the consequent neglect of his professional duties.' While the contingent's two Lieutenants were members of the College staff, one of whom was salaried, as a non-staff member, Trotman, was 'only paid for the work he actually carries out', and a 'quite nominal' sum at that.[355]

While this official exchange of correspondence was under way, Trotman wrote directly to Major C.J. Scovell of the Northern Command, making similar, though not identical, arguments. Trotman claimed that, since August 1914, 400 of his cadets had obtained commissions, and a further 130 were undergoing continuous training (likely on the military science course). These figures diverged from those given by the College authorities that same month. In Trotman's calculation, these achievements had necessitated an expenditure of £900, with only £230 having been supplied by the Government and £50 from the Council of the College. The remaining £620 had been provided personally by Trotman 'and his friends'.[356]

Despite having found two thirds of the Corps' operational budget through private means, Trotman was not looking for handouts or even reimbursement, a position that again placed him at variance with the College, which made full compensation a core component of its claim. Instead, he proposed to Major Scovell that he expand the work of the Nottingham OTC to admit a total of 250 cadets for continuous training, an increase of around 120 men, that was not only double that of the 'three platoons' requested by the Committee, but actually exceeded the then available intake at Nottingham. Trotman's suggestion was that his unit could make a larger contribution by accepting external cadets, 'candidates for commissions or even some of those who have accepted commissions'. In addition, boys of 17 with officer potential, who could be trained for a year or more'. This work could not be done by Trotman alone but would require paid military instructors.[357]

355. UNMASC UR/1025/39.
356. Eltringham, Appendix B.
357. Eltringham Appendix B.

Although these parallel communications were clearly not co-ordinated (the difference in figures testifies to that, as does the duplication of effort), they do paint a picture of the overall situation and intention of the contingent as the war passed its first anniversary. The opening year had been one of tremendous effort and personal sacrifice, driven largely by the personality and enthusiasm of Captain Trotman, with little care for the niceties of protocol and seeking official sanction *ex post facto*. Despite these pressures, it has also been a year of success in training terms, with the OTC expanding its role as a producer of effective young officers-in-waiting.

The physical presence of the College also developed a war role. Its buildings , the design and location of which had prompted such debate in the 1870s were, by 1914 a major asset. Their size, location and facilities were all resources that could be redeployed in the service of war work and did so almost immediately. During the frantic weeks of September 1914, the College's role as a conduit for recruitment expanded beyond its work with the OTC, and even beyond that with its own students. As a centrally located and easily identifiable location, the College was also a suitable site for wider recruitment activities that included enlistment of young men as Privates. The Mayor of Nottingham, Councillor Frederick Ball, issued an appeal in early September, calling for recruits to the regular and reserve territorial battalions of the Robin Hoods, and for 'young men of the professional and commercial classes in the city' to form a city battalion for Lord Kitchener's new army. Ball arranged that this recruitment would take place at the College under the supervision of the officers of the OTC. Shakespeare Street was duly made available for these purposes from 1pm to 8pm daily, with Dr Black in command.[358]

Recruitment began on the 3rd September, in advance of official permission to raise the battalion. However, this sanction was granted the same day, with the proviso that the new battalion be raised on a regular basis and that it mustered a strength of 1,100 men after medical examination. The combined efforts of the Mayor, the College and the OTC showed some initial success; 301 men were recruited on the first day, fully half of which were for the putative battalion.[359] By Saturday evening, this total had reached 528, of which 269 were for the new battalion, 98 for active service with the Robin Hoods and 161 in the territorial reserve.[360]

358. *Nottingham Journal* Wednesday 2nd September 1914 p4.
359. *Nottingham Journal* Friday 4th September 1914 p4.
360. *Nottingham Journal* Monday 7th September 1914 p4.

It appears that the truly eager had volunteered in the first few days as a fresh call had to be made within a week of the launch of the appeal. The response was described as 'hardly satisfactory', and a proposal was made for the Duke of Portland to give a public address to prompt further volunteers. The *Nottingham Journal* made an oblique reference to 'rumours of an uncomfortable nature' that had been circulating about the battalion but issued its readers that they were entirely without foundation.[361] Although recruitment continued, numbers fell considerably and on the second Monday of the appeal, just 23 men were passed from Dr Black's recruiting station to the battalion. That same day, the College ceased to accept recruits to the Robin Hood reserves and directed young men with that intention to the Territorial HQ on Derby Road.[362]

This, the first of the College's dedicated war projects, was a short-lived endeavour. It exploited UCN's accessible position in the town, and the working hours of its staff, but used none of the institution's latent value. Later efforts in recruitment would do just that.

The College's association with the Red Cross predated the war. A Red Cross Society was established for women students during the academic year 1913-14, the first such society in any English college.[363] This was considered a 'patriotic' parallel to the OTC and, like its masculine counterpart, offered its members training and the opportunity to receive certificates of proficiency. The detachment also shared with the OTC an expanded role in wartime, when membership of the society increased from an initial roll of 24 to reach 58 by the end of 1914. The society engaged in the production of clothing parcels to be sent to members of the OTC (or more likely, a 'less fortunate' comrade) and to the children in Nottingham schools'.[364] In addition, programmes of training in nursing and other caring occupations were delivered to members of the Society at Shakespeare Street.[365]

The Red Cross made a more invasive use of College property at Mapperley Hall. This eighteenth century country house, located on Lucknow Drive a mile and a half away from the Shakespeare Street, had been taken by the College as a men's hostel in 1906, an acquisition that 'marked the transition from the casual association of persons who met only in the classroom and laboratory to an academic life in common'.[366] In July 1916, Colonel Battersby, officer-in-charge of the Military Hospitals in Nottingham approached the Hostels Committee

361. *Nottingham Journal,* Wednesday 9th September 1914 p4.
362. *Nottingham Journal*, Tuesday 15th September 1914 p3.
363. *Nottingham Journal*, Friday 18th December 1914 p4.
364. *Nottingham Journal*, Friday 18th December 1914 p4.
365. Wood p67.
366. Granger p13.

of the College Council to request that the Hall be used as a V.A.D. auxiliary hospital. The Committee agreed to release the facility into Battersby's care at no cost, save those required for the hostel's superintendent, Professor Henderson, to quit his lodgings there. These sums were estimated at £75pa for his rent, plus £25 in moving expenses and £10 in additional costs.[367] Mapperley Hall was duly deployed as an auxiliary hospital supporting sixty beds.[368]

Once converted, the facility remained under the ultimate purview of the College, a responsibility that continued to attract demands for funding. A month after the Committee agreed to Battersby's request, it was again prevailed upon for support. Battersby accompanied Lady Cecily Mary Cavendish-Bentinck, who had taken responsibility for supervising the hospital, in visiting the Committee to request financial assistance for cleaning and the installation of electric lighting. It was agreed that the Council would provide £75 towards the installation of lighting and to bear one sixth of a sum not exceeding £150 on painting and cleaning.[369]

This was not the last time that the hospital authorities would seek continued financial involvement from the College. In January 1917, the Finance Committee of the Corporation be asked to remit the rates or some part thereof of Mapperley Hall during the time that the same is being used as a hospital.[370]

When hostilities ceased, the College sought the return of the hostel with alacrity. Lady Bentinck advised that she would vacate the premises 'before long'. The College was to 'endeavour to take possession of the hall on or before the 25th March 1919', upon which the City Architect would be requested to inspect the premises and fixtures.[371] For her part, Lady Bentinck agreed to 'do her best to be out by 25th March'.[372]

Early in 1919, Professor Henderson prepared to return to the Hall. However, he was forced to report to the Council that 'representatives from the War Office had inspected the Hall with a view to converting it to an orthopaedic hospital', on the apparent say-so of Lady Bentinck. The Chairman duly reminded Lady Bentinck that she was 'only a tenant and [could not] make arrangements with the War Office'.[373]

367. UNMASC UCN/G/4 Minutes of the Hostel Committee, College Council, 25th July 1916
368. Wood p67.
369. UNMASC UCN/G/4 Minutes of the Hostel Committee, College Council, 31st August 1916.
370. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd January 1917.
371. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 19th November 1918.
372. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 16th December 1918.
373. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 21st January 1919.

Part Two: The College as a Wartime Training Institution

In September 1915, the College's Vice-Principal, Professor Frank. S. Granger gave a speech at a prize-giving ceremony for the evening school. While his broad theme was the value of continuing education, he made a special focus on something which, while not a new idea, had a certain political currency in that year. 'It has become clear to everyone', he said, 'that one of the causes of the great success of Germany has been…the organisation of her scientific knowledge and her industrial training'. At that time, it was the industrial training that was of greatest value. Germany's military successes had been, continued Granger, 'made possible by the German boys and girls who have attended schools like this, and who, being grown up, are now at work in the German munition factories'.[374]

The work being done in munitions factories - on both sides in the conflict - was of special pertinence in 1915. This work was also the first systematic use of UCN's expertise and special facilities in the war. Granger was only too aware that, even as he spoke, men and women who had attended his own college were at work in British munitions factories.

The supply of warlike stores had been a growing problem since the beginning of the war, resulting in both shortages of materiel at the front lines and political conflict at home. As early as September 1914, David Lloyd George, then Chancellor of the Exchequer, demanded the establishment of a Cabinet committee to address the 'guns, shells and rifles question'. Despite opposition from Lord Kitchener, Secretary of State for War, Lloyd George got his Committee, with Kitchener himself as Chair.[375] This, however, was merely the beginning of the 'War in Whitehall' and the question of munitions supply would continue to be a vexed one.

The issue was supercharged in May 1915 when British losses at Aubers Ridge were attributed to a lack of high explosives. An article in the *Times* castigated the government and brought the issue to public notice. Although the troops did 'splendidly', the article alleged that the 'want of an unlimited supply of high explosive was a fatal bar to our success'.[376] This public crisis operated contemporaneously with a larger one, conducted chiefly behind closed doors. Admiral Sir Jacky Fisher, First Sea Lord, resigned on the 15th May after failing to

374. 'Investment for Life', *Nottingham Journal,* Friday 24th September 1915, p4.
375. Adams (1978) p19.
376. 'Need for Shells', *The Times*, Friday, May 14th, 1915, p8.

prevent Winston Churchill from proceeding with his plan to launch his Dardanelles Campaign. The politically toxic effects of his resignation prompted the Liberal Lloyd George and the Conservative Bonar Law to propose a coalition government, which Prime Minister Herbert Asquith accepted. Although the Fisher crisis was the proximate cause of the fall of the Liberal government, the Shells Crisis ensured that the new government would make armaments a cornerstone of its programme. A mere committee would not be sufficient to address the problem; it would take a full Department with executive power.[377] Although technically a demotion from the position of Chancellor, Lloyd George felt that, given his insistence on urging the issue of armaments left him 'honour bound' to accept the role of Minister.[378]

Lloyd George and his Ministry had several key priorities, among them the national and regional organisation of armaments supply, the sourcing of raw materials (under the additional strains caused by the German blockade) and the contracting of large and small enterprises. However, perhaps the most challenging objective was ensuring the adequate supply of labour.[379] A nationwide skills shortage had been evident from late 1914; the supply of skilled labour had been constrained by the 'indiscriminate recruiting practices of the War Office', which was only too willing to swell the Army with volunteers from crucial industries, while the needs of the war simultaneously increased the demand for their skills.[380] In response, the Board of Trade pursued a two-fold policy of 'reinforcement' (bringing in additional hands from the ranks of the unemployed, from among the refugees newly arrived in Britain and from other engineering trades) and 'relaxation' (of trade union rules concerning demarcation and other restrictive practices).[381] These attempts being insufficient to improve the supply of labour, the War Office was persuaded to accept the 'badging' system, whereby men in essential trades would be dissuaded (though not prohibited) from entering to the Army and issued with a badge to demonstrate that their civilian work was essential to the war effort. After May 1915, recruiting sergeants were instructed not to accept enlistments from men in certain armaments trades. While this was slowing the tide of exits from the armaments and related industries, a related effort was made to track down the skilled men who had already joined the Army and return them to their civilian occupation. This was met with only moderate success: just 3,000 men had been so returned by the time

377. Adams (1978) p36.
378. David Lloyd George, *War Memoirs of David Lloyd George, Volume 1* (London: Odhams Press, 1938) p144.
379. Adams (1978) p71.
380. Lloyd George p172.
381. Adams (1978) p74.

the Ministry of Munitions was established.[382]

This collection of measures to maximise the ordinary skill base of the armaments trade was inadequate for the special circumstances in which the Ministry of Munitions was born. The only remaining option was to expand the skill base itself by bringing in new hands. This effort, which was to become known as a 'Dilution' policy, consisted of recruiting workers from invalided soldiers, from men too old or unfit for military service and from women and youths.[383] It was a controversial policy that had to be stewarded very carefully though the objections of the trade unions, for which the policy 'touched their most sensitive nerves'.[384] Keen to preserve the core labour value of their members, the unions accepted Dilution only with strict controls of the extent and duration of its implementation. Alongside these controls was a principle by which 'no worker in the munitions shops was to be employed at any task with required skill of a lesser degree than he possessed'. Furthermore, the so-called dilutees were to be engaged only on tasks that had been subdivided into the simplest processes and were to be constantly trained in the correct methods.[385] The success of the national armaments policy rested on the success of the Dilution scheme, which in turn rested on the application of training. The role of giving and supervising this training was of critical national importance. For delivery of the training, the government turned to the technical schools, of which University College Nottingham was among the sixty-one selected for participation.[386]

Although labour supply was a significant challenge, armaments underproduction was exacerbated by a shortage of necessary machinery and productive estate. Most of the technical colleges lacked the machinery for effective demonstration and training while those that did possess equipment were prevailed upon to place it at the disposal of manufacturers. The provision of adequate machinery, for training and production alike, took several months, during which time the new factories were built to order.[387]

The training courses were popular and there was such an oversubscription of volunteers that it became necessary to compel entrants to take 'an undertaking to work the whole time with a munitions firm', rather than simply complete training for work elsewhere. A variety of courses were offered, ranging in length from 20 to 120 hours, depending on 'the equipment

382. Adams (1978) p95.
383. Adams (1978) p104.
384. David Lloyd George, *War Memoirs of David Lloyd George, Volume 1* (London: Odhams Press, 1938) p144
385. Adams (1978) p104.
386. *History of the Ministry of Munitions, Vol.IV: The Supply and Control of Labour 1915-1916* (London: HMSO, 1922) Appendix XIV, p160.
387. *History of the Ministry of Munitions Vol.IV*, p59.

and the work done'.[388]

The issue of payment was contested. The Board of Education took the view that, as this work meant a diversion 'from educational to strictly utilitarian' matters, the responsibility for costs should fall elsewhere. Likewise, the local education boards complained about financing a national initiative. The costs of the training scheme therefore fell to the Ministry of Munitions, albeit with the Board of Educational retaining an administrative role. The Ministry made payments in respect of the salaries of instructors and the cost of fuel, light, cleaning and materials, along with the responsibility for paying for any damage, depreciation and necessary alterations of apparatus and premises.[389] The colleges now formed part of the Ministry of Munitions' domain of responsibility.

At the start of 1916 the Ministry put out a short, illustrated volume on the employment of women in munitions. Compiled by an 'expert engineer' on the direct instructions of Lloyd George, the book outlines the tasks and responsibilities being observed in the munitions factories then operating around the country. The express intention was to 'act as an incentive and a guide in many factories where employers and employed have been sceptical as to the possibilities of the policy of dilution'.[390] The work, although clearly intended to assuage fears of the weaknesses of the Dilution policy, provides an engineer's insight into the precise nature of the work being done by these neophyte workers and, by extension, of the training that they had been receiving. The Ministry of Munitions, in conjunction with the Board of Education, arranged that this training be delivered by the nation's technical schools, including, where resources permitted, the new colleges and universities.[391] In keeping with the agreements that underpinned the Dilution policy, these new workers were only to be given a surface training, with the intention that they be made swiftly ready for the armaments factories and equally swiftly returned to their former occupations in peacetime.

The rapid turnover of newly trained workers demanded a close relationship between the Ministries, the companies contracted to deliver armaments and the colleges employed to train the workers. The 'more progressive' employers and colleges exchanged information on training needs in advance, enabling the novices to be trained to order, even training them to

388. *History of the Ministry of Munitions Vol.IV* p59.
389. *History of the Ministry of Munitions, Vol.IV:* pp60-61.
390. Ministry of Munitions, *Notes on the Employment of Women on Munitions of War, with an Appendix on Training of Munitions Workers* (London: The Chiswick Press, 1916) Preface by David Lloyd George p5.
391. Ministry of Munitions, *Notes on the Employment of Women on Munitions of War, with an Appendix on Training of Munitions Workers* (London: The Chiswick Press, 1916) p75.

work on single machine operations.[392]

Despite the government's assurances that the new workers would only receive a limited training, it was recognised, and even publicly admitted that some recruits had 'higher capacity' and were given every encouragement to advance in training. Once again, this relied on a close relationship between the three parties: state, industry and college.

The concerns for munitions supply had prompted action in Nottingham even before the crisis became acute. During February and March 1915, a group of manufacturers in Leicester had organised a committee to co-ordinate their efforts and, despite ministerial cynicism, succeeded in engaging the attention of the Ordnance Department.[393] Although this initiative was to be short-lived, with the centrally organising capacity of the Ministry of Munitions having superseded the local efforts by the end of the summer, it did prompt mimic committees in other towns and cities. The Nottingham and District Armaments Committee formed in April 1915, with Mr Charles R. Woodward as Chair. UCN was involved from the beginning, the Committee noting appreciatively that 'the engineering staff of the technical side of the University College is assisting [with its work]'.[394] Although no names were given at this stage, it seems likely that the College's representative was Professor Charles Bulleid, the Chair of Engineering. In June of that year, he was formally appointed to the Armaments Committee.[395] Despite the Committee's short lifespan (like all local committees, its role was superseded by the central organisation of the Ministry) the involvement in munitions of Bulleid, and of the College was to be a lasting one.

At this time, production was piecemeal by the standards later set by the war and carried out by manufacturers including the Beeston Foundry Company (later the Beeston Boiler Company), Turney Brothers Ltd and the Raleigh Bicycle Company, which, according to its founder, Sir Frank Bowden, had by June given over the majority of its 2,000 employees to munitions production, 'not only for England, but for Russia and France'.[396] Raleigh manufactured fuses by the hundreds of thousands, L. M. Ericsson Co, of Beeston made field telephones. The Premier Gas Engine Company of Sandiacre collaborated with G. R. Turner Ltd., of Langley Mill on gun carriage work. Many other local firms contributed to the output. This was all, according to Woodward, done with the assistance of the engineering staff of the

392. Ministry of Munitions, *Notes on the Employment of Women on Munitions of War, with an Appendix on Training of Munitions Workers* (London: The Chiswick Press, 1916) p76.
393. Adams (1978) p57.
394. *Nottingham Evening Post*, Friday 23rd April 1915, p5.
395. *Nottingham Journal*, Thursday 17th June 1915, p4.
396. *Nottingham Journal*, Thursday 17th June 1915, p4.

technical side of the University College.[397]

The primary responsibility of the College was training of the workers, which was done under the supervision of Professor Bulleid and through the efforts of the Engineering Department's Mr Alfred Parr, who was given an additional £1 per week in respect of the overtime that this work necessitated.[398]

When the advent of the Ministry radicalised armaments production, Nottingham responded with enthusiasm. Cammell Laird and Company expressed an early interest in building a munitions factory in the town and, following negotiations and several visits of inspection, a partnership scheme was devised by which the Council leased around 14 acres of land at King's Meadow and permit Cammell Laird to use it without charge. Cammell Laird, for its part, refused to accept payment from the government for construction or management of the facility (originally the National Projectile Factory, after October 1917 the National Ordnance Factory), which was intended for the production of 6in and 9.2in shells at an output of 6000 and 2000 per week respectively.[399] This project, which was expected to be an economic boon to the city was accepted with a unanimous vote of Council in August.[400] Construction began in September and was complete by March.[401]

At the outset, Cammell Laird intended to employ 1,230 women in the new factory but only on the 6in shell lines, as it was 'considered impossible for them to handle the heavier shell'. 2,538 men were employed across both types of shell, though only 287 of them were skilled. Numbers rose and, by the first summer of operations, 3,056 men and women were employed and demand for additional labour was high. Six months later, these numbers had risen to 5,835 workers, just over half of whom were women.[402]

Work began on the construction of National Filing Factory No.6, at Chilwell, the very same month that the NPF was commenced. This facility, managed and organised by Lord Chetwynd, a director at the engineering firm Vickers, was designed for on-site preparation of TNT and amatol for the filling of the heavy calibre shells manufactured in the north and the midlands. Like the NPF, construction was rapid; the first test shells were filled in January 1916 and regular production began the following month. A year later, the factory employed

397. *Nottingham Evening Post*, Friday 23rd April 1915, p5.
398. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th July 1915.
399. *History of the Ministry of Munitions, Vol.VIII: Control of Industrial Capacity and Equipment* (London: HMSO, 1922) p142.
400. *The Nottingham Daily Express*, Thursday 19th August 1915 p2.
401. H*istory of the Ministry of Munitions, Vol.VIII* p143.
402. *History of the Ministry of Munitions, Vol.VIII* p143.

7452 workers, over three quarters of whom were men. As with the NPF, the high proportion of male workers was attributed to the heavy nature of the work. Finding labour 'of the right type' was a particular challenge, especially in the early months of the operation.[403] This presented an immediate and acute training need.

The sheer demand for output meant that the College's munitions classes were necessarily part of the Dilution policy. It had been intended that the usual factory hours would be filled by 'those ordinarily employed in the trades', but to avoid machinery sitting idle, a call was issued for Nottingham citizens to register their interest in working on Saturday afternoons, in the late evenings, and Sundays. to supplement the output. Applicants, on completion of a form and the passing of an interview, were to report to Bulleid for 'short preliminary training in the College workshops'.[404] The training was principally for 'semiskilled men' who were shown how to perform 'single operations as rapidly and accurately as necessary for their part in the entire manufacture of war material'. Turnaround was rapid. As the first foundations of the NPF were being laid, 200 such men had already been trained by Bullied and Parr and were available for full-time work.[405]

Precise monthly figures for the colleges trainees are not available. In December of 1915 it was reported that 'no fewer than 483 girls and men had been trained and had become efficient', giving UCN the distinction of 'ranking next to Sheffield, the leader of the movement'. With two shifts of training every day, between 12 and 20 pupils were being turned out weekly as qualified workers, an effort that was limited by an insufficiency of lathes to meet requirements for instructional purposes.[406]

It seems likely that these limitations meant that the classes were effectively oversubscribed, or at least that the College was unable to keep pace with demand. A self-described 'Hard-Working Woman' wrote to the *Nottingham Evening Post* in December 1915 to complain that she had applied to train in the evenings at the University College but had been told that women were only being admitted to the afternoon classes. There would be, she asserted, 'thousands of women' who would prefer to train at other times.[407] Despite the correspondent's obvious frustrations, it is plausible that these segregations were simply a crude method of managing admissions. Certainly, the College took some pride in its training

403. *History of the Ministry of Munitions, Vol.VIII* p161.
404. 'Munitions of War', *Nottingham Journal*, Friday 25th June 1915, p6.
405. 'Nottingham University and the Crisis', *Nottingham Journal*, Friday 10th September 1915, p2.
406. 'Nottingham University College', *Nottingham Journal*, Saturday 4th December 1915, p7.
407. *Nottingham Evening Post,* Wednesday 15th December 1915, p3.

of women; Bulleid permitted a photographer from the *Evening Post* to capture a lesson being given to female trainees and the image was reproduced on the front page of the paper under the headline, 'Nottingham Lace Workers Learn to Make Munitions'.[408] Further calls, explicitly for female trainees, continued to be made and even expanded. By October 1916, the College could boast that 'thousands of women, drawn from all ranks' had been passed as proficient and that even more numbers, especially those belonging to the better classes', were needed. Instruction was free of charge to the trainee, who could not only expect to earn from £1 to 25s. a week at the beginning of her employment but also expect an increase.[409]

This was not, however, the College's own largesse. As indicated above, financial responsibility for training the workers was borne by the Ministry, which made payments to the College in respect of its work and use of its workshops. This understandably gave the Ministry a degree of control over the administration of the training. When the workload demanded an additional (female) instructor, sanction was sought from, and given by, the Ministry.[410] A Miss L. Johnson was duly appointed at a salary of 25/- per week.[411] Overtime was also occasionally permitted.[412] The Ministry also covered the cost of repairs to workshop machinery. The College secured tenders for the repair of a broken machine motor and the bill, £38.6.0, was paid by the Ministry.[413]

The final grant payment was made in February 1919. Thereafter the College's munitions account remained open for the collection of interest earned from an investment of £1350 made in War Bonds.

The College's contribution to armaments production was not limited to the training of workers. As the NPF neared completion, Cammell Laird were given permission to use the College's engineering workshops to manufacture gauges for use in the new factory. These arrangements, which were approved by the College Council in February 1916, were the product of direct contracting between the College and the firm.[414] This particular aspect of the partnership was short-lived, Cammell Laird having their own local premises once the NPF had opened, but it reveals the value that the College possessed beyond that of a site of training and education.[415] The College authorities displayed some enthusiasm for this

408. *Nottingham Evening Post,* Thursday 9th December 1915, p1.
409. 'Shell Makers Wanted: A New Appeal to Women', *Nottingham Evening Post*, 26th October 1916.
410. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 15th December 1916.
411. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 19th December 1916.
412. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Finance Committee 9th April 1918.
413. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Finance Committee 30th July 1918.
414. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd February 1916.
415. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 28th March 1916.

extension work. They wrote to the Ministry of Munitions with an offer to test officers' compasses. This offer was, however, politely declined by the men at Whitehall Gardens.[416]

The preparation and delivery of a course on military science was perhaps the emblematic wartime augmentation of the College's curriculum. However, the rupture and reach of the Great War was such that its effects were felt in subjects less immediately recognisable as being connected with the conflict. From 1915, the first academic year to be planned following the declaration of war, the College adopted and adapted several courses that reflected the changed environment. In several cases, these changes would prove permanent.

Among the courses that were at least 'war-adjacent', modern languages are the most prominent. The altered global political environment made certain languages more desirable, even 'fashionable', and gave them a supercharged economic value. The country's wartime alliances fostered a new interest in certain European cultures while the changing complexion of international business and commerce fostered demand for language training for potential commercial agents in new territories.[417]

Particularly striking among these new interests was the 'boom' in Russianist studies that occurred between the start of the war and the October Revolution of 1917.[418] Russia had not enjoyed an especially good reputation in Britain before 1914. Its language was regarded as difficult to learn, its politics as arcane and cruel and its population distant and unknowable. Despite some intellectual interest in Russian culture (particularly its exceptional literature, which enjoyed new English translations in the early twentieth century), elite Russianophilia did not translate into popular interest.[419]

The war changed all that. The allying of Britain and Russia's war aims (not least in the focus on a common enemy) 'jolted the complacency of the British public' with regard to the study of Russian language and culture, fostering an enthusiasm that Russianophile intellectuals were only too happy to exploit. The prospect of new commercial markets, to replace those that Germany had enjoyed in both countries gave a harder-edged impetus to these developments. Britain's business class saw fit to sponsor Russian language teaching, either through private philanthropic donation or through the institutional support of Chambers of Commerce. In Leeds, for example, the industrialist Sir James Roberts made an endowment

416. UNMASC UCN/G/4 Minutes of the Sentate of University College Nottingham 13th December 1915.
417. Taylor p188.
418. James Muckle, 'Russian in the University Curriculum: A Case-study of the Impact of the First World War on Language Study in Higher Education in Britain'. *History of Education* 37, no. 3 (May 2008): 359–81.
419. Muckle, p359

of £10,000 for the establishment of a Chair in Russian.[420] Manchester likewise established a Chair, while Russian courses were also started at Sheffield, Birmingham, Glasgow and Newcastle as well as 'sporadic' classes in Bristol, Edinburgh and Southampton. King's College London founded a School of Slavonic Studies in 1915.[421]

Russian at Nottingham was commercially driven. The Chamber of Commerce, with which the College enjoyed a close collaboration, expressed an interest in the teaching of Russian in the town and requested that the College make recommendations on how it might be arranged.[422] With the Chamber prepared to pay £50 p/a towards the course, along with a prize fund of £20, the College identified three suitable candidates to teach it, eventually appointing Basil Slepchenko at £150p/a from 1st September 1915.[423]

This appointment reflected a further boon to Britain's nascent Russian departments; the presence in the country of educated Russian emigres. Slepchenko, a Kuban Cossack from Ekaterinodar, had been a teacher of modern languages in Russia and had travelled to England in 1914, intending to improve his English and to 'investigate the possibilities of exchanges' between England and the Commercial Institute in Moscow, where he had taught. Medically unfit for war service, he found employment as secretary to the Imperial Russian Consulate in Liverpool before his appointment at Nottingham.[424] His tenure at Nottingham was to be short-lived, he left his post in 1918, but he was highly regarded as a teacher, ensuring a 'very favourable' impression on the part of the Board of Education, which reported on Nottingham's Russian efforts in 1917.[425] Beyond mere languages teaching, Slepchenko also delivered courses of public lectures in Anglo-Russian relations, reflecting the increased popular interest in the country's eastern ally.[426]

The Russian course was a success and attracted wider interest. On the commencement of teaching, the Russian Minister of Education presented to the College 138 volumes of Russian works, followed by a further 71 volumes the following July.[427] These gifts were apparently brokered by the Chamber of Commerce, while it was still enamoured of UCN's work. This, it transpired, was to be a limited honeymoon period.

---

420. Taylor p189.
421. Muckle.
422. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd February 1915.
423. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Committee to Appoint a Teacher of Russian 7th May 1915.
424. Muckle.
425. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 27th March 1917
426. *Nottingham Journal* Saturday 17th July 1915, p7.
427. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 26th September 1916.

The Chamber's priority in sponsoring the course was, understandably, the facilitation of commercial opportunities. However, when the College reported on its progress in 1917, it gave details of the backgrounds of the 42 students that had enrolled. These included 'ladies intending to travel, foreigners and gentlemen of position' while the enterprising young men whom the Chamber had hoped to support had, by and large, joined the colours instead.[428] Wartime, though clearly replete with commercial opportunities, was less than propitious when it came to the availability of young men of career-starting age. The Chamber's committee expressed the view that good progress in the language should permit deferment to military age youths. In the meantime, it was unable to recommend the Council to make a further unconditional grant but suggested that the Chamber should offer to make a grant of £1.1s in respect of each student approved by the Foreign Trade Committee.[429] For the Chamber, the learning of languages was for a direct, instrumentalist purpose.

Although the revised financing arrangements revealed some of the tensions between the purposes of the College and those of its new benefactors, the Chamber was prevailed upon to support further language instruction, this time in Spanish and Portuguese. The stated focus, again, was commercial; it was hoped that the markets of Latin America would open up to British trade. The Chamber offered its support, again at a guinea per student, and the College council set about recruiting a suitably trained teacher, which proved impossible by the start of the 1917-18 session.[430] Leeds provided the model once more, when a £10,000 gift was made for a Chair in Spanish Language and Literature. This was an endowment of Lord and Lady Cowdray, who had significant business interests in Mexico.[431]

The Russian boom proved temporary. The October Revolution in 1917 and the country's subsequent exit from the war undid much of the goodwill that had been generated in 1914. By the end of 1918, the College council reported that Russian and general German were alike 'under an eclipse', mustering just five day students between them. Of the other wartime acquisitions, Spanish was, like French and Italian, 'flourishing' and Portuguese had 'made a very useful start'.[432] However, despite its declining popularity, Russian had, in less than three years, become established at Nottingham. Slepchenko's return to Liverpool did not prove the end of his department; his successor, the Slovene Janko Lavrin, held his post for thirty-five

428. Muckle.
429. Muckle.
430. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 2nd October 1917.
431. Taylor p189; Daniel Yergin, *The Prize, The Epic Quest for Oil, Money & Power*, Simon & Schuster, 1991, p.230-232
432. *Nottingham Journal and Express*, Friday 20th December 1918 p5.

years and, unlike Slepchenko, engaged in active research alongside his teaching responsibilities. He was made Professor in 1921.[433]

The Russian course, in its early years at least, was nurtured by the vacuum left by Britain's severed relationship with Germany. However, links to the Germanosphere could not be ignored completely. The absence of native speakers of German, heretofore the principal language of science, created problems in scientific and technical communication.

The College had employed German nationals prior to the war. Dr Heinrich Mutschmann, had been in post as lecturer in German and Phonetics since 1909, when he replaced Dr Stähl, and had been a contributor to the College's programme of public lectures, speaking in German on, among other things, '*Charakterbilder aus der deutschen Geschichte*' in 1912.[434] A year later, he published *The Place-names of Nottinghamshire, Their Origin and Development*, a work that emerged from researches he had been conducting since before his appointment at UCN.[435] He left Nottingham, quite understandably, in the early autumn of 1914. A note in the Minutes of Council records him simply as having 'been called away to the war'. It seems reasonable to assume that Mutschmann, born 1885, had been mobilised as a reservist, in line with German policy of the time.[436]

It is almost certain that several members of the College's staff would have had the German language, particularly those in the hard sciences. Thomas Porteous Black, the Registrar and formerly of the Department of Physics, had spent time at the University of Strasbourg, where he gained his PhD, and had published in German.[437] However, the loss of native speakers posed a problem for technical endeavours in the country and, in 1915, the College found it necessary to seek the appointment of a teacher of 'scientific German'.[438] The class was duly arranged and became well-attended, even as enrolments in the standard German class sank.[439] Even after the war, when the study of German began to recover under the instruction of Dr W.R. Schweizer (a Swiss), science students were particularly well-represented.[440]

433. Muckle. Muckle notes that Lavrin was given the title of Professor but not the salary.
434. *Nottingham Daily Express*, Wednesday 2nd October 1912, p8.
435. Heinrich Mutschmann, *The Place-names of Nottinghamshire, Their Origin and Development,* Cambridge University Press, 1913.
436. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd September 1914.
437. Thomas P. Black, 'Über den Widerstand von Spulen für schnelle elektrische Schwingungen', *Annalen der Physik* 324, no. 1 (1906): 157–6.
438. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 26th January 1915.
439. *Nottingham Journal and Express*, Friday 20th December 1918 p5.
440. *Nottingham Journal and Express*, Monday 13th December 1920 p2.

Another language that enjoyed a surge in interest after 1914 was of course English. The arrival in Nottinghamshire and Derbyshire of refugees from occupied Belgium prompted a raft of institutional responses. At UCN and other colleges, this meant educational activities. Around 400 Belgians had been housed in Nottingham by the end of October 1914.[441] The College Council announced the commencement of free classes in conversational English that same month.[442] These classes, which were held on Thursday afternoons, were delivered by Miss Harriett Hutchinson (Lecturer in Physiology) and Professor Frederic Bumby (Lecturer in English). The two members of staff clearly struck up a rapport with their new pupils, who they found to be keen learners of the 'intricacies of the English language'. In a glowing write-up in the *Nottingham Daily Express*, Hutchinson and Bumby described their approach as "'direct" as opposed to what may be described the "grammar school" method'. By this, they meant a conversational and phrase-based approach that disdained the technical details of grammar in favour of English that was useful to the students. Nevertheless, as the Belgians' skills improved to levels that permitted reading in English, their requested books were 'invariably for works of philosophy'.[443] One of the Thursday afternoon sessions even included a class excursion to Nottingham Castle where the City Librarian, John Potter Briscoe, acted as historical guide.[444]

The course was, in short, a practical, rather than academic class, more in keeping with the College's vocational mode than its purely academic one. This is in spite of Bumby's personal record as an academic lexicographer, and who, prior to his appointment at Nottingham in 1887, had been assistant to James Murray, the editor of the *Oxford English Dictionary*.[445] The selection of the physiognomist Hutchinson as class tutor is a more obscure decision, particularly given the revelation that she led the advanced class while Bumby, who was Professor of English, took the elementary one. It is possible, given the prejudices of the time, that a woman teacher was required for a class of women (though it is certain that she herself also taught men). It may be that she simply volunteered her services, in the same way that her male colleagues had offered their own energies in the College's war work. Indeed, she appears to have been a keen supporter of 'doing one's bit', having also led OTC classes on first aid and care for the wounded, activities that did at least make use of her professional

441. *Nottingham Daily Express*, Friday 30 October 1914 p4.
442. *Nottingham Daily Express*, Thursday 15th October 1914 p4.
443. *Nottingham Daily Express*, Friday 30 October 1914 p4.
444. *Nottingham Daily Express*, Friday 18th June 1915 p6.
445. Peter Gilliver, *The Making of the Oxford English Dictionary*. Oxford ; New York, NY: Oxford University Press, 2016.

expertise.[446] She is also known to have visited France 'several times during hostilities' and to have gathered sufficient personal experience to give public talks on 'France in Wartime'.[447]

Whatever the reason, her involvement in English teaching was long-term and personally fruitful. At the end of the first year's session, Miss Hutchinson's class presented their tireless teacher with a large bouquet of carnations and other flowers and a cut-glass vase while one of their number demonstrated the benefits of her teaching by making a 'well-phrased speech in excellent English' to offer thanks.[448] More practically, a member of her first cohort, who had been a medical student in Belgium and just short of taking his degree, was invited by Hutchinson to attend her physiology lectures, acting as demonstrator for her in return.[449]

This offer was extended to other Belgian refugees, who were invited to attend, free of charge, 'any lectures or classes' that the Principal deemed would benefit them.[450] In January 1915, the College hosted a guest lecture by Paul Hamelius, Professor of English Language and Literature at the University of Liège and who was exiled in London. Hamelius, who had just published his account of the Siege of Liège, gave his audience an account of 'every branch of Belgian national life and the physical features and history of the country'.[451]

Nottingham was, naturally, not alone in offering support and solidarity to displaced Belgians. Similar classes were established at other colleges and universities. Nine classes, comprising 165 students, were held weekly at Bristol, while at Leeds, the University's financial resources were used to provide direct aid.[452] The emergence of a common enemy fostered feelings of fellowship that extended from the intellectual classes to the common people. Hamelius' Nottingham lecture, which was given to a 'crowded' audience, would have delighted his British hearers, as they were treated not only to an encomium on Britain's free trade policy, but a denouncement of the barbaric Germans, whose crimes against culture Hamelius had described at length in his book.[453]

The surge in British affections for Belgium was more pronounced than it was for Russia. The 250,000 Belgian nationals arrived to a 'warm and enthusiastic welcome', which, while likely genuine in individual cases, was, *en masse*, the product of a collective process of

446. *Nottingham Daily Express* Friday 10th September 1915, p2.
447. *Nottingham Daily Express*, Tuesday 19th March 1918 p1.
448. *Nottingham Journal*, Saturday 19th June 1915, p8.
449. *Nottingham Daily Express*, Friday 30 October 1914 p4.
450. *Nottingham Evening Post*, Wednesday 28th October 1914 p2.
451. *Nottingham Daily Express*, Saturday 16th January 1915 p6.
452. Taylor p40.
453. Paul Hamelius, *The Siege of Liège, a Personal Narrative*, London: T. Werner Laurie Ltd, 1914.

mythologising.[454] These were, in point of fact, two interrelated myths, that of 'plucky Belgium' and the 'dastardly Hun'. Sympathy for Belgium rose in proportion to disgust at Germany and was further enhanced by a sense of national guilt for having let Belgium, the protection of which was Britain's *casus belli*, suffer as much as it had.[455] Support for exiled Belgians, whether of an emotional or practical nature, was not so much an expression of compassion as one of patriotism. In this reading, UCN's donation of its labour, intellect and resources was yet another stand of its contribution to the great national project, performed, like most of the others at this stage of the war, on a local stage.

A council minute from February 1915 noted that the College had been requested to provide 'lectures of a technical and military character for soldiers now in the town'.[456] This was a commencement of an instructional relationship with the uniformed services that would last for the duration of the war and beyond. Naturally, as the physical toll of combat mounted, focus shifted to the occupation of those men whose had been discharged as disabled.

Support for injured personnel, their families and the families of those killed followed the same pattern as recruitment. Prior to the war, it had been a largely voluntary endeavour, relying on charitable activities, supplemented by state support. During the Crimean War, a 'Patriotic Fund' had been established, chiefly from voluntary contributions, but supplemented by the War Office, establishing 'a precedent for voluntary endeavour to have a small measure of official funding as a component part'. In 1885, the Soldiers' and Sailors' Families Association (SSFA), again a charity, was established with a broader remit of support.[457] By the 1914, state support for disabled personnel was shared between the Admiralty, the War Office, and the Royal Hospital of Chelsea.[458] This piecemeal support, plainly, would be insufficient for the industrial-scale demand of the Great War.

The Naval and Military War Pensions Act 1915 sought to change that. It placed the Royal Patriotic Fund on a statutory footing to address the problem of handling the major public expense of supporting those whose livelihoods depended on the income of a man no longer able to earn it in full. The principal aim of the project was to prevent the misuse of public funds, for example by dismissing claims for injuries that predated the war, but it also

454. Tony Kushner, 'Local Heroes: Belgian Refugees in Britain During the First World War'. *Immigrants & Minorities* 18, no. 1 (March 1999): 1–28.
455. Kushner.
456. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd February 1915.
457. Janis Lomas, '"Delicate Duties": Issues of Class and Respectability in Government Policy Towards the Wives and Widows of British Soldiers in the Era of the Great War'. *Women's History Review* 9, No. 1 (March 2000): 123–47.
458. M. A. Gadsby, M. A. 'Finding Jobs for Great Britain Disabled Soldiers Provisions for Disabled Soldiers', *Monthly Review of the U.S. Bureau of Labor Statistics*, no. 6 (1917): 1137–54

included ‘provision for the health, training, and employment’ of disabled men, with the intention that they become able to support themselves in their postwar condition.[459] As with the process of recruitment, the day-to-day work was delegated to local committees. In March 1917, the Nottingham committee wrote to the College to request assistance with the training of discharged soldiers and sailors. The Senate was instructed to devise a suitable scheme.[460]

After the end of the war, not all of those leaving the forces were disabled or injured. Many, nevertheless, needed to rebuild or restart their lives and careers. In this the College was also in a position to help. Supported by the Ministry of Labour, the College offered courses in wireless telegraphy and trained discharged soldiers as electrical and cinematography operators. These classes were sufficiently subscribed to warrant division into several smaller classes. In addition, number of experimental lectures had been delivered to wounded soldiers, and members of the Army Pay, and Records Departments.[461]

Part Three: The Mobilisation of the College’s Expertise

If the recruitment and military training activities of the College could be attributed to its position as an institution for the development of young people, and its munitions training work the product of its physical training capacities, a third branch of institutional war service came through its position as a centre of intellectual expertise. This work, which was mirrored in other college and universities in combatant nations, stands as Nottingham’s most significant contribution to the war effort and the area of work in which the role of higher education institutions was unique.

The particularities of the First World War, among them its industrialised nature, the desperation borne of attritional stalemate and the demands that it placed on society, would carve a dedicated role for intellectual and scientific expertise. The Great War was an arms race at its most acute and urgent. For the historian H.A.L. Fisher, who was in post as Vice-Chancellor at the University of Sheffield when war broke out, the conflict was a ‘battle of brains … a war of chemists, of engineers, of physicists, of doctors. The professor and lecturer, the research assistant and the research student have suddenly become powerful

459. Naval and Military War Pensions, &c, Act, 1915 (3) (1) (j).
460. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 27th May 1917.
461. *Nottingham Journal and Express*, Friday 20th December 1918 p5.

assets to the nation'.[462]

Fisher's comments, which were made while the war was still in progress, included a coded acknowledgement that the war also provided an opportunity for the nation's scholars. 'Before the war', he noted, 'some people may have doubted whether the Universities were properly discharging their function in the economy of National life'.[463] The contribution of their skills and expertise enabled academics to prove their value in an instrumentalist manner. This would have long-term implications not just for the public perception of academia but for its structural position in society.

The scholarly community had not been immediate converts to the cause of war. Prior to the formal declaration of war, academics had been among the strongest voices urging peace. As July gave way to August and the practicalities of mobilisation made war almost inevitable, scholars collaborated on a 'peace manifesto', acknowledging Germany's role as a 'nation leading the way in arts and sciences', and war with her to be 'a sin against civilisation'.[464] However, the signatories, drawn from several universities and including Sir J.J. Thomson, who would later be instrumental in mobilising the academic community to war work, noted that in the event of war, 'patriotism might still our mouths'.[465] So it turned out. The invasion of Belgium by Germany shifted political realities and brought public opinion along with it. For the academic community, the defining crime was the sack of Louvain, and in particular the destruction of its university by arson. This atrocity was cast as an assault on civilisation itself and, more than any other event, brought the war to the gates of the university.[466]

Academia, like the population at large, is subject to a spectrum of opinion, which at this time ran from unbending pacifism to jingoistic belligerence. By September, British intellectuals, like the rest of the British public, were largely supportive of the war. The posters of Lord Kitchener pointing his finger, of a regretful father wishing he had a more honourable war story to tell his children and of the women of Britain saying 'go', have become the dominant visual representations of propaganda in the war. Despite this, such efforts were not simply (or even principally) directed by an interventionist government, but a 'complex process by which intellectuals and others (who needed little prompting from the

462. H.A.L. Fisher, *British Universities and the War: A Record and its Meaning*. London: The Field & Queen (Horace Cox). Ltd, 1917, Preface p. xiii.
463. Fisher, Preface p. xiii.
464. 'Scholars' Protest Against War With Germany', *The Times*, Saturday 1st August 1914 p.6.
465. 'Scholars' Protest Against War With Germany', *The Times*, Saturday 1st August 1914 p.6.
466. Irish, Chapter 1.

state) constructed and propagated meanings that expressed what the war meant for them'.[467] Public opinion was mobilised by a 'powerful reflex of unity' that 'focused on defining the national or imperial cause and stigmatising the enemy'.[468]

Nevertheless, academia's general support for the war, and the motivation for assisting in the achievement of war aims, bears some particular scrutiny.

Academia had a troubled reputation before the war. As Fisher's comments suggested, scholars were considered remote, elitist and even effete. On the demonstration of Marconi's trans-channel wireless telegraphy system in 1899, scientists were described as living 'on a plane beyond the influence of the passions and prejudice which move ordinary mortals' and engaged in a project that might forge a closer union between Britain and France. This, coming at the height of the Dreyfus Affair, was considered suspect and something that might be better deferred 'until France has returned to her senses'.[469] Comments such as these took the notion that scholarly work was ignorant of the concerns of ordinary people and fused them with a more dangerous assertion that academics were too internationalised to express true patriotism. The rise of Germany as the prominent rival to Britain heightened such suspicions further still.

Prior to 1914, academia in general and hard science in particular, was avowedly Germanophile. The system that governed the new universities had been largely imported from Germany and the pioneering Humboldt University to, *inter alia*, the 'institutionalisation of the German influence, the professionalisation of disciplines, the creation of new areas of study, and the reform of existing institutions'.[470]

At the level of the individual scholar, German influence was profound, albeit not universal. A steady stream of British students elected to study in Germany, the rate increasing up to the 1880s and slowing, but not ceasing after 1890. This was partly in response to the poor quality of British research institutions, relative to their German counterparts. British[471] research facilities improved after the 1880s and a return traffic of German scholars made their way to British institutions and, in a fair number of cases, to positions of eminence.

This warmth of feeling towards, and sense of fellowship with, Germany was not always

467. John Horne, 'End of a Paradigm? The Cultural History of the Great War', *Past & Present* 242, no. 1 (22 January 2019): 155–92.
468. John Horne, *Companion to World War I* (Hoboken: Wiley, 2004).
469. *Nottinghamshire Guardian*, Saturday 16 September 1899 p4.
470. Stuart Wallace, *War and the Image of Germany: British Academics, 1914-1918* (Edinburgh : Atlantic Highlands, NJ, USA: J. Donald Publishers ; Distribution in the United States of America and Canada by Humanities Press, 1988) p5
471. Wallace p5.

shared by the public at large. Such feelings fluctuated from 'Germanophobe to Germanophile according to political and imperial developments' in the decades prior to the war, particularly after unification created political unease and stoked competitive tensions. By the end of the nineteenth century an 'Anglo-German estrangement' was evident.[472]

As war approached, this national estrangement hardened and suspicion extended to domestic Germanophiles, with the elitist academic community falling briefly out of step with the mass of public opinion. This disconnection was made plain in October 1914 when the BAAS elected the German-born physicist Arthur Schuster as its president. This move, made after war was declared, earned the BAAS accusations of treason and disloyalty and claims that it had fallen 'under alien control'.[473] Schuster himself, despite a long and successful career in Britain, had to contend with personal mistrust. The police seized a wireless receiver and associated equipment from his house. Despite Schuster's protestations that it was not capable of transmitting messages, the confiscation was evidence of the suspicion of treacherous intent.[474] Schuster was at this time also the Secretary of the Royal Society and, in this capacity, would be instrumental in the mobilisation of British science. Whatever his motivations, which may have been simple patriotism for his adopted home, this mobilisation offered him and his academic contemporaries a path to public acceptance.

Throughout the war, the 'mobilisation of expertise' can be organised into two broad categories: self-directed volunteering and responses to direct requests for assistance. The self-directed civilian work (regarded here as distinct from the traditional, and more widespread, military volunteering) initially took the form of simple adjustments to work that had been already planned. There is, for instance, evidence of a changed focus in the programme of public activities, most prominently the talks and lectures that had been a function of the College since its founding. In September, Rev T.G. Colton substituted his planned series of lectures on Florentine art for one on the causes of the war.[475] The changed profile persisted. The following academic year, Professor Bond and Mr Hewitt shared responsibility for delivering a course of six lectures on 'War in our Literature'. By then, traditional evening lecture topics had returned. Bond and Hewitt's course was accompanied by courses on

472. Keir Waddington, '"We Don't Want Any German Sausages Here!" Food, Fear, and the German Nation in Victorian and Edwardian Britain', *Journal of British Studies* 52, no. 4 (October 2013): 1017–42.
473. Heather Ellis, 'Men of Science: The British Association, Masculinity, and the First World War', in Marie-Eve Chagnon and Tomás Irish, *The Academic World in the Era of the Great War* (Palgrave-Macmillan, 2017), pp45-46.
474. *Pall Mall Gazette*, Tuesday 20th October 1914 p4.
475. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd September 1914.

'American Thinkers' and 'Greece, the Mother of True Culture' by Professor F. S. Grange.[476]

Nevertheless, the discussion of war-related topics was a natural reflection of the intense public interest in an overwhelming current event (indeed, it would have been curious if the war had been absent from these discourses), but they stand as an example of how the College was able to rapidly direct its strengths to solving the needs raised by war.

This focus is evident in the activities of academics in Nottingham, where it was enthusiastically accepted that the College had a national duty. On the first Friday of October, the College welcomed as its guest Professor Paul Vinogradoff, Corpus Professor of Jurisprudence at Oxford, who had been invited to speak under the auspices of the University Society of Nottingham and the East Midlands. The Russian's welcome was an exceptionally warm one; he was received not just as an eminent intellectual but also as a representative of Britain's national ally in the war. Alderman J.A.H. Green, acting as Chair, introduced Vinogradoff as 'one of that great nation, with whom we were allied in a tremendous conflict of Christian culture against pagan barbarism'.[477]

On the subject of culture, Vinogradoff had something to say on the role of academics in a time of war, a historical moment that conveyed a certain responsibility on the intellectual. Following his disquisition on the social classes of Russia, Vinogradoff noted that he himself came from the intelligentsia, a class 'longing to serve the great ideal and to merge their insignificant existence in the great common cause'. The Bishop of Southwell, in moving a vote of thanks, noted also that 'it was the duty of universities to teach people how to understand the problems that lie not merely before Russia but before the British Empire'.[478] Both claims were received with enthusiasm.

In the first months of the war, the prominent duty of the public spirited academic was to supply authoritative information of an explicatory and persuasive nature. It was in this vein that the Professor principally spoke in his lecture on Russian society. His home country, he said, had been until recently the subject of a German fallacy, in which it was cast as a 'barbarous power', a calumny that could not survive the most rudimentary historical inquiry. A taste for Russian literature, music and painting had been common in western artistic circles for some time, but the country itself remained a mystery to the British.[479] 'One redeeming

476. *Nottingham Journal* Saturday 17th July 1915, p7.
477. 'Russia's Pressing Problem', *Nottingham Journal*, Saturday 3rd October 1914 p6.
478. 'Russia's Pressing Problem', *Nottingham Journal*, Saturday 3rd October 1914 p6.
479. Caroline Maclean, *The Vogue for Russia: Modernism and the Unseen in Britain 1900-1930* (Edinburgh University Press, 2015).

feature of the war', suggested Vingradoff, 'was that it drove to inquire into the explanation strange events, and forced us to get rid of many prejudices and to revise many estimates', and such revisions could properly be guided by college and university academics.[480]

This 'situational Russophilia' continued to be supported by the College. Russian classes were first offered in the academic year 1915-16, with the Muscovite Mr B. Slepchenko appointed to deliver the lessons to both day and evening students. alongside a series of five lectures on Anglo-Russian relations.[481] These lectures, and the broad interest in war-related subjects, would continue throughout the war. In January 1915, Rev. W. Temple, MA gave a public lecture on 'Christianity and the War' and over the following months, Professor J.A. Todd of the Department of Economics, gave a series of lectures on 'Trade and the War', in which he expounded on how the economic crisis had developed before a single shot had even been fired.[482]

Some Nottingham figures had a special zeal for this work. Reginald Charles Francis Dolley, who had been at Nottingham since 1910, was made Director of History in 1912 and appointed Professor two years later at the age of 27, was an enthusiastic public speaker, who joined his Nottingham colleagues in providing lectures to the Workers Educational Association.[483] Like several of his colleagues, he tended to offer the opening lectures of his autumn courses to the public. In his first year as Director, the initial lecture of his course on 'the British constitution as it works in practice today', was offered with free admission.[484] The following year, the opening lecture of 'the history of our own times; Europe during the nineteenth century', was likewise open, albeit at a fee of 7/6.[485]

The subjects of these lectures suggest an engagement with contemporary issues (in contrast to Dolley's precise academic specialism of seventeenth century history) and an interest in bringing such concerns to a wider audience. His talk on the practicalities of the British constitution was fully designed as a 'popular lecture' intended for the average citizen who would not want, or indeed have time, to read through a great mass of literature on the subject'. Dolley himself appears to have been a consummate speaker, able to convert even the driest of subjects into engaging orations.[486] .

480. 'Russia's Pressing Problem', *Nottingham Journal*, Saturday 3rd October 1914 p6.
481. *Nottingham Journal*, Saturday 17th July 1915 p7.
482. *Nottingham Journal*, Friday 29th January 1915 p6; *Nottingham Daily Express*, Wednesday February 10th, 1915, p6.
483. *Nottingham Journal*, Monday 22nd January 1912.
484. *Nottingham Journal*, Friday 4th October 1912 p8.
485. *Nottingham Journal*, Monday 6th October 1913.
486. *Nottingham Journal*, Saturday 5th October 1912 p8.

The early months of the war coincided with his usual season for public work. His autumn lectures that year, distinctly flavoured with the concerns of 1914, were titled 'The Rise of Modern Germany' and concluded with an assessment of post-Bismarck Germany and the 'growing antagonism' between Germany and Great Britain in the west, and with Russia in the east'.[487]

The peculiar circumstances of that year also prompted him to leave the lecture theatre and undertake activities directed more explicitly at a general public audience. In November he was invited to give a pair of public lectures at the High Pavement Chapel Lecture Hall under the heading 'The War: Before and After' with the goal of channelling public opinion to secure a 'just and lasting peace'. Dolley's lectures, which reportedly attracted a large audience, were given on the broad subject of 'Europe as a single state in the past'. The first lecture was on the peacefulness of the Roman Empire, a 'great peace empire' which went to war only in a defensive capacity.[488] At the second lecture, Dolley expounded a view on the causes and effects of the French Revolution with regard to international relations and on nationalism, which he described as the 'self-assertion of individualism in nations'.[489]

In addition to his academic expertise, Dolley also lent his authority as a man of learning and status. He spoke twice in one day at a large recruitment rally in October 1915, where he made a 'strong appeal' in favour of recruitment. His preferred argument was that there was a specific honour in volunteering. For the voluble Dolley, the patriotic young men of Nottingham should not wait to be conscripted, thereby earning the label of one who had to be forced to go but should instead go of their own demonstrable volition. Taking the King's shilling, he added, would provide the recruit with 'free rations, good wages and a good chance of a foreign trip'. He offered this in good humour and, with equally crowd-pleasing aplomb, handled a protestor whose stage invasion he dismissed with a quip.[490]

Dolley, born July 1887, was himself of military age and in good health but despite his public advocacy for volunteering, remained in post at the College until November 1915 when he was forced to resign his Professorship following a private scandal with a female student, Kathleen Gladish. He left his marital home in Nottingham and returned, briefly, to live with his parents in Hertfordshire, from which location he volunteered as a cadet with the Inns of Court OTC. He accepted a commission in the Sherwood Foresters in January 1917 and was

487. *Nottingham Evening Post,* Monday 26th October 1914 p2.
488. *Nottingham Daily Express*, Friday 6th November 1914 p4.
489. *Nottingham Daily Express*, Friday 13th November 1914 p4.
490. *Nottingham Evening Post*, Monday 4th October 1915 p3.

killed in action near Arras that July. For a long time, it had been believed that Dolley had resigned at Nottingham in order to serve but this appears to have been a convenient fiction, albeit a fatal one, put about to disguise the actual circumstances of his leaving.[491] As the example of his colleagues show, resignation was not a prerequisite of accepting a commission. Indeed, there were strong financial incentives not to do so.

None of this diminishes Dolley's abstract support for the war, which appears to have been genuine and heartfelt. Whatever the circumstances of his recruitment to the regiment, it was nevertheless done voluntarily, and the word of his fellow solders attests to a committed soldier. It may have been that Dolley felt his position as a 'civilian recruiting sergeant' was a more valuable use of his gifts and social standing, than his personal enlistment. He remains, nevertheless, Nottingham's principal example of the academic as public advocate for war.

In addition to the increased demand for armaments and military equipment, the war created other pressures of resourcing. The severing of diplomatic and trading connections with the Central Powers restricted imports with those countries while the effects of naval blockades created supply problems even from allied and neutral countries. The issue of developing substitute or alternative materials was considered as a technical problem to be solved.

In early 1915, the University of Sheffield established a Scientific Advisory Committee, under W.E.S. Turner of the Chemistry Department, with the intent of supporting local manufacturers in solving technical problems, chiefly those connected with the war.[492] This initiative, which was reported in the national press, was explicitly mimicked at Nottingham, where a Scientific and Technical Consultative Committee was formed of the Principal plus the professorial staff from the science and economics departments, *viz.* Bulleid, Barton, Carr, McMillan, Kipping, Robinson, Swinnerton and Todd.[493] Todd, of the Department of Economics was appointed Honorary Secretary and their first meeting was arranged for the

491. The narrative of Dolley having resigned to accept a commission appears to have emerged from Wood (1953) who described the resignation and commission as *subsequent*, though not explicitly *consequent*, events. Since then, the two events have been conflated in university literature. This narrative appears in Michael Jones et al., *History at Nottingham: Teaching, Research and Departmental Life from the 1880s to the Present* (Nottingham, University of Nottingham, 1995) and in Dolley's entry on the Nottinghamshire roll of honour. The truth of the case emerged after the opening of file UR43 M&SC in 2016. This file, closed under the 100-year rule, contains correspondence connected with the case. For a summary of the events surrounding Dolley's exit from Nottingham see Sarah Edwards, 'The Female Student on Trial, 1910–1915: Dorothy M. Gladish Versus University College Nottingham Versus Oscar Wilde', *Women's History Review* 26, no. 6 (2 November 2017): 880–99. The detail of the break-up of Dolley's marriage is suggested by his Commonwealth War Graves Commission entry in which it is noted that his wife had reverted to her maiden name.
492. Mathers p78.
493. UNMASC UCN/G/4 Minutes of the Senate of University College Nottingham, 25th January 1915.

22nd February 1915.[494]

> The approach of the Committee is interesting in that it illuminates not only the nature of the support needed by businesses, but also the geography of the College's horizons at this time. Like the Sheffield organisation that inspired it, the focus of the initiative was firmly local and it devoted much of its early energies to seeking a collaborative partnership with the Nottingham Chamber of Commerce, to which it sold itself as willing to aid manufacturers to find alternatives to goods 'hitherto made in Germany or Austria' and who were 'hampered by the difficulty of not having anywhere to apply to for scientific and technical assistance in carrying out unfamiliar processes'.[495]

The Chamber was enthusiastic, accepting the collaboration by unanimous vote and even suggesting the name of the Committee. Details were circulated among its members, but three inquiries had already been received and dealt with by members of the committee.[496]

The function of the Committee was to 'direct manufacturers, experimenters, and inventors to scientific and technical literature bearing upon the difficulties with which they were presented in dealing with new problems', and to 'put manufacturers into communication with suitable scientific and practical expert opinion'

Care was taken to prevent the encroachment of the College onto the commercial expertise of the town, with an undertaking that 'no work will be done by the committee which can in the ordinary professional way be dealt with local experts', though such experts would be welcome to co-operate with the initiative.[497]

In appointing Todd as the Honorary Secretary of the Committee, the Council recognised his facility for the public and policymaking aspects of academic work, a talent that would be further reflected in the trajectory of his career.

Todd, who had been born in Glasgow in 1875, was an economist and former solicitor who had been Lecturer on Economics and Public Finance in the Khedivial School of Law, Cairo immediately prior to his arrival at Nottingham. His appointment as Nottingham's first Chair of Economics and Commerce was made alongside the appointment of H.H. Swinnerton

494. As a mark of the local effects of shortages, the beginning of 1915 saw the Council issue a call for economy in the use of glassware in UCN's laboratories. Alternative production methods of glassware were among of the principal concerns of the Sheffield Committee under Turner. January 1915 also saw the launch of a course in 'Scientific German' at UCN, as a means of compensating for the loss of native German speakers in scientific circles.
495. *Nottingham Evening Post* Wednesday 3rd February 1915 p3.
496. UNMASC UCN/G/4 Minutes of the Senate of University College Nottingham 25th January 1915.
497. *Nottingham Evening Post* Wednesday 3rd February 1915 p3.

as Chair of Geology and Geography and W.H. McMillan as Chair of Mining, three new professorships that were deliberately intended to signal UCN's drive towards full university status.[498]

The selection of Economics and Commerce as one of the new Chairs had been made on the recommendation of Professor Sydney Chapman, Dean of the Faculty of Commerce and Administration at the University of Manchester.[499] Chapman, a close contemporary of Todd in age, was an ardent proponent of the expansion of his discipline and of the development of productive links with business and government.[500] Todd shared these views and began work at Nottingham in the same spirit, making 'rapid headway' and earning 'golden opinions throughout the city'.[501] Both men would go on to place their energies at the disposal of the government during the war.

Todd's principal research interest at this time was the cotton trade. He gave a paper on the effects of labour costs on the American cotton industry at the International Congress of Tropical Agriculture in June 1914.[502] On the outbreak of war, Todd adapted his focus to consider the implications of the conflict on his specialist commodity as well as the wider economic and financial effects.

In the early months of 1915, Todd gave a course of four public lectures on 'Trade and the War'. These presentations were made in association with the Chamber of Commerce, with which Todd was then collaborating on the Scientific and Technical Consultative Committee. The first of these lectures, which took place on the 9th February, took as its focus the effect of the war on the world's trading system. This, the professor assured his audience, directly affected 'a town like Nottingham, whose transactions were largely concerned with foreign trade'.[503] The international credit system, although 'most wonderful and extraordinary', was vulnerable to shocks. The events of the July days, during which 'foreign debtors could not find the means of remitting to stockbrokers…because the usual methods of sending goods, selling securities, or drawing new bills were all impossible, and no gold was anywhere available' meant that the financial system had suffered before a single combat shot had been

498. Wood p55.
499. *Nottingham Daily Express* Wednesday 30th September 1914 p4.
500. . Keith Tribe. 'Chapman, Sir Sydney John (1871–1951), Economist and Civil Servant'. *Oxford Dictionary of National Biography* (Oxford University Press 2004).
501. Nottingham Daily Express Wednesday 30th September 1914 p4.
502. *Nottingham Evening Post*, Tuesday 30th June 1914 p5.
503. *Nottingham Daily Express*, Wednesday 10th February 1915 p6.

fired.[504]

Having despaired of the effects of a diplomatic crisis on finance, Todd's gloomy outlook was deepened by outright war. His research in this area was published in the *Bulletin of the Imperial Institute* and warned of a 'cotton famine', should the war continue beyond 1915.[505]

An academic of a particularly modern type, Todd recognised that if his research was to have the impact that he intended, he needed to cultivate his public profile on a national level. While still at Nottingham, he spent a year as Special Lecturer on Economics at the University of the Panjab, Lahore, and took the opportunity to investigate Indian cotton production at first hand. Increasing the use of Empire cotton in place of American cotton became a theme of his research and his public advocacy. In July 1916 he duly published further commentary on the 'World's Cotton Supply' in the Trade Supplement of the *Times* in August 1916, warning that price speculation was forcing prices to heights not attained since the American Civil War.[506] By December, with the price of American cotton still high, he described the problem as having become 'acute' and urged the government to apply a system of licensing and control to ensure the quality of India's cotton exports, making them suitable for the British market.[507]

He summarised his arguments in a lengthy article in January 1917, decrying the 'complacency' that he had observed and stressing the 'need for action' on the supply of cotton. The US market was insufficient for British needs and should be considered unreliable. The Empire had plenty of suitable grounds for cotton growing in West Africa, but mainly in India, which had an established cotton sector that, subject to intervention, could be swiftly made ready for the purposes.[508]

Todd's public agitations finally reached the ear of government and in May 1917 he was invited to carry out a formal inquiry into 'certain economic questions of general interest' and that he would be required to divide his time between Nottingham and London. The Council, having been assured that these new duties would not 'materially interfere' with his responsibilities to the College, granted him the authorisation to proceed.[509]

Having planned to spend just two or three months on this work, Todd's governmental duties proved to be lasting. By the end of 1917, he had been appointed Secretary to the

504. *Nottingham Daily Express*, Wednesday 10th February 1915 p6.
505. John A. Todd, 'The War and the World's Cotton Crops' in *Bulletin of the Imperial institute* v. 13 1915.
506. Referenced in *The Times*, Tuesday 29th August 1916, p3.
507. *The Times*, Friday, 15th December 1916, p5.
508. 'Cotton Supply: The Need for Action', *The Times* Friday, 19th January 19 1917, p8.
509. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 27th May 1917.

Empire Cotton Growing Committee at the Board of Trade.[510] A few months later he was additionally appointed secretary to a Board of Trade committee investigating the supply of flax.[511]

It appears that, although his public role was growing, Todd kept trying to serve two masters for some time. He continued to conduct research and to publish. His book, *The Mechanism of Exchange: a Handbook of Currency, Banking and Trade in Peace and in War* was put out in 1917. In it, he attempted to make economics, a subject he asserted 'had come into its own' because of the war, accessible to 'the elementary student or by the business man who wants to understand how economic problems affect him in his business'.[512] For Todd, the war had been an intellectually invigorating event, giving his discipline a newly immediate relevance and prompting him to expend heroic energies in communicating his ideas to his fellow academics, to policymakers and the general public.

Despite his evident enthusiasm, his workload had by 1919 become unsupportable. He advised the College Council that 'the time was here for the appointment of a permanent Professor of Economics and Commerce'.[513] His successor, Adam Willis Kirkaldy, who had been Professor of Economics and Finance at the University of Birmingham, was appointed in March 1919.He[514] shared his predecessor's concern for the practical application of economic analysis and 'wanted the universities to train men who could go out and make their mark on the commercial, industrial and financial life of the community'. To this end, he instituted a three-year honours diploma that combined study in the sciences, humanities and economics with the aim of producing just this type of man. This, and his assiduous cultivation of contacts in the local business community, did not endear him to his College colleagues, at least according to the institution's historian A.C.Wood, who was his contemporary.[515] However, his interests appear to be a continuation of the approach taken by Todd and may have been a factor in Kirkaldy's appointment.

Meanwhile, Todd remained as Secretary to the Empire Cotton Growing Committee until

510. Empire Cotton Growing Committee. Report to the Board of Trade of the Empire Cotton Growing Committee. Command Papers Cmd 523 XVI.13.
511. *The Times*, Tuesday, Feb. 26, 1918, p6.
512. John A. Todd, *The Mechanism of Exchange: A Handbook of Currency, Banking and Trade in Peace and in War*. London: Humphrey Milford, 1917 pp v-viii.
513. UNMASC UCN/G/4 University College Nottingham Appointments Committee 28th January 1919.
514. *Nottingham Journal and Express*, Thursday 20th March 1919 p5. A.C. Wood's history of Nottingham places the transfer from Todd to Kirkaldy to 1917, a date that is not borne out by the documentary evidence, but which may reflect Todd's frequent absences from that year on.
515. Wood p115.

at least October 1919.[516] Although he was by this point effectively a full-time civil servant, Todd continued to be associated with UCN and to present himself as a public academic.[517] He continued to teach, lecturing at Balliol College from 1918-1923 but was not to return to Nottingham. In 1923 he accepted the position of Principal at the City School of Commerce in Liverpool, remaining there until his retirement in 1940.[518]

A Nottingham man whose wartime efforts were comparable to those of John Todd was Professor Charles Bullied, who had been Chair of Engineering since 1912. Like his colleague in Economics, Bullied bolstered his academic work with strong links to business and industry. He took First Class Honours in Mathematics (1904) and Mechanical Sciences (1905) at Trinity College Cambridge and spent two years in demonstrating and lecturing in the Engineering Laboratories at Trinity before leaving for industry.[519] He served an apprenticeship in the locomotive department of the Midland Railway, where he took part in the tests of the first superheater engine built by the MR and then joined Parsons Marine Steam Turbine Company in Wallsend-on-Tyne.[520] His appointment at Nottingham marked a return to academia that was effectively permanent, notwithstanding the temporary interruptions of war.[521]

As we have already seen, Bulleid established a wartime role for himself via the local Armaments Committee and by opening his workshops to Cammell Laird for gauge testing and the training of novice munitions workers.[522] However, his involvement with munitions continued and in January 1917, at the direct request of Louis Pearson, then Chairman of the Nottingham Armaments Committee, he was appointed General Manager of the National Shell Factory. He was permitted to take special leave from the College for this work, with the condition that he continued to 'undertake the general responsibility of the Department and conduct classes one morning and one evening per week and that his remuneration for his services to the Council be £150 per annum'.[523] Despite these conditions, Bulleid's work at the

516. *The Times* of Friday 17th October 1919 describes Todd as Secretary of the Committee. The Report to the Board of Trade of the Empire Cotton Growing Committee. Command Papers Cmd 523 XVI.13, notes that he had been replaced (apparently temporarily) by his assistant, Captain C.R. Eddison on 28th August 1919.
517. *Nottingham Evening Post*, Tuesday 16th December 1919 p1.
518. Warn Young and Frederic S Lee. *Oxford Economics and Oxford Economists*. Basingstoke: Macmillan, 1993 p218.
519. 'Obituary. Professor Charles Henry Bulleid, OBE, 1883-1956', *Proceedings of the Institution of Civil Engineers* 6, No. 1 (January 1957).
520. 'Engineering at Nottingham: Prof. C. H. Bulleid, O.B.E.', *Nature* 164 (9 July 1949): 55.
521. 'Obituary. Professor Charles Henry Bulleid, OBE, 1883-1956', *Proceedings of the Institution of Civil Engineers* 6, No. 1 (January 1957).
522. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd February 1916 and 28th March 1916.
523. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd January 1917.

factory monopolised his energies and in June he oversaw (or requested) the appointment of a temporary lecturer to compensate for his absence from the College.[524]

This was to prove a percipient move. In January 1918 he received a yet more demanding calling when he was appointed Chief Engineer of the Admiralty School of Mines at HMS Gunwharf in Portsmouth, an important commission that was to last for the remainder of the war.[525] He was retained on UNC's staff as Consultative Professor of Engineering and paid a salary of £100 per annum (inclusive of £50 per annum to the Superannuation Fund) on the understanding that he resumed his duties and position at the College on the Termination of his engagement with the Admiralty.[526] At the close of hostilities he duly returned to UCN where he carried out researches on the fatigue of cast iron and on the vibration of shafts.[527]

Appeals for assistance were also received from external and official sources. One of the earliest direct requests for assistance came in the autumn of 1914 when Sir Arthur Schuster, formerly the Langworthy Professor of Physics at the University of Manchester, wrote in his capacity as Secretary of the Royal Society to Professor Kipping, to enquire 'whether the Chemical Department of the College would be willing to assist in the supply of certain Drugs and Medicaments needed in connection with the Medical Services of the Army and Navy'.[528] Although the College Council gave Kipping its sanction to assist Schuster, the precise nature of this assistance remains unknown, as does the reasons for Schuster to have contacted Kipping in the first place. Kipping was an inorganic chemist by personal specialism, and, purely in professional terms, was unlikely to have been the principal choice for provision of medicaments. However, he had been elected a Fellow of the Royal Society in 1897 and it is this networked connection that seems the likeliest link.[529]

Further work was handed to Kipping by the War Committee of the Royal Laboratory, which asked him to 'undertake the preparation of certain organic compounds' for Government purposes.[530] It is unclear how much (if any) of this work was undertaken by Kipping personally. A handful of chemistry students were involved in unspecified government work in return for fee remission. Richard Parkinson Bothamley and Harold

524. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 26th June 1917.
525. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Minutes of University College Council 15th January 1918.
526. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 19th March 1918.
527. 'Engineering at Nottingham: Prof. C. H. Bulleid, O.B.E.', *Nature* 164 (9 July 1949): 55.
528. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 24th November 1914.
529. Frederick Challenger, *Kipping, Frederic Stanley (1863–1949), Chemist*, ed. John Shorter, vol. 1 (Oxford University Press, 2004), https://doi.org/10.1093/ref:odnb/34335.
530. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 22nd June 1915.

Hayden Barber were granted fee remission in return for carrying out special government work in the chemical laboratory.[531] Bothamley was given similar privileges in 1918, along with a Mr. Foham, in respect of their research being 'of national importance'.[532] Barber took his BSc in Chemistry in 1919, Bottomley in 1924, both went on to pursue research careers.[533]

Kipping also collaborated with industry, working with Dr Francis H. Carr, the Director of Research at the Boots Pure Drug Company to prepare synthetic 'Adalin' (diethylbromoacetylurea) and 'Flavine' as safe wound antiseptics.[534] Carr had previously been at Burroughs Wellcome before being poached by Jesse Boot to improve the research and development operation at the Nottingham firm. His appointment, which had coincided with the outbreak of war, saw the company make great strides in the development of synthetic drugs to combat the shortfall caused by the severing of trading links with Germany. Kipping had a family link to the firm, his son being employed there, but he also had a record of collaboration, having corresponded with Burroughs Wellcome in the early 1900s.[535]

Dr P.E. Shaw was a long-term Nottingham man. He had joined the Physics Department as a junior demonstrator in 1895 and was one of the College's earliest doctoral students, earning his D.Sc at the turn of the century.[536] A workaholic with a 'prim and old maidish' manner, he was regarded as 'an able teacher and lecturer of distinction', and dedicated researcher, who published nearly 40 papers in a thirty-year career.[537] He was also an inventor, committed to the practical (and commercial) application of knowledge.

In 1906 he was named in the Monthly Consular Reports for the US House of Representatives Department of Commerce and Labor Bureau of Manufactures, which reported that, following 'five years of labour', he had succeeded in producing a device that could measure the one seventy millionth part of an inch, and which would be suited to the measuring of engineering gauges. He had been noticed staying at the College after hours to work in absolute stillness, this being necessary for equipment of such delicate sensitivity that

531. UNMASC UCN/G/4 Minutes of the Senate of University College Nottingham October 23rd, 1916.
532. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 19th February 1918.
533. Both men's bachelor's degrees are acknowledged on the list of London University external graduates [https://www.british-history.ac.uk/no-series/london-university-graduates/210-228 Accessed 20/01/2020]. They left publication records in various journals. Bottomley's work included 'The Interaction of Chlorine and Sulphur Monochloride. Preparation of Sulphur Dichloride: Use of Antimony Pentachloride as Catalyst', *Trans. Faraday Soc*., 1928,24, 47-50. Barber's work included 'The Metabolism of Oxalic Acid in the Animal Body'*, Journal of Biological Chemistry,* 1940 Feb;34(2):144-8.
534. S. A. B. Kipping, 'The Research Department of Boots Pure Drug Co. Ltd.' *Chemistry & Industry* (23 February 1961): 302-10.
535. Keith J. Williams, *British Pharmaceutical Industry, Synthetic Drug Manufacture and the Clinical Testing of Novel Drugs, 1895-1939* Ph.D. thesis, 2005.
536. Wood p29.
537. Wood p75.

'even the buzzing of a fly' would disturb its accuracy.[538] Shaw's system substituted point contact for the earlier technique of surface contact and deployed an electric touch method to ensure accuracy.[539]

The pursuit of exact measurement; the science of metrology, remained Shaw's professional passion. In 1911, the Royal Society published his article 'The Measurement of End-standards of Length', a short, technical piece that noted the recent improvements that had been made by himself and others and which alluded to the rather fierce international competition to secure ever more accurate and accepted measurements. The leading figure in metrology at this time was Carl Edvard Johansson, whose 'secret process' for producing gauges was, according to Shaw 'incomparably superior' to anything else on the market.[540]

Shaw's use of the term 'market' was tellingly accurate. The quest for measurement in the early twentieth century was heavily marketised, in the sense both of a competition of ideas and a commercial rivalry. Johansson, a Swede, was in demand for the large US automobile manufacturers Cadillac and Ford and his work was of such import that it ultimately led to the standardisation of the inch, which had heretofore been defined differently across territories.[541] The establishment of common standards and of precise definitions had the paradoxical effect of supporting the internationalisation of trade while driving each country to establish its own (superior) methods of measurement. In the UK, the National Physical Laboratory (est. 1900) was responsible for standardisation. It had been established in 1900 for 'standardising and verifying instruments, for testing materials, and for the determination of physical constants'.[542]

In this environment, Shaw's expertise was in high demand, a situation only exacerbated by the war. When, in May 1916, he proposed forming a department dedicated to the subject, interested from local business was immediate and serious. Representatives from Rolls Royce expressed the company's 'extreme interest' in the proposed department and, in particular, the opportunity that the company might have to use the College's new apparatus as an alternative to the National Physical Laboratory. Such was Rolls Royce's interest that they offered a contribution of £50 towards the department's expenses. At the same time, £10 was offered by

538. United States. Bureau of Foreign Commerce, United States. Department of Commerce and Labor Consular Reports: Commerce, Manufactures, etc, U.S. Government Printing Office, 1906.
539. 'A New Measuring Machine', *The Engineer*, 20th July 1906 p73.
540. P.E. Shaw and John Henry Poynting, 'The Measurement of End-standards of Length' *Proceedings of the Royal Society*, Volume 84 Issue 574, 15 February 1911.
541. John Gaillard, 'Carl Edvard Johansson: Grand Master of Industrial Measurement 1864-1943 (obit) *Industrial Standardization and Commercial Standards Monthly*, October 1943 p. 293.
542. The National Physical Laboratory: Our History, https://www.npl.co.uk/history [accessed 08/03/2020].

the Mayor of Nottingham, Mr J.G. Small.[543] Further business donations were received that summer from Taylor and Hobson Ltd of Leicester and the Nottingham firms Moses Mellor and Sons, the Castle Tobacco Factory, Manlove Alliott & Co, Turney Bros and Ruston Proctor & Co.[544] Later donations of £10 each were made by W.J. Furse, J.W. Windely and British Ericsson Co.[545] The new department was duly set up and Shaw placed in charge.[546]

Installed at the head of his new department, Shaw remained as steadfast in his work as he had ever been and sustained his links to business. In June, he addressed the Nottingham Chamber and introduced its member to his machine for measuring the 25,000th part of an inch and spoke of the importance of scientific standardisation in engineering.[547]

Shaw was as committed a teacher as he was a researcher, and it is as a taught subject that Metrology can be considered innovative at Nottingham. It was, according to Shaw himself, 'the first educational institution where the study of metrology was pursued'. The boon to industry was obvious, with Nottingham trained engineers entering the trades already primed with theoretical and practical knowledge. This, it seems likely, was the principal interest of the department's industry sponsors. Shaw's department also served his colleagues, offering 'a distinct improvement in the accuracy of all scientific departments of the college'.[548]

It was an auspicious time for Shaw's discipline. He proudly described the 'extraordinary developments' that had been made 'in the matter of gauge-making and precision screw-cutting, with the result that now [the United Kingdom] could take equal rank with the United States, Germany, or any other country'.[549]

For him, the primary motivator was the war. The sudden demand for improved and more plentiful munitions focused minds and budgets. Like the munitions business itself, this was a distributed phenomenon. Prior to the war, 'practically only one firm was definitely engaged upon standardisation for one article', but by 1919, 'every engineering concern in the country was devoting its whole energies to the task'.[550]

Another important aspect of the war was Britain's loss of access to German industrial expertise. In Nottingham, this was felt most keenly in the lace trade, which had heretofore

543. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 23rd May 1916.
544. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 27th June 1916.
545. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham Council 26th September 1916.
546. *Nottingham Evening Post*, Tuesday 19th December 1916 p3.
547. *Nottingham Daily Express,* Wednesday 7th June 1916 p4.
548. *Nottingham Daily Express*, 14th March 1918.
549. *Nottingham Daily Express,* 14th March 1918.
550. *Nottingham Daily Express*, 14th March 1918.

relied on imports of precision-engineered machine needles from Germany. The Nottingham Embroidery Manufacturers' Association approached the College in 1916 to seek assistance, likely in response to the call for business enquiries made through the Chamber of Commerce. Shaw made measurements of the German needles still in British possession and was able to set out their precise dimensions to enable perfect copies to be produced domestically. After the war, Shaw was rewarded with emphatic and public thanks for his expertise by manufacturers English and Sons, Perkins and Sons and Abel Morrall Ltd, with the latter claiming that Dr. Shaw's work had given them the 'knowledge they previously lacked regard to the requirements of a Shuttle Embroidery Needle'. They were, they said, 'much indebted to him'.[551]

In Shaw's mind, the interplay between research, industry and national ambitions was fluid and natural. Shortly after the war, he contributed some arguments to a series of articles written by UCN staff for the local press. These pieces were designed to set out the demand, accelerated by the war, for a full university to be instituted in the East Midlands, with UCN the obvious nucleus. Shaw's article elevated the role of science and technology to a 'matter of life and death', a perspective that might have seemed natural in the immediate aftermath of the "chemists' war". Nevertheless, Shaw warned of a general apathy, the evidence of which he could already detect by 1920, and forcefully made the case that that 'every natural science found useful in war (and they are all useful) is equally essential in prosperity and peace'. Once again, the country could be compared to the United States and to Germany and be found wanting. There was, Shaw reminded his readers, 'a scientific hustle on'. In peace, as in war, science and technology was of national importance and the fostering of expertise should be regarded as a public good.

'At present', warned Shaw darkly, 'we waste too many mute inglorious Newtons, Kelvins, and Darwins', men who, even on a purely economic estimation, were 'worth untold millions to *the nation*' (my emphasis). The incubator of such talented national assets was, and could only be, the university.[552] Expertise had won the war. It could surely win the peace too.

551. *Nottingham Evening Post*, Saturday 13th November 1920 p3.
552. *Nottingham Journal and Express*, Tuesday 23rd March 1920 p5.

Chapter Five: Peace and a Changed Landscape

Introduction

Peace came upon a world that had significantly changed from the one in which war had arrived. Such changes were evident in higher education and, in particular, in the relationship that it had with the state. Even as the war continued, efforts were made to regulate and organise state control of higher education and research, to make it more effective, efficient and subject to a careful degree of control.

These innovations, several of which were the result of decades of lobbying, were not intended to act as mere wartime contingencies, but instead represented a permanent shift in the public administration of universities and comparable institutions.

For University College Nottingham, the postwar years offered an opportunity to return to the ambitions that it had had prior to 1914, not least of which was the goal of gaining full university status. Although this aspiration was to prove impossible in the immediate term, new opportunities also arrived, principally in the person of Jesse Boot, Nottingham's pharmacy magnate, who gave the institution its own plutocratic benefactor, with pockets as deep as John Owens, Josiah Mason and Mark Firth, who had done so much to advance the growth of the universities of Manchester, Birmingham and Sheffield respectively.[553] Boot's largesse provided the College with new facilities, a new home and an increased institutional heft.

This chapter outlines these national and local developments and contextualises them as the result, not just of wartime necessity, but of longstanding efforts and trends for which the war was a catalysing, rather than causal event. It addresses the establishment of two standing bodies, the Department of Scientific and Industrial Research and the University Grants Committee, that formalised and made permanent the new relationship between the state and institutions of higher education and research. It also examines the immediate postwar events in Nottingham and the attempts, only partly successful, to capitalise on this newly energised public support.

Part One: The Formalisation of State Support

553. See page 60

It has become a commonplace to describe the First World War as a caesura. This is the case with the broad example of the war itself and also with some of its smaller effects. In the case of the present topic, the founding of the Department of Scientific and Industrial Research (DSIR) in 1915, has been regarded as a major break with earlier forms of public science. For most of the decades that followed, the establishment of a standing public committee (which was very quickly elevated to a full Department), marked the 'end to piecemeal support and…was therefore a watershed' moment at which the state finally accepted its responsibility to finance and direct research following years of agitation in that direction.[554]

However, this process represents a mere 'formalisation' - and necessarily an expansion - of a pattern that had been emerging for several decades. The birth of public science in Britain can be traced back to the middle of the nineteenth century. Frank Turner, who described the nineteenth and early twentieth centuries as 'the premier age of British public science', suggested three phases of development.[555]

The first of these phases lasted from the early nineteenth century to the Great Exhibition. During this period, prominent scientists such as Charles Babbage, Sir Humphrey Davy and Sir David Brewster urged the importance of science as a mode of useful knowledge. The second phase, from the 1840s to 1870s saw leading scientists use their position to challenge the dominant position of the clergy, equating the advance of science with the progress of civilisation.[556] The third phase commenced after 1875 and was represented by a shift in rhetoric, with a focus on nationalism, military preparedness and patriotism.[557]

This phase, and the turn of the century, marked a major shift in thinking about the value of science to the nation and of the role of government in financing and organising innovation. The threat of economic and military competition created a clarity of mission for science that fostered the emergence of a 'lobbying' mentality that was more strident and targeted than that present in earlier generations.

The *Exposition Universelle*, which was held in Paris from April to November 1867, led to feelings of disquiet among British delegates, attitudes that were articulated by Colonel

554. Andrew Hull "War of Words: the Public Science of the British Scientific Community and the Origins of the Department of Scientific and Industrial Research, 1914–16." *The British Journal for the History of Science* 32, no. 4 (1999): 461–81
555. Frank M. Turner, 'Public Science in Britain 1880-1919'. *Isis* 71, no. 4 (December 1980): 589–608.
556. The pattern of development through these two phases is outlined in detail in Chapter One
557. Frank M. Turner, 'Public Science in Britain 1880-1919'. *Isis* 71, no. 4 (December 1980): 589–608.

Alexander Strange, who warned the British Association of the threat of Germany, both economic and military.[558]

Mark Pattinson, the Rector of Oxford wrote favourably of research activities in 1868, noting that 'the preservation and tradition of *useful* knowledge…is in the common interest of the whole community' (my emphasis).[559] However, despite Pattinson's view that such work was to the national benefit, he stopped short of endorsing direct state funding, preferring an endowments model.

There were calls for stronger state involvement in some quarters. The Devonshire Commission (1872) led to expectations that the state would encourage and recognise science. It recommended a ministry of science and a science advisory council, an early concrete example of demand for formal support. However, its proposals largely fell on deaf ears and the decade saw just a handful of small-scale schemes, such as the Parliamentary Fund for Scientific Research (1877-1882), administered by the Science and Art Department, and an annual grant to the Solar Physics Committee.[560]

However, the Devonshire Commission had a lasting impact in that it 'closed the era of voluntarism and individualism in public science by declaring that henceforth only the resources of the nation-state would be sufficient to support modern science'.[561] This marked a definitive break in thinking that would underpin the technical responses to the war. It also meant that the attitude of politicians and the political classes could no longer be ignored by the scientific community, a mutual relationship that would be further strengthened by the acute demands of war.

The impetus for state financing of scientific research was military in nature. The army and navy had been the major channels of state funding to scientists throughout the nineteenth century, offering a clear precedent for public funding for national security reasons.[562] Scientists soon argued that the contemporary British political structure failed to address genuine, self-evident national problems because it lacked scientific procedures itself.

By the turn of the century, some research was funded by the general support to universities and university colleges administered by the Board of Education and the Treasury

558. Frank M. Turner, 'Public Science in Britain 1880-1919'. *Isis* 71, no. 4 (December 1980): 589–608.
559. Mark Pattinson, *Suggestions on Academical Organisation with Especial Reference to Oxford*, (Edinburgh: Edmonston and Douglas 1868) p327
560. Roy M. McLeod and E. Kay Andrews, 'The Origins of the D.S.I.R.: Reflections on Ideas and Men, 1915-1916' *Public Administration*, Volume 48, Issue 1, March 1970 Pages 23-48.
561. McLeod and Andrews.
562. Frank M. Turner, 'Public Science in Britain 1880-1919', *Isis*, Vol. 71, No. 4 (December 1980), pp. 589-608 p601.

Grants Committee (the forerunner of the University Grants Committee).[563] This was plainly insufficient for the growing demands of economic and military competition. Consequently, a governmental champion emerged, who not only straddled the military and scientific interest, but also had the necessary reforming zeal to achieve lasting policy change.

This man was Richard Burdon Haldane, the Liberal Member of Parliament for Haddingtonshire, who served as Secretary of State for War from 1905 to 1912. His was a reforming appointment. The 'Haldane Reforms' rebuilt the British Army following the trials of the Boer War and established the Expeditionary Force that would form Britain's initial fighting force in the First World War.

Haldane was also an intellectual with family links to science.[564] His brother, John Scott Haldane, was a respiratory physiologist who contributed to British understanding of the chemical weapons deployed by Germany in the trenches, while his nephew, (and John's son) John Burdon Sanderson Haldane, was a Fellow of the Royal Society who became a postwar advocate for the use of chemical weapons.

R.B. Haldane's interest in science was of an active and organising type. While serving as an MP, he joined the nascent British Science Guild (BSG), acting as political champion and serving as its first President, continuing to do so even after he had been appointed to Government.

The BSG was an interest group with a commitment to advocacy. Its objectives were to 'bring together all those interested in science and the scientific method…to convince the people…of the necessity of applying the methods of science to all branches of human endeavour'.[565] It laid special emphasis on engaging with industry and education.[566] For Haldane, the Guild had 'great work' to do in advancing science in a country 'where science is not as much appreciated as it should be'. His confederate, the industrialist and former MP Sir William Mather, urged the BSG to encourage the universities 'where the bounds of science may be extended, or where new applications of science may be discovered'. The Guild was, from the outset, concerned with the pursuit of knowledge for practical ends.

It boasted a powerful membership with which to do that. In addition to its illustrious President, it counted among its early Vice Presidents leading scientists, politicians and

563. McLeod and Andrews.
564. John Campbell. *Haldane: The Forgotten Statesman Who Shaped Modern Britain* (C. Hurst & Co. 2020).
565. The British Science Guild: its objects and its Aims, Pamphlet, British Science Guild, 1905 p1.
566. The British Science Guild: its objects and its Aims, Pamphlet, British Science Guild, 1905 p1.

military men, among them Sir Norman Lockyer FRS, the discoverer of helium and the founder and first editor of *Nature*, Admiral Sir Cyprian Bridge, the botanist Sir Joseph Dalton Hooker and Joseph Chamberlain (who was himself a Fellow of the Royal Society). From its very inception, the BSG was an organisation of formidable resources, with an abundance of social and political capital.

That these pursuits should be the responsibility of the state was implicit in the constitution of the Guild, which included among its objectives the duty to 'bring before the Government the scientific aspects of all matters affecting the national welfare'.[567] For the BSG, and increasingly so as the decade wore on, the 'national welfare' meant imperial power and British supremacy, a perspective that was shared by 'various professional middle class groups, including civil servants'.[568] Chamberlain, in a letter to the *Times*, had already expressed this view in starkly combative terms; 'university competition between states is as potent as competition in building battleships, and it is on that ground that our university conditions become of the highest possible national concern'.[569]

With a prominent Liberal as President but an increasing conservative attitude among its leadership, the BSG was emblematic of the cross-party acceptance of the role of the state in supporting science. The view was also shared by elements of the Left. Sidney Webb, writing in a pamphlet for the Fabian Society, asserted that even 'the man in the street, though he knows nothing accurately, has got into his mind the uncomfortable conviction that Germany and the United States are outstripping us, not merely in general education and commercial "cuteness", but also in chemistry and electricity, engineering and business organisation in the largest sense'. Webb's recommendation was to increase the public grant to the universities to half a million per annum and to use these enhanced funds to furnish 'a dozen perfectly equipped faculties of science, engineering, economics and modern languages'.[570]

Webb had noted that a prominent obstacle to this goal was Whitehall's tendency towards 'official pedantries on this point' and that it would take a skilled politician to cut through them. In the event, this politician was Haldane, whose task was to take the broad acceptance of state-sponsored research and make it a practical reality. He was supported in this endeavour by his close friend William McCormick, who would become the leading figure in

567. The British Science Guild: its objects and its Aims, Pamphlet, British Science Guild, 1905 p1.
568. Turner.
569. *The Times*, 6 November 1902.
570. Sidney Webb, 'Twentieth Century Politics: A Policy of National Efficiency', *Fabian Tract No. 108* (London: The Fabian Society, 1901 p15.

the formalisation of state support.

In 1906, McCormick was invited to lead a Treasury committee to 'advise the Treasury as to distribution of the grant in aid of colleges furnishing education of a university standard'.[571] Three years later the Board of Education established a special department to examine ways of supporting technical and medical training in universities. This department was led by Frank Heath, who immediately sought a partnership with McCormick to develop ideas for research funding schemes. A further committee, chaired by A.H. Dyke Acland, was formed in 1913 with the express intention of administering university scholarships and exhibitions.[572]

The establishment of a standing committee, particularly one led by an able administrator such as McCormick allowed for a proper review of the funding system that had emerged in piecemeal stages. By this time, the Board of Education, the Board of Agriculture and the Treasury had accrued responsibility for financing different elements of university research. This had naturally led to duplication of responsibility and wasteful overlap.[573] McCormick's Committee was able to examine this system and make recommendations for rationalisation. An example of this overlap was the awarding of grants 'for general education of a University standard in Letters and Pure Science' by the Treasury and for 'education of a similar standard concerned with technical and professional subjects (including the training of teachers)' by the Board of Education.[574] These grants were transferred wholly to the Board of Education in 1910, along with McCormick's Committee.[575]

These tentative steps showed a drift towards structuralised administration of research. They created, in embryonic form, a central state apparatus and gave influential civil servants the opportunity and incentive to examine the 'scarcity of research manpower and to the needs of industry'.[576] In particular, the accrual of responsibility in the hands of a single individual, McCormick, fostered a unity that made administrative cohesion almost a formality. Even so, it would take the outbreak of war, and the early lessons that it provided in the technological challenges of industrialised conflict, to supercharge these efforts.

Britain's scientific community responded to the challenges and opportunities of the war with alacrity. As early as October 1914, a strident editorial in *Nature* noted that while the

571. Treasury Minute, 31 January 1906.
572. McLeod and Andrews.
573. Berdahl, p54.
574. Berdahl, p54.
575. McLeod and Andrews p26.
576. McLeod and Andrews.

country's young men and women were being engaged in military service and medical duties, the 'class of fellow-subjects' that constituted the nation's brainpower had not yet been subjected to any co-ordinated effort of mobilisation.[577]

The sudden and urgent necessities of war fostered a 'tightening of the bonds between science and government' and a realisation that the calls for more concerted national scientific effort and public financing of research had not been groundless. Britain was heavily dependent on imports for military materials, with items such as 'drugs, dyestuffs, and optical equipment' having been heretofore sourced from Germany.[578]

Although scientific advisers had 'for years' been attached to the technical branches of the armed forces, the war demanded a concentrated effort. The article stopped short of calling for governmental co-ordination, noting that the War Office (in which the author naturally assumed such responsibility would lie) had plenty to be getting on with. Instead, it suggested that efforts should be volunteered by elite membership organisations, such as the Royal Society and the British Science Guild.[579]

The War Office did indeed have a full agenda in the later months of 1914, but the Board of Education, with its responsibility for administration of university grants, had the capacity to consider the question. Christopher Addison MP, Parliamentary Secretary to the Board of Education, a medical doctor and published anatomist, was a keen advocate of government responsibility for scientific work. He drafted a plan to link scientific and industrial efforts and presented it to Lloyd George (a personal friend) with a request for Treasury support. The Chancellor, who had also been lobbied on similar matters by William McCormick, was more than receptive. Addison's scheme, he suggested, could be even more ambitious. Addison had the Chancellor's full support.[580]

This support, however fulsome on Lloyd George's personal part, was contingent on the realities of the time. The Government had immediately had to seek over £300m of public credit (£35bn in 2020) on the outbreak of war, while 1914's Spring Budget had to be revised in a supplementary Budget in November, doubling income tax and super tax and increased duties on beer and tea. The Budget announcement also saw the issue of the first of the Government's war loans, raising a further £350m.[581] The Chancellor was forced to persuade

577. 'Science and the State', *Nature* (Vol. 94 No. 2348 29th October 1914) p221.
578. Gummett pp22-23.
579. Gummett.
580. McLeod and Andrews, pp26-27.
581. Lloyd George, *War Memoirs*, p73.

Addison to limit his ambitions.[582]

In a sign of the confusion, uncertainty and competing priorities of the time, Addison was then accosted by Haldane and urged not to compromise in his proposals.[583] Haldane suggested founding a small committee to examine the issue in detail. It was at this point that the question of financing higher education for the training of students was separated from the matter of advanced research. Addison set to work examining the needs of teaching, while his colleague Frank Heath took responsibility for research, or what was described as 'the industrial side of the programme'. As McLeod and Andrews note, no surviving documents record the reason for this division of labour, either in practical or ideological terms.[584] Nevertheless, although teaching and research were to chart a tightly paralleled course through Whitehall and beyond, these preliminary reviews recognised the different needs and pressures that obtained in the two missions of high education. This division would ultimately be recognised in national policy.

Heath's proposals were comprehensive and ambitious. He took the view, perhaps more palatable in war than in peacetime, that the entirety of the state had a stake in productive research and that the needs of all departments should be considered. He also advocated for the recognition of the universities and colleges as the natural home of state-backed research.[585]

The proposals were taken up, along with Addison's work on training, by Sir Joseph Pease, President of the Board of Education, and presented to the Cabinet. Pease's[586] memorandum followed the approach taken by Heath and Addision but placed an even greater emphasis on outside expertise. The organising committee should, Pease suggested, consist of 'scientists, traders and other persons selected *because of their personal fitness*.' (My emphasis).[587] The argument that scientists were uniquely qualified to guide science policy was now being championed in government. As work continued on these proposals, events transpired that would strengthen this argument yet further.

Sir John French, Commander-in-Chief of the British Expeditionary Force, was concerned

582. McLeod and Andrews.
583. McLeod and Andrews.
584. McLeod and Andrews p27.
585. McLeod and Andrews.
586. TNA Ed. 24/1581. Proposals for a Scheme of Advanced Instruction and Research in Science, Technology and Commerce, April 1915.
587. TNA Ed. 24/1581. Proposals for a Scheme of Advanced Instruction and Research in Science, Technology and Commerce, April 1915.

about the poor supply of munitions to the front. In the spring of 1915, he conspired with his friend, the newspaper proprietor Lord Northcliffe, to place stories in Northcliffe's papers criticising the government for failing to supply sufficient armaments.[588] The disastrous outcome of the Battle of Aubers Ridge on 9th May 1915, in which British casualties topped 11,000, while inflicting fewer than 1000 on the German side, marked an opportune moment to sway public opinion.[589]

It was also an opportune moment for certain elements of the Government. Although a 'domestic political truce' had held since the declaration of war, a more formal arrangement was proving necessary.[590] The disastrous Dardanelles campaign, championed by Winston Churchill against the wishes of Admiral Jacky Fisher, led ultimately to the resignation of both men and precipitated a political crisis. The combination of cabinet instability and public clamour for concerted action helped carry support for a formal coalition government and for the establishment of a war economy. The ad hoc approaches that had been taken from autumn 1914 would come to an end. This would prove critical for advocates of a co-ordinated policy for science and innovation.[591]

The issue of supply as an essential component of the war effort was not new. Indeed, Kitchener had even mooted the fusion of War Office and the Board of Trade. Despite this, the first months of the war saw only a cursory attempt to address the issue in practice. Two committees, one on shells and the other a Treasury committee and both led by David Lloyd George, had engaged with the question, but with very little impact. The matter required full ministerial attention and executive power; nothing less than a dedicated ministry would do.

In July 1915, Haldane presented his White Paper, 'Scheme for the Organisation and Development of Scientific and Industrial Research'.[592] It was the culmination of the argument that Haldane and his confederates had been making for years and, despite its overt concern with the crises that occupied the government in 1915, was unmistakably the product of longer-term thinking.

The paper refers to the 'special need [that] exists at the present time…for additional state assistance in order to promote and organise scientific research' and notes the special

588. Adams (1978) p32.
589. James Edmonds, (1928). Military Operations France and Belgium, 1915: Battles of Aubers Ridge, Festubert, and Loos. History of the Great War Based on Official Documents By Direction of the Historical Section of the Committee of Imperial Defence. Vol. II (1st ed.). London: Macmillan. For more on Aubers Ridge, see p121.
590. Adams (1978).
591. Adams (1978) p35.
592. Scheme for the Organisation and Development of Scientific and Industrial Research, Command Paper 8005, July 1915.

circumstances that the war had created. However, these circumstances, and in particular, the poor condition of British science relative to Germany's, was a product of peacetime. A central issue was Britain's 'inability to produce at home certain articles and materials required in trade processes', manufacturing having been left to develop overseas and particularly in Germany, where 'science has there been more thoroughly and effectively applied to the solution of scientific problems bearing on trade and industry and to idle elaboration of economical and improved processes of manufacture'.[593]

The nation was facing an acute crisis in 1915, but the situation had been created long before the war had started and would, Haldane averred, continue into peacetime absent any adjustment in policy.

Consequently, the focus of the White Paper was the end of the war and the 'difficult period of reconstruction' that would follow the cessation of hostilities.[594] It was explicitly not a proposal for the improvement in supply of munitions, which were properly the domain of the War Office, the Admiralty and the Ministry of Munitions, but instead a suggestion for a permanent resetting of the state's relationship with science, industrial innovation and advanced training.

It bore all the hallmarks of the debate that had been underway for decades. The principal rival, unsurprisingly, was Germany, the scientific culture of which had been 'more thoroughly and effectively applied to the solution of scientific problems bearing on trade and industry and to idle elaboration of economical and improved processes of manufacture' than had been the case in Britain.[595] Germany, it was clearly implied, was better organised in these efforts and, if Britain was to stand any chance of competing, it would have to mimic its great enemy.

The principal focus of the proposal was therefore in the administration of scientific and industrial activity. At its heart was a recommendation for centralisation and rationalisation. The administration should cover the entire kingdom, taking 'as little regard as possible for the Tweed and the Irish Channel'. This was not merely an ideological position, but a practical one, and one that recognised the advances that had been made in higher education institutions outside London, Oxford and Cambridge. Support for research should be made provided to 'the most effective institutions and investigators available, irrespective of their location'.

593. Scheme for the Organisation and Development of Scientific and Industrial Research, Command Paper 8005, July 1915.
594. Scheme for the Organisation and Development of Scientific and Industrial Research, Command Paper 8005, July 1915.
595. Scheme for the Organisation and Development of Scientific and Industrial Research, Command Paper 8005, July 1915.

The practicalities of the proposal encompassed a central funding scheme, administered by a committee of the Privy Council with the support of a dedicated Advisory Council consisting of 'eminent scientific men and men actually-engaged in industries dependent upon scientific research'. This Council would be responsible for advising the Committee on proposals for instituting specific research, proposals for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades and the establishment and award of research studentships. The fruits of any research so funded would 'be made available for the public advantage'.

It was recognised that the natural home for much of this work (and the natural destination for the funds) would be the universities and colleges, which would not only carry out the research, but also advise on training needs so that the supply of qualified personnel could be maintained.

The Advisory Council was designed as a force multiplier for the intellectual power of the state. Its assorted eminences would offer not just their own expertise, but also leverage their contacts and networks in the wider academic and scientific community. Deliberate provision was made for the Council to consult with associations such as the Royal Society, which would be prevailed upon to issue calls for research proposals for consideration.

The Council, it was anticipated, would also generate its own sub-committees 'reinforced by suitable experts in the particular branch of science or industry concerned' to allow for special focus to be made on critical areas of enquiry.

For all the well-rehearsed arguments, the scheme still needed to win over a cynical Treasury. The war may have offered an unarguable case for reform but it was also a huge, energy-sapping crisis that placed unprecedented demand on the capacity of the state and 'financial constraints militated against any step which was not manifestly essential to the war effort'. This understandable concern for the public purse was not eased by the involvement of the Board of Education, long regarded as irresponsibly profligate.[596] The ultimate passage of the scheme through the objections of the Treasury offers an insight into how the circumstances of war acted as an advocate for reform.

Once again, the presence of a sympathetic personality proved crucial. The Permanent Secretary to the Treasury at that time was the mathematician Sir Thomas Heath FRS, who

596. McLeod and Andrews p36

shared the view that science deserved greater support.[597] His was a powerful voice in support of the scheme at a critical time. His Fellowship of the Royal Society also proved useful. As noted above, the RS had long acted in a formal consultative position to the Government and held a great deal of credibility and political capital. An idea was floated for the Royal Society to control the putative committee but the delegation of publicly funded responsibilities outside of the formal structure of the state was a non-starter. Ultimately, it was reasoned that the Royal Society had been involved in the development of the proposals and that members of the advisory council would naturally be Fellows in any case, the RS would be a *de facto* element in the oversight of its activities.[598]

The objections to placing the new body in the Board of Education went beyond mere concerns for its spending habits. The work would necessarily cover all four nations of the Union, which meant responsibility would exceed the territory of the Board. The Board of Trade was posited as a preferable host, not just because of its whole-country remit but also because of its concern with Industry. The Board of Trade, however, did not want the responsibility and the new body would instead be constituted as a special Committee of the Privy Council with oversight of the Advisory Council.[599] William McCormick was appointed Chairman in June.[600]

Overall, the proposal was a crystallisation of the strategies that Haldane and his confederates had been advocating for a decade. It was a blueprint, offered at the most opportune moment, for a modern, and permanent, system of research administration. The content of the proposal was not shaped by the war; the war had simply provided evidence of the need and the consensus of opinion required to complete the reforms.

The Committee for Scientific and Industrial Research was allocated an initial budget of £25,000. In its first year, it made twenty awards for 'scientific investigations of industrial importance'. It additionally made grants to a number of individual researchers, including students, of a combined value of £6,000. The Royal Society was awarded a grant of £4,250. For its second year, the Committee's budget was increased to £40,000.[601]

Appropriately, for a body that had been established to impose order on an organically

597. McLeod and Andrews p37.
598. McLeod and Andrews p38.
599. McLeod and Andrews p38.
600. McLeod and Andrews p39.
601. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.

arrived system, the approach of the Committee was considered and methodical. It determined that the priority for support should be the practical, rather than the pure, sciences. Acknowledging the symbiotic relationship between the two strands of scientific enquiry, the Committee nonetheless recognised that it needed to deliver results quickly. It also had to establish a reputation for effectiveness with the business community, with which it sought partnership.[602]

Further partnerships were also pursued, again in a methodical manner. In addition to the Royal Society and the Chemical Society, overtures were made to professional societies such as the Institute of Chemistry, the Society of Chemical Industry, the Society of Public Analysts, the Society of Dyers and Colourists, the Royal Institute of British Architects, the Faraday Society, and trade associations such as the British Electrical and Allied Manufacturers Association, the Silk Association, the Staffordshire Pottery Manufacturers Association and the Federation of Master Printers, all with 'gratifying results'.[603]

Contemporaneous approaches were made to the universities and technical colleges with requests for information that would support the compilation of a 'register of researches' that had been underway at the outbreak of war. The Committee gathered intelligence on the names of researchers, the topic under consideration and the cause for its abandonment if, as was often the case, work had been suspended. This work, the Committee averred, was a necessary prerequisite to the establishment of a 'systemic programme of aid'.[604]

This audit recognised the critical impact that the war was having on research, even in its first year. The universities described a situation in which they had been 'so depleted of both students and teachers' that they were 'barely able to continue their routine work'. In several cases, this depletion of resource was putting existing schemes of research in 'grave jeopardy of enforced abandonment'.[605]

Of that first cohort of twenty research projects, eleven were re-financed schemes that had already been underway, while the remaining nine were new initiatives. The technology of materials appears to have been a priority; research included optical glass (led by the National

602. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.
603. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.
604. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.
605. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.

Physical Laboratory), hard porcelain (Stoke Central School of Science and Technology/the Staffordshire Potteries Manufacturers Association) and tin and tungsten (Institution of Mining and Metallurgy). This last example was one of several funded projects that was collaborative in nature, the Institution worked with several privately-owned laboratories, Cornish mining companies and the Royal School of Mines, which was then based at Imperial College.[606] An examination of the flow of steam through nozzles was led by the Institution of Mechanical Engineers, which conducted the practical work at the University of Manchester, Glasgow Royal Technical College and in several private firms.[607] Government finance was thus dispersed through a multitude of organisations with a variety of resources, not least of which was the intellectual capacity of universities, colleges, companies and learned societies. It was a *de facto* network of expertise operating under central control.

Its early years were marked by systematic expansion. By December 1916 it had become clear that as the 'work of the Advisory Council developed and the industrial side of research grew in bulk and importance', it warranted elevation to a full department, capable of holding and administering its own funds.[608] The charter that created the department gave the Lord President and six of his officers the power to hold funds and enter into contracts and agreements. In addition to the general expansion of its work, this also allowed the department to hold in trust the sum of one million pounds for the financing of industrial research.[609]

This increase in responsibilities was an explicit recognition of the scale and complexity of research. The close relationship between the committee and the organisations and individuals involved in research activities made it impossible to disguise the fact that serious, applicable research required an investment of large sums of money and a commitment of several years. The fact that so many research projects had floundered on the outbreak of war was itself testament to the precariousness of this work. That the government was uniquely placed to support research had been a key argument of the advocates for state financing. With the creation of a spending department, authorised to award grants over a period of 'five to six years', it appeared that they had finally won their argument.[610]

Further moves towards permanence were made. The National Physical Laboratory, which

606. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.
607. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1915-16. Cd. 8336 VIII.469.
608. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1916-17. Cd. 8718.
609. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1916-17. Cd. 8718.
610. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1916-17. Cd. 8718.

was the site of much of the first tranche of funded work, was incorporated into the department, which assumed responsibility for its maintenance and development. At the same time, a dedicated Fuel Research Board was established as a committee of the department under the direction of Sir George Beilby. Having only recently been established as a committee itself, the embryonic department was swiftly acquiring divisions and subsections.

The number of direct research grants increased from 20 in 1915-16 to 44 the following year. Of these, nine were continuations of the original projects while the remaining 35 were new proposals. There were 21 such awards made in 1917-18 (15 of which were continuations) and 28 in 1918-19 (24 continuations).

Supporting researchers was challenging during the war years.[611] From a total budget of £40,000 for 1916-17, only £3,550 was given in awards to just 36 applicants. Such was the depletion in trained personnel. The situation improved in subsequent years; in 1917-18 a total of £7,500 was awarded to 25 students and 86 research workers, and in 1918-19 the numbers increased again to £14,170 between 35 students and 68 workers.[612]

Government action on the funding of teaching followed a similar pattern of gradual, then sudden reform. The war had broken out in the middle of a five-year funding round of the Treasury grant that had been made since 1889.[613] The expiration of this round, in July 1916 offered an opportunity for reform to be considered in Whitehall. This would only be an exploratory review, owing to the challenges of war On 21st March 1916, the Advisory Committee at the Board of Education wrote to the Treasury to review the funding position of Universities and Colleges.[614] The Committee was still principally concerned with the special circumstances of the war, but acknowledged that the issue of core funding would need to be considered.

As it transpired, the universities and colleges managed without further special grants in the 1916-17 academic year.[615] They had proved adept at making savings, although as some universities (notably Leeds) pointed out, some of these savings would only be temporary; reduced enrolments being just one example. The issue of funding higher education in peacetime was emerging as the dominant question.

611. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1916-17. Cd. 8718.
612. Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1916-17. Cd. 8718.
613. See page 66.
614. Taylor p123.
615. Taylor p125.

Here, the most significant figure was Alan Kidd, the Secretary of the Advisory Committee. A close ally of William McCormick and a reformist thinker, Kidd devoted much of his energies in 1916 and 1917 to addressing the matter. In 1917 he prepared a memorandum that outlined the situation in clear terms.

He warned that replenishing the universities after the war would require 'large sums' if it was to be done successfully.[616] For Kidd, 'successfully' meant that higher education would emerge in an improved condition when compared with pre-war realities. This was an opportune time. As Kidd noted, 'the war has quickened, if not created, a general appreciation of the benefits to be derived [from higher education institutions]'. Demand for higher education was spreading and should, Kidd averred, be expanded to more of the population. Noting the reforms to the financing of research in the form of the nascent DSIR, Kidd envisioned major structural reforms, with public financing of capital grants for universities alongside the existing maintenance grants.

> In these ambitions, Kidd had McCormick's support. As John Taylor notes, the acceptance of responsibility for financing higher education was 'testimony to how much had changed in the thinking within Government about higher education in the course of the War'.[617] 'Indeed, the very phrase "higher education", used by Kidd in his memorandum, marked a shift in Government attitude towards an activity central to national development. Perhaps most significant of all was the language of Kidd in referring to a "national scheme"; few observers in July 1914 would have recognised the possibility of any such approach'.[618]

Casual observers may not have recognised this possibility in 1914, but informed insiders certainly did. Indeed, the tenor of Kidd's argument strongly accepted the inevitability of wider and more permanent state support, even in the absence of war. As he noted, 'the demands of scientific and technological subjects are becoming so heavy that the individual institutions and their local supporters cannot hope to meet them unassisted'. Furthermore, 'there is no disputing the fact that additional maintenance grants will have to be provided. The quinquennium for which the Exchequer Grants were fixed at their present rate expired in 1916 and *even had there been no war* the reassessment of the grants would certainly have involved a considerable increase in the total amount' (my emphasis).[619] As with the funding

616. TNA ED 23/93, Advisory Committee on University Grants, Correspondence, 1917–1918.
617. Taylor p135.
618. Taylor.
619. TNA ED 23/93 Advisory Committee on University Grants, Correspondence, 1917–1918.

of research, Kidd's memorandum was a reflection of that certain long term latent trends had been made explicit by the war.

Naturally, these concerns were shared by the universities and colleges themselves. In July 1918, Oliver Lodge, the Vice-Chancellor of the University of Birmingham proposed a deputation of university leaders the President of the Board of Education H.A.L Fisher, to discuss the necessity of additional government assistance. Fisher was supportive and expressed a view that was 'increasingly one of a higher education "system" that spanned the whole of the United Kingdom'.[620]

Approval from the Treasury followed in early 1919 and the Board of Education established the University Grants Committee to 'inquire and report as to the funds which are necessary to meet the needs of the university institutions'. It also made a one-off grant of £500,000 'for the purpose of restoring the universities to their pre-war position'.[621] Thirty-nine institutions were supported by this central grant, forming the core of the 'system' described by Fisher.[622]

Part Two: University College Nottingham After the War

Peace brought an end to the limitations under which the College had laboured since 1914. This was reflected in enrolments; between 1919 and 1921 the number of evening students increased from 1,320 to 1,874 while day students doubled in the same period, from 509 to 1,011.[623] The growth in day students reflected the changed circumstances in quality as well as quantity; many of the new students were ex-servicemen who had taken advantage of government funding schemes for retraining.

The question of state-funded scholarships for higher education was seriously addressed before the war. In March 1913 the Board of Education appointed a consultative committee under the Chairmanship of Arthur Dyke Acland to 'consider the existing provision of awards…for assisting pupils (other than those who have declared their intention to become teachers in State-aided Schools) to proceed from Secondary Schools to Universities or other places of Higher Education' and recommend measures 'for developing a system of such Scholarships and Exhibitions in organic relation to a system of National Education'.[624]

620. Taylor, p141.
621. TNA ED23/93, Advisory Committee on University Grants, Correspondence, 1918–1919.
622. Shinn, p45.
623. Wood p69.
624. Board of Education, Interim Report of the Consultative Committee on Scholarships for Higher Education, May 1916.

The Committee managed ten sittings and interviewed 28 witnesses before its work was suspended for the war. However, as the war went on, the Board of Education took the view that 'the question of further extension and encouragement of scientific and technological instruction and research could not be postponed' and that the intensification of demand required that its work continue.

Like the embryonic Department of Scientific and Industrial Research, to which the Committee made repeated reference, Dyke Acland's panel placed emphasis on practical matters, concerning itself with 'the needs of Commerce and Industry, and with the development of scientific and technological education or the purpose of supplying the Nation with trained students competent to render public service in the industries or in research such as is within the province of the [DSIR]'. Although the war provided additional impetus to its work, the Committee was, like the DISR, focused on permanent alterations to the relationship between higher education and the state and looked ahead to peacetime for the implementation of its recommendations.

The College leadership never fully abandoned their ambition to gain the status of a full university. As Chapter 3 showed, they restated the goal every year on the presentation of the annual report.[625] In the war years, the handbook of the students' union continued to carry the assertion that the institution's aim 'must be the establishment of our University College as a fully endowed and fully chartered university. This is our chief want'.[626]

In 1917, however, there was a decidedly more practical edge to the desire. The establishment, in August that year, of the Ministry of Reconstruction had concentrated minds, in and out of government, on the question of planning for peace. 1917 and 1918 were also years in which educational reform were firmly on the national agenda as the bill that would become the 1918 Education Act made its way through parliament.[627] Although the legislation, known as the Fisher Act, focused principally on school education (among other things, it raised the school leaving age from 12 to 14), it nevertheless touched on the work of further and higher education institutions by improving the scope and quality of secondary education and strengthening the 'ladder' on which students could progress to later education.

This provided UCN with fresh impetus for pursuing university status. In November 1917 the Principal declared that 'the time is now ripe for immediate action to obtain a full charter

625. See pages 84 and 85.
626. Wood p78.
627. Education Act 1918 (8 & 9 Geo. V c. 39).

for the College'. Work began on preparing a scheme for an East Midlands University, headquartered at UCN and on establishing an endowment fund, to repair the critical failing that had prevented elevation before the war.[628]

On New Year's Day 1918, a reconstruction committee was set up to examine plans for an East Midlands University. Its initial progress was promising; the City Council offered to transfer the Shakespeare Street buildings to the new university and make a perpetual grant of £15,000, conditional on the establishment of the University.[629] New homes would also be found for the Free Library and Museum, the support of which had promoted the Council's stake in the College at its founding. This would all be subject to the site reverting to Council control if not used for a university, and that a covenant be established by which the new university would provide higher technical instruction for students of the city of Nottingham.[630] Overtures were made to other local authorities, including Leicester, Derby and their surrounding counties, as well as Nottinghamshire, which also agreed to provide £5000 per annum.[631] Later that year, the Nottinghamshire Education Committee also offered a grant of £5k pa when the university was in being.

In January 1919 a consortium of representatives of local authorities and educational institutions met at the Guildhall in Nottingham to agree the way forward. The group moved to seek a university to 'provide university and advanced technical education and promoting scientific research' for the counties of Derby, Leicester, Lincoln, Northampton, Nottingham and Rutland. An exploratory committee was formed with the aim of preparing a plan amenable to the Board of Education.[632]

As A.C. Wood notes, the case was easy to make on paper. The East Midlands was a coherent region comprising an established combination of counties with historical ties. The region also boasted significant industrial and commercial enterprises that could offer funding and foster demand for trained graduates. Among the various lessons of the war was that modern industry required a supply of well-trained personnel if the country was to compete with its international peers. The absence of a full university in the East Midlands could therefore be regarded (and marketed to decision-makers) as a brake on regional prosperity. In terms of raw numbers, the three million people of the East Midlands had no university, while

628. UNMASC UCN/G/4 University College (Reconstitution) Committee 16th November 1917.
629. UNMASC UCN/G/4 University College Nottingham Court of Governors 11th February 1918.
630. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 19th March 1918.
631. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 14th May 1918 and 16th July 1918.
632. UNMASC UCN/G/4 Minutes of the Council of University College Nottingham 9th January 1919.

the eight million in Lancashire and the West Riding of Yorkshire had four.[633]

The very existence of UCN acted as a further argument in favour of establishing a university. Just as the peripatetic lectures had demonstrated a market for adult education in the Nottingham of the 19th century, the continued success of the university college acted as proof of sustained interest. The war work that the college leadership had so assiduously courted was further evidence that this was an institution capable of university standard work. In another echo of the arguments for founding UCN, a charter would simply formalise an existing arrangement.

However, this argument proved as divisive as it was compelling. It leaned rather too much on the status of UCN and hinted that Nottingham would be the 'natural' head of a combined regional university. For partner towns, particularly Leicester, which had just opened its own university college, a too-robust Nottingham delegation was a threat to civic pride.

With a degree of inter-town sensitivity, work continue to devise a system of organisation. A series of meetings fostered a proposed constitution, based on a Court of Governors with members drawn *ex officio* from local authorities and institutions. This proposal was adopted in October 1921 with unanimous approval but not without some reluctance from Leicester delegates. Still nominally united in June 1922 when Haldane visited Nottingham to lay the foundation stone at Highfields.

Nevertheless, the diplomacy that could, temporarily at least, cover the cracks in the relationship between the towns could not overcome more concrete problems. Between £60,000 and £100,000 would be required annually to support a full university. Two thirds of this sum could be raised by grants and student fees. The remainder would need to come from elsewhere. An endowment of £250,000 would also be required. However, support from the population of Nottingham, which was a necessary prerequisite for local funding, was muted at best. In its forty years as a local institution, UCN had done little to manage relations with the townspeople, who regarded the College as somewhat remote. This attitude was responsible for the local reluctance to the prospect of financing a university through a penny rate in the towns (more remote areas were considered), not least because of the increasingly difficult economic times.

As the 1920s wore on, the unhealthy state of the national economy became an even

633. Wood.

greater impediment. The short boom of the immediate postwar years gave way to depression. In Whitehall, the Geddes Committee sought to reduce government expenditure. This prompted a reduction in the Treasury grant to universities which was reduced in 1922-23. In this climate, the University Grants Committee had a hesitant attitude to founding new universities. Its report of 1923-24 suggested that doing so was neither of necessity nor wisdom. The University of Reading, which obtained its charter in 1926 was the sole exception in the interwar period.

In December 1922, Huntsman was prepared to admit that the ambition was not in a healthy condition. At a meeting of the Court of Governors he acknowledged the hesitance of his partners and expressed the view that, if the other towns decline to participate, Nottingham would go it alone.

By this time, Leicester had won incorporation for its college. The Leicester contingent expressed disappointment that the proposed East Midlands University would be a *de facto* Nottingham University, in which Nottingham's control would far exceed that of Leicester. Dr RF Rattray, the Principal of Leicester University College, opposed the proposed unitary constitution on the basis that it was unfair on Leicester. He suggested running the putative university on a federal basis, with Leicester having equal representation on both Court and Council. The lessons of the brief Victoria University had failed to reach the East Midlands.

Despite some derisory attempts to keep things going, a decisive failure was evident by February 1927 when Huntsman admitted that they could not go on with Leicester. The projected institution would therefore be Nottingham University and not a combined East Midlands one. It would also have to wait. Nottingham did not have resources enough to go it alone.

Jesse Boot inherited a small herbalist's shop from his father John who had died while Jesse was a small boy. The younger Boot had a talent for business and an astonishing work ethic that allowed him to expand that single shop into a nationwide chain of pharmaceutical retail stores. A politically-connected Liberal Party Methodist, Boot was a late example of the nonconformist Victorian entrepreneur, of the sort that had done so much to support the establishment of provincial colleges in the nineteenth century. Having[634] made his millions at the cost of his health, Boot sold his company for £2.3m in 1920 and retired to the Channel Islands, where his mind, like those of his Victorian predecessors, turned to thoughts of a

634. See page 60.

philanthropic legacy.[635]

> While actively running his business, Boot had played no role in supporting the college beyond the sponsorship of a small prize. His part in the College's history began in earnest in July 1920. Huntsman spoke about the College's money troubles at a meeting in Leicester. His comments were picked up by the press and subsequently came to Boot's attention. Boot summoned Huntsman to St Helier. He immediately offered £50,000 'to begin with'. Along with his cheque, he enclosed a note reading, 'from all I hear, the university extension movement seems to be making but little progress. This is surprising in a city the size of Nottingham with so many men of means and proved public spirit, and I do not like to think that my native city should fall in any way short of other large towns and cities'.[636] He suggested that £30,000 should be added to the building fund and £20,000 to endow a chair of chemistry.

Over the next year, Boot made further contributions. The £30,000 for the building fund was topped up with a further £120,000 and he offered the use of land he held on the banks of the Trent. However, on visiting it, he declared it unsuitable on account of the noise from a nearby school. He offered instead the site at Highfields. He had acquired this land with the intention of building a 'Port Sunlight' style workers' town, then thought of giving it for use as a public park. In Summer 1921, on visiting, he decided that it would be ideal for the university.

Part Three: A University in All But Name?

Highfields was duly selected as the site for the new campus. The foundation stone was laid in June 1922 by R.B. Haldane (by then Lord Haldane) who gave a speech in which he revealed that Boot had donated a further £10,000, with a further £100,000 given by an anonymous donor (generally accepted as Boot) who had signed himself 'East Midlander'. The stone-laying ceremony was the focal point of a day-long celebration, which began with Haldane being greeting at the railway station by a student 'rag' and 'initiated into the Order of Bacchus by emptying a full pot of ale'.[637] A luncheon was held, at which both Boot and Haldane gave speeches, the former expressing his hope that 'every poor student of Nottingham and the East Midlands [may] climb every rung of the educational ladder'. For his

635. S.D. Chapman, "Boot, Jesse, first Baron Trent (1850–1931), retail and manufacturing chemist." *Oxford Dictionary of National Biography*. 23 Sep. 2004; Accessed 5 Apr. 2022.
636. Wood p82.
637. Wood p87.

part, Haldane suggested that ‘an almost passionate interest for education had developed among the people’, who would not be satisfied until they had access to the full breadth of educational opportunities.[638]

The parallels with the construction of the College’s original site on Shakespeare Street were profound. Once again, a new building was erected to the sound of hope for a widening of access to education. Once again, prominent local and national figures declared that their project would elevate not just the students but the broader community. Once again, there were clear expressions of greater success to come.[639]

In the nineteenth century, the hope had been that a municipal college would eventually furnish a ‘university-type education’. In 1922, hope remained that Boot’s gifts would become a full university. It was an ambition expressed in stone. The architect of the new building was Percy Morley Horder, selected personally by Boot.[640] Morley Horder’s design was in the classical tradition, white stone with sharply rectangular lines. Its clock tower, lending even greater height to a building already advantaged by topography, is beacon-like. In terms of colour and shape, a literal ivory tower.

This was, as William Whyte notes, part of an interwar trend in higher education architecture. Senate House, though more imposing, shares some resemblance with Nottingham, while the use of Highfields Park as an enclosed campus space was mirrored at Birmingham, Leicester, Exeter and Hull.[641] In short, by the middle of the 1920s, University College Nottingham certainly looked like a university. To become one in reality would take more time.

638. *Nottingham Journal*, Thursday 18th June 1922, p5.
639. See page 79.
640. Whyte p177.
641. Whyte p180.

Chapter Six: Conclusion

This thesis has been completed almost exactly a century on from the laying of the first foundation stone at Highfields. The institution that was built there is now indisputably a university with a capacity that has exceeded even the most fevered dreams of its founders. A member of the Russell Group, the University of Nottingham has expanded to three campuses on two continents. In the present academic year, it has 35,800 full time equivalent students across five faculties. It has an operating budget of £773bn.[642] By any measure, it is a success.

That success was hard-won. Despite the strenuous efforts of its leaders, University College Nottingham did not attain chartered university status until 1948.[643] It was to prove an ambition too far for the First World War generation. Nevertheless, the achievements of those years reflect well on the College, its staff and students and the war was indeed a formative event for the institution, as it was for British higher education as a whole.

It illustrates an issue at the heart of learning as a concept and the socio-institutional purpose of universities. It remains a contested notion. A century and a half since its publication, John Henry Newman's *The Idea of a University* continues to hold sway in debates about the purposes of higher education institutions.[644] The debates, though they have tended to recur through peaks and troughs of activity, can be essentialised into a binary choice. Should universities, and similar institutions, focus on the pursuit of knowledge for its own, morally improving, sake, or should they have a more targeted purpose, to equip students with the skills necessary to succeed in a modern economy and driving researchers to answer questions with a clearly identifiable application?[645]

As this thesis has argued, the First World War was a clearly identifiable application *in extremis*. With the emergence of a war economy in 1915, there was one targeted purpose in which the whole nation was engaged.[646] Of course, this was nothing new in itself. Engines of war, in both a metaphorical and literal sense, have been in demand since ancient times. From the earliest civilisations, rulers sought out experts who could use their ingenuity to provide military and economic advantage over rival states, factions and individuals. Those same

642. Figures for 2021-2022. 'University of Nottingham', S&P Global Ratings, 23rd June 2022.
643. Beckett.
644. John Henry Newman, *The Idea of a University, Defined and Illustrated*. London, Basil Montagu Pickering 1873.
645. Stefan Collini, *What Are Universities For?* (London, 2012).
646. I date this to the crisis when economic and industrial mobilisation was added to the existing military mobilisation that had begun in the late summer of 1914. See page 106.

leaders were furnished with moral arguments for war, not to mention practical guidance of strategy and tactics, that were the product of careful analysis. However, the fundamental driver of all innovation, at a level more basic even than competition, is human curiosity. The pursuit of answers to scientific and humanistic questions have occupied the spare moments of people for as long as there have been people. Practical application and the pursuit of knowledge working together. Newman's arguments must continue unresolved for now.

However, the critical matter is the relation between the state and the academy. This predated the war. The economic success of industrial Britain had fostered an environment in which advanced training and research was made first possible and then necessary. The advent of industrial technology increased the scale and urgency of demand for knowledge. It also made research much more expensive, with the state necessarily taking on an increasingly interventionist role. Jealous of Britain's economic and naval superiority, successive UK governments took responsibility for organising and financing education and research with the explicit goal of remaining ahead of emergent rivals, principally Germany.[647] In doing so, these governments had established a precedent by which supporting education and research was considered a responsibility of the state and, in return, educational and research institutions had adopted a role, albeit perhaps an obscure one, in driving the nation's success. This relationship would prove decisive in the war.[648]

The relationship, encompassing science, industry, economy and society, remained symbiotic with higher education institutions, and in particular, the 'new' colleges and universities that had spread through Britain's urban centres. Local and regional educational initiatives grew into permanent colleges and, latterly, full universities, the first such establishments to have been founded for six hundred years.[649] The expansion of school education had provided these new institutions with regular intakes of young people suitably prepared for further and higher education while the advanced technologies of industry had created an economic demand for the training that they could provide. Industry also required constant innovation and the application of theoretical knowledge to practical problems; knowledge that was produced by research.[650]

The emergence of industrialised weaponry was a development in parallel. The Western Front created unprecedented demand for materiel, disruptions to imports threatened domestic

647. Keith Robbins, *The Eclipse of a Great Power: Modern Britain, 1870-1975* (London; New York: Longman, 1983).
648. Shinn.
649. Green.
650. Berdahl.

food supplies, while the staggering human cost of the war required the constant re-mobilisation of public opinion. In a situation of stalemate, victory would belong to whichever of the opposing powers could make most effective use of its national resources, not just to out-supply, but to out-*think* its rivals.

The nature of the war from this point meant that the economy, of which the colleges were a constituent part, was raided for every possible advantage, whether in direct military activities, such as the supply of war materiel, or in adapting to the wider effects of war, for example in increasing domestic food production to overcome the deficiencies in imports. higher education was an arm of the state. The war simply made this fact inescapable.

Among these resources was the latent expertise of university and college academics. Chemists, physicists and engineers were mobilised to find solutions to the technical problems posed by total war, while their colleagues in the humanities and social sciences lent their intellectual imprimatur to the political case for the war and helped to guide postwar reconstruction planning.

With significant populations of young men, the colleges were key nodes of the recruitment operation in both the voluntary and compulsory phases of military mobilisation. This work took several forms. Implicit recruitment activities included the militarisation of the student body, through initiatives such as the Officers Training Corps and the valorisation of students and graduates who had joined the colours and the 'easing of the path' to recruitment by preserving course places for volunteering students and paying salary allowances to staff on active service. Explicit recruitment activities included the provision of 'military science courses' and other schemes of training designed to provide students with a basic familiarity of military matters before their formal recruitment into the forces. College staff also took part in direct recruitment activities, such as rallies to mobilise public opinion.

Although by no means monoliths of opinion, higher education institutions contributed to the war effort with enthusiasm and energy. Nevertheless, the very attributes that made them effective conduits for recruitment, namely a predominantly young, male demographic profile, also gave them a high level of exposure to the costs of war. They widened their mission while narrowing their resources. This required the pursuit of efficiencies.

This necessitated co-ordination on a national scale and led to the establishment of permanent agencies such as the Department for Scientific and Industrial Research (1915) and

the University Grants Committee (1919).[651] Calls for such organisations had been made prior to 1914 but the realities of total war made their case unarguable. They then fostered the development of the research councils and the systematisation of higher education and research in the United Kingdom.

University College Nottingham (UCN) was, in several respects, a typical product of the environment that fostered the new colleges. It was founded through private philanthropy, lauded as 'a great work of enlightenment and progress', provided vocational training and built on several decades of smaller-scale educational activity in the town.[652] When the government began issuing annual grants to university colleges, UCN was among the first cohort of recipients. However, UCN was also atypical. It was, from the beginning, operated by the town council, effectively a public institution when comparable colleges were still wholly private.[653] When these other university colleges began to receive full university status and the authority to award their own degrees, UCN remained a university college. In the context of the English higher education system UCN was both pioneer and laggard.[654]

The founding of the college was essentially a process of rationalisation. The work of education was already being performed in Nottingham, and elsewhere, but in a piecemeal and fractured manner. National and local governments had already made efforts towards supporting educational and cultural activities but again in a purely *ad hoc* fashion. The establishment of colleges formalised these activities and thereby made them more effective and secure. This process, which comprised the regularisation of governance and the direct application of public financing and administration, was antecedent to a larger one during the war years. Between 1914 and 1920, work that had already been undertaken in a 'free-form' manner, such as the public financing of higher education, the public role of the academic and the performance of research on behalf of the state, was regularised and made more permanent.[655]

Its wartime experiences were also typical of an English higher education institution. Staff and students enthusiastically embraced the war effort, contributing their energies, expertise and, in several cases, their lives to victory. With strong leadership, the College proved itself an adaptable and resilient institution, capable of taking on additional responsibilities of

651. Berdahl pp56-59.
652. 'The Opening Ceremony', Nottingham Evening Post, Thursday 30th June 1881 p3. The remark about 'enlightenment and progress' was made by John Spencer, 5th Earl Spencer.
653. Becket p48.
654. Wood p152.
655. Berdahl Chapter IV.

national importance at short notice and in constrained circumstances.

Nottingham, which as we have seen, had been founded in the public sector, was especially suited to governmental work. The leaders of the College responded to the mobilisation call with alacrity and, as the foregoing chapters have shown, with a fervent patriotic zeal. Although it was by no means unique in pursuing war work, Nottingham's special case gave it a particular impetus that was not shared by other institutions.

It was natural, given the efforts made by the College to this national mission, that its leadership would see it as an opportunity to press for elevation to full university status. Although the ambition had predated the war, it was given a boost by the opportunity for Nottingham to demonstrate its resemblance to other mobilised institutions. This was, however, not a transactional moment and there was to be no 'reward' in the form of a charter.

Indeed, given that much of the College's work during the war was of a technical or vocational character, its mobilisation had the unintended effect of making it appear to be more of a technical college than a university.

Such appearances are important. It is for this reason that the greatest step forward in the College's development came immediately *after* the war, when a single benefactor in the form of Jesse Boot came onto the scene. Boot's largesse provided the College with a new home and impressive physical presence, along with renewed academic energy.

University College Nottingham spent the decade that followed the First World War in a stronger position than it had the one that preceded it. The 1920s were years disappointment as well as advance, but as an institution, the College had come a long way from the *ad hoc* lectures of the nineteenth century. Not a university, but a thoroughly modern university college, it had met its first major test of strength and had passed.

Archival Sources

University of Nottingham Manuscripts and Special Collections (UNMASC)

UCN - Records of University College Nottingham; 1875-c.1950

UCN/A Papers relating to the administration of University College Nottingham; 1875-1960

UCN/A/1 Clerk's Incoming and Outgoing Correspondence; 1881-1913

UCN/A/1/1 Letter Book 2; 1881-1913

UCN/A/2 Clerk's Correspondence files, A-O; 1911-1939

UCN/A/2/1 Papers relating to the appointment of Principal of University College, Nottingham; Apr. 1929 Dec. 1929.

UCN/A/2/2 Five letters relating to the nomination and installation of Principal Professor H.A.S. Wortley as Principal; Nov. 1934 Feb. 1937.

UCN/A/2/3 Papers relating to the Mrs Abbot fund; Nov. 1927 Jul. 1939.

UCN/A/2/4 Papers relating to the creation of a memorial in the form of a scholarship in honour of Dr T. P. Black killed in action in the first World War; Nov. 1915.

UCN/A/2/39 Papers relating to the affiliation of Derby Technical College to the East Midlands University; Jan. 1914.

UCN/A/2/40 Papers relating to the East Midlands University Scheme; Jan. 1919 Aug. 1919.

UCN/A/2/41 Papers relating to the East Midlands University Scheme; Jul. 1920 Feb. 1921.

UCN/A/2/42 Papers relating to the East Midlands University Scheme; Jun. 1921 Jul. 1921.

UCN/A/2/43 Papers relating to the East Midlands University Scheme; Jul. Sep. 1921.

UCN/A/2/44 Papers concerning the conference for the passing of a charter and statutes for the new university; Aug. 1921 Jul. 1922.

UCN/A/2/45 Papers concerning the building and opening of the new University buildings and site; Jun. 1922 Oct. 1923.

UCN/A/2/58 Papers concerning womens' accommodation and the temporary use of Hylton House as a womens' hostel; Aug. 1914 Dec. 1918.

UCN/A/2/68 Miscellaneous papers on the administrative counties of the East Midlands and grants; 11 Nov. 1911 Apr. 1914.

UCN/A/2/69 Papers concerning Board of Education inspections and follow up changes made; Jan. 1914 Dec. 1914.

UCN/A/2/70 Papers concerning effects of war on student intake and the proposed East Midlands University; 1 Jan. 1915 30 Jun. 1918.

UCN/A/2/71 Papers concerning the proposed East Midlands University; Jun. 1918 Dec. 1918.

UCN/A/2/72 Papers concerning the Conference regarding the proposed East Midlands University; 1 Jan. 1919 31 Jan. 1919.

UCN/A/2/73 Papers concerning the Conference regarding the proposed East Midlands University; Feb. 1919 Jul. 1919.

UCN/A/2/87 Papers concerning the cost of building and the ongoing work in erecting the new buildings; 13th Sep. 1924 25th Nov. 1925.

UCN/A/2/88 Papers concerning the cost of building and the ongoing work in erecting the new buildings; 22nd Apr. 1925 31st Oct. 1927.

UCN/A/2/89 Papers concerning the cost of building and the ongoing work in erecting the new buildings; 17th Nov. 1927 8th Aug. 1929.

UCN/A/2/90 Papers concerning the cost of building and the ongoing work in erecting the new buildings; 17th Nov. 1927 8th Aug. 1929.

UCN/A/2/90/1 Papers concerning the cost of building and the ongoing work in

erecting the new buildings; 17th Nov. 1927 8th Aug. 1929.

UCN/A/2/91 Papers concerning the charter for the University of Nottingham; 1921 1939

UCN/A/2/91/1 Papers concerning the charter for the University of Nottingham; 16th Aug. 1921 9 Sep. 1927.

UCN/A/2/91/2 Papers concerning the charter for the University of Nottingham; Apr. 1928 Oct. 1936.

UCN/A/2/92 Papers concerning the proposals for a war memorial; 16th Oct. 1919 20th Oct. 1919.

UCN/A/3 Registrar's Correspondence files; 1903-1954

UCN/A/3/18 Correspondence files, 'University Grants Committee (Blue Book Returns)'

UCN/A/3/18/1 Papers concerning Treasury Grant to the University College; Jul. 1915 Nov. 1919.

UCN/A/3/18/2 Papers concerning Treasury Grant to the University College; Feb. 1921 Jan. 1926

UCN/A/3/18/3 Papers concerning Treasury Grant to the University College; Jan. 1926 Mar. 1929.

UCN/A/3/18/7 Papers concerning the estimated financial year; 1920 1921

UCN/A/3/18/8 Papers concerning financial status of the University regarding application for funds; Oct. 1920 May. 1921.

UCN/A/3/18/9 Papers concerning financial status of the University regarding application for funds; 1922 1923

UCN/A/3/18/10 Papers concerning financial estimates by the University College regarding application for funds; 1922 1923

UCN/A/3/18/11 Papers concerning report by the University College regarding application for funds; 1920 1924

UCN/A/3/18/12 Papers concerning report by the University College; 1920 1924

UCN/A/3/18/13 Papers concerning report by the University College; 1925 1926

UCN/A/3/18/15 Papers concerning grants for the University College; 1928 1929

UCN/A/3/18/16 Papers concerning reports about the University College; 1914 1915

UCN/A/3/18/17 Papers relating to report compiled for the University Grants Committee; 1925 1926

UCN/A/10 Blueprint Plans for Proposed "East Midlands University Nottingham"; 1922

UCN/A/10/1 Architect Morley Horder's blueprints for 'East Midlands University Nottingham' Upper Ground Floor Plan; 1922

UCN/A/10/2 Architect Morley Horder's blueprints for 'East Midlands University Nottingham' Lower Ground Floor Plan; 1922

UCN/A/10/3 Architect Morley Horder's blueprints for 'East Midlands University Nottingham' First, Second and Third Floor Plans; 1922

UCN/A/11 Floor plans of the University College Nottingham building at Shakespeare Street, Nottingham; 1892

UCN/E Early papers of University College Nottingham; 1875-1948

UCN/E/1/1 Letter from Richard Enfield to S.G. Johnson esquire, Town Clerk of Nottingham; 4 Jan. 1875

UCN/E/1/2 Letter from Mr Patchett, clerk to the enclosure commissioners to S.G. Johnson esquire, Town Clerk of Nottingham; 16 Feb. 1875

UCN/E/1/3 Suggested scheme for use of £10,000 endowment; undated [c.1875]

UCN/E/1/4 Documents relating to proposal to construct University College on Nottingham Castle site; n.d.

UCN/E/1/5 Copy of resolutions to be proposed by Mr G.B. Rothera at a meeting

of the Free Public Libraries and Museums Committee; 6 Jun. 1875

UCN/E/1/6 Report of the Public Buildings Committee, Borough of Nottingham; 25 Aug. 1875

UCN/E/1/7 Second report of Public Buildings Committee, Borough of Nottingham; 20 Mar. 1876

UCN/E/1/8 Report of Finance Committee, Borough of Nottingham; 18 Sep. 1876

UCN/E/1/9 Report of Public Buildings Committee, Borough of Nottingham; 30 Oct. 1876

UCN/E/1/10 Copy of Declaration of Trusts for promoting the Extension of University Education in Nottingham; 23 Jul. 1877

UCN/E/1/11 Report of University College and Police Courts Buildings Committee, Borough of Nottingham; 2 Jan. 1878

UCN/E/1/12 List of the Council, Committees and Chief Officials, Borough of Nottingham; 1880

UCN/E/1/13 List of the Council, Committees and Chief Officials, Borough of Nottingham; 1881

UCN/E/1/14 Appointment of Mr Frederick Felkin to serve on the Committee of Management of University College Nottingham; 23 Jan. 1883

UCN/E/1/15 Further Report of the Committee appointed to advise the council with reference to the offer of an anonymous donor to invest £10,000 for public purposes under certain conditions; 11 Oct. 1875

UCN/E/2/1 Copy letter from Richard Enfield to S.G. Johnson, Town Clerk of Nottingham; 31 Jul. 1877

UCN/E/2/2 Suggested Scheme of Instruction addressed by Mr G.B. Rothera to the Town Clerk; 26 Nov. 1879

UCN/E/2/3 Suggested standards of study in the College curriculum; 28 Nov. 1879

UCN/E/2/4 Suggested subjects to be taught at University College Nottingham;

undated [c.1881?]

UCN/E/2/5 Report on the proposed scheme of study by Rev. J.E. Symes; 11 Jun. 1881

UCN/E/2/6 Report on proposed scheme of Instruction by Prof. J.F. Blake; 7 Jul. 1881

UCN/E/2/7 Report of Prof. J.A. Fleming on apparatus required; 7 Jul. 1881

UCN/E/2/8 Report on the Scheme of Instruction in the Physics Department by Prof. J.A. Fleming ; 12 Jul. 1881

UCN/E/2/9 Suggestions as to arrangement of Physics Laboratories; undated [c.1881]

UCN/E/2/10 Report to the College Management Committee by Professor Frank Clowes on apparatus, chemicals, extra fittings and furniture for Chemical Dept; 22 Jul. 1881

UCN/E/2/11 Memorandum for a preliminary announcement of lectures; 26 Jul. 1881

UCN/E/2/12 Handbills announcing classes at University College Nottingham; 27 Jul. 1881

UCN/E/2/13 Prospectus of lectures and classes for the first term of the session 1881-1882; Sep. 1881

UCN/E/2/14 Return of number of students attending lectures and classes in the first and second terms of first session; 1881-1882

UCN/E/2/15 Report of Professors on College Examinations and Classes not connected with Cambridge; 24 Mar. 1882

UCN/E/2/16 Report on Commercial Education on the Continent and Proposals for the Organisation of a Commercial Dept at the College by Dr Charles U. Yates; Nov. 1884

Papers relating to early finance of University College Nottingham; c.1880-1913

UCN/E/3/1 Estimate of income and expenditure of University College Nottingham; n.d.

UCN/E/3/2 Statement of Capital Account, University College Nottingham, from commencement to 18 Feb. 1880; Mar. 1880

UCN/E/3/3 Estimate of income and expenditure made by Messrs Enfield, Paton and Rothera, and outline scheme of teaching for the college; 15 Apr. 1880

UCN/E/3/4 Suggested report and estimate of income and expenditure of University College Nottingham; 24 May 1880

UCN/E/3/5 Common Charges relating to the College, Free Library and Natural History Museum; n.d.

UCN/E/3/6 Estimates of Expenditure and Income of College, Library and Museum for 1882 - 1883; 10 May 1882

UCN/E/3/14 Report of the Professors on reduction of expenditure; 22 Jun. 1887

UCN/E/3/15 Letter from Prof. Frank Clowes to the University College Committee; n.d. [post 1882]

UCN/E/3/16 Suggested expenditure of £850 Treasury Grant; 1905 - 1906

UCN/E/3/17 Statement of University College Nottingham account; 31 Mar. 1913

UCN/E/3/18 Early statement of University College Nottingham accounts; n.d.

Papers dealing with the early organisation of the College; 1879-c.1900

UCN/E/4/1 Scheme of organisation of Nottingham University College; 7 Jan. 1879

UCN/E/4/2 Report of University College and Free Library Committee giving particulars of salaries, duties and conditions of appointment of Professors; 7 Feb. 1881

UCN/E/4/3 Report of Sub Committee dealing with extra remuneration of language teachers; 17 Jan. 1882

UCN/E/4/4 Printed resolution of Committee constituting a Board of Professors; 19 Apr. 1887

UCN/E/4/5 Duties of the Senate; n.d. [1900s]

UCN/E/5 Papers dealing with affiliation of University College Nottingham with the University of Cambridge; 1875-1883

UCN/E/5/1 Letter of James Stuart, Secretary of University Extension Syndicate to Richard Enfield; 16 Feb. 1875

UCN/E/5/2 Letter from Richard Enfield to J.H. Greenwood, Owen's College; 23 Apr. 1878

UCN/E/5/3 Printed Memorial of the Managers of University College Nottingham to the Vice Chancellor of the University of Cambridge; 21 Oct. 1878

UCN/E/5/4 Letter from Professor Stuart to Mr Enfield on the possible organisation of a local college, affiliated with Cambridge; 21 Nov. 1878

UCN/E/5/5 Scheme for affiliation of local college to Oxford or Cambridge or to both; 7 Jan. 1879

UCN/E/5/6 List of persons in Nottingham to whom questions concerning affiliation were sent by the synidate appointed 1878 to cinsiuder the affiliation of local college; Jan. 1879

UCN/E/5/7 Report of the Syndicate appointed to consider affiliation of local colleges; 28 Mar. 1879

UCN/E/5/8 Observations on the Report of the Syndicate; 26 Mar. 1879

UCN/E/5/9 Memorial of the Committee of Management of University College Nottingham to the University of Cambridge, concerning fellowships; 30 May 1879

UCN/E/5/10 Memorial of the Managers of University College, Nottingham to the University of Cambridge to consider certain Memorials as to the higher education of women; 1880

UCN/E/5/11 Letter from Mr Stuart to Richard Enfield concerning the work of 'an

affiliated student'; 1 Feb. 1883

UCN/E/5/12 Letter of Secretary of Cambridge University Local Examinations and Lectures Syndicate to the Town Clerk with details concerning affiliation; 23 Jun. 1873

UCN/E/5/13 Notes on affiliation; n.d. [1870s]

UCN/E/6 Correspondence of Professors and Lecturers; 1884 1887

UCN/E/6/1 Letter from Professor Symes to Mr Lindley; 5 Feb. 1884

UCN/E/6/2 Letter from Professor Symes to Mr Lindley; 2 Jul. 1887

UCN/E/6/3 Letter from Professor Clowes to Mr Lindley; 4 Jul. 1887

UCN/E/6/4 Letter from Professor Symes to Mr Lindley; 5 Jul. 1887

UCN/E/6/5 Letter from J.M. Thompson, Preswylfa, near Cardiff to Leonard Lindley; 19 Sep. 1887

UCN/E/6/6 Letter from J.M. Thompson to Leonard Lindley; 28 Sep. 1887

UCN/E/6/7 Notes in unidentified hand regarding conversations with J.E. Symes; n.d. [Jul. 1887]

UCN/E/6/8 Letters concerning Mr Solomon's retirement and Dr Granger's appointment as Lecturer in Classics; 1887

UCN/E/6/9 Letter from Professor Heaton to Chairman of College Council; n.d.

UCN/E/7 Correspondence relating to Nottingham Free Public Library; 1874 1881

UCN/E/7/1 Letter from the Town Clerk of Birmingham to the Town Clerk of Nottingham; 11 Jun. 1874

UCN/E/7/2 Letter from the Town Clerk of Sheffield to the Town Clerk of Nottingham; 11 Jun. 1874

UCN/E/7/3 Letter from Town Clerk, Liverpool to Town Clerk, Nottingham; 12 Jun. 1874

UCN/E/7/4 Report presented to the Free Public Library Committee; 2 Dec. 1874

UCN/E/7/5 Rules of the Reference Library; 22 Dec. 1874

UCN/E/7/6 Letter from British Museum; 18 Jan. 1875

UCN/E/7/7 Offer of books by George Ellis of St Johns Wood; 13 Feb. 1875

UCN/E/7/8 Offer of books by Lord Charles Willoughby, Wollaton; 13 Jun. 1875

UCN/E/7/9 Offer of books by Lord Belper to Richard Enfield; 27 Aug. 1875

UCN/E/7/10 Application by J. Potter Briscoe, Principal Librarian for an increase of salary; 6 Oct. 1875

UCN/E/7/11 Return of numbers of applications for admission cards; 1875

UCN/E/7/12 List of newspapers etc. in the reading room; 25 Jul. 1881

UCN/E/7/13 Principal Librarian's report on staff required at the Free Library; 25 Jul. 1881

UCN/E/7/14 List of geological books given by Dr Bigsby to the Free Library; 1881

UCN/E/7/15 Particulars concerning Public Libraries of large towns of England; 1881

UCN/E/8 Correspondence and reports relating to the Natural History Museum; 1872 1888

UCN/E/8/1 Letter from Robert Etherington of the Museum of Practical Geology to S.G. Johnson, Town Clerk of Nottingham; 8 Jun. 1872

UCN/E/8/2 Letter from the Secretary of the Nottingham Naturalists' Society to S.G. Johnson, Town Clerk; 3 Apr. 1875

UCN/E/8/3 Letter from the Secretary of the Nottingham Naturalists' Society to S.G. Johson, Town Clerk; 8 Apr. 1875

UCN/E/8/4 Letter of Mr Felkin to the Town Clerk, asking for return of foreign birds lent to the town; 29 Oct. 1875

UCN/E/8/5 Letter from the anatomist Monsieur Tramond, Paris to E. Goldschmidt; 11 Feb. 1879

UCN/E/8/6 Suggestions concerning applications to Trustees of British Museum for Specimens; 14 Dec. 1880

UCN/E/8/7 Estimate from Chas. Mills & Co., cabinet manufacturers for the cost of glass exhibition cases for the museum; 1881

UCN/E/8/8 Reports on staff required at the museum; 6 8 Jul. 1881

UCN/E/8/9 Report of the Curator, J.F. Blake, on the state of the Museum; 31 Dec. 1881

UCN/E/8/10 Report on the Cholmondley Collection of specimens presented by by Mr G.B. Rothera; 13 Feb. 1882

UCN/E/8/11 Report of the Museum Sub Committee on subject of a 'Local Collection of Birds'; 27 Feb. 1882

UCN/E/8/12 Professor J.F. Blake's report on the arrangement of the Museum, with reference to a local collection; Mar. 1882

UCN/E/8/13 Supplemental Report of the Museum Sub Committee on the arrangment of the Museum with reference to a Local Collection; 8 May 1882

UCN/E/8/14 Catalogue of books, maps, instruments, etc. presented to University College by Nottingham Literary and Philosophical Society at its dissolution; Apr. 1883

UCN/E/8/15 Letter from Professor J.F. Blake to the Chairman of the College Committee, referring to assistance in his work; 8 Apr. 1885

UCN/E/8/16 Letter from Professor J.F. Blake, requesting assistance in his work; 5 May 1885

UCN/E/8/17 Letter from Professor J.F. Blake concerning a dispute with the museum committee; 5 May 1885

UCN/E/8/18 Correspondence and Minutes referring to Professor J.F. Blake and

the appointment of a Curator of the Museum in 1886; 1879 1888

UCN/E/8/19 List of applicants for post of Curator; May 1886

UCN/E/8/20 Correspondence between Professor J.F. Blake and others relating to the arrangement of invertebrates in the museum; 1886

UCN/E/8/21 Further correspondence concerning arrangement of the type groups in the museum; 1886

UCN/E/8/22 Letter from Professor J.F. Blake to the Museum Sub Committee concerning the termination of his work for the museum; 5 Jun. 1888

UCN/E/9 Miscellaneous papers dealing with college fittings; 1879 1895

UCN/E/9/1 Tracings from H.N. Stocker as to suggested alterations to University College building; Sep. 1879

UCN/E/9/2 Resolution passed at the Committee; 21 Dec. 1880

UCN/E/9/3 Details and sketches of fittings for lecture theatres; n.d.

UCN/E/9/4 Suggestions by J.A. Fleming as to details of fittings of lecture room and adjacent rooms; undated [c.1881]

UCN/E/10 Official papers dealing with grants to University College, etc; 1894 1921

UCN/E/10/1 Treasury minute on Recommendations of the University Colleges' Committee; 18 Jul. 1905

UCN/E/10/2 Report of Committee, University College Grants in Aid; 20 Mar. 1906

UCN/E/10/3 Letter from the Treasury to the Principal of University College Nottingham; 14 May 1906

UCN/E/10/4 Letter from the Treasury to the Principal of University College Nottingham; 22 Jun. 1906

UCN/E/10/5 Printed memorandum in support of Application for increase of

Grants to Universities and University Colleges; n.d.

UCN/E/10/6 Letter from the Board of Education concerning Information of work at University College; 20 Jul. 1907

UCN/E/10/7 Headings for Returns to Board; Jul. 1907

UCN/E/10/8 Letter from R.G. Hawtrey of the Treasury; 25 Oct. 1907

UCN/E/10/9 Letter from the Board of Education to the Registrar of University College Nottingham; 24 Dec. 1908

UCN/E/10/10 Report by the Advisory Committee on Grants to University Colleges concerning Grant for 1909 10 session; 16 Mar. 1910

UCN/E/10/11 Report on an Inspection of University College Nottingham; 6 10 Nov. 1911

UCN/E/10/12 Third Report of the Advisory Committee on the Distribution of Exchequer Grants to Universities and Universty Colleges in England; 11 Jun. 1913

UCN/E/10/13 Board of Education memorandum on the Teaching of Building in Evening Technical Schools; 1916

UCN/E/10/14 Board of Education, Draft suggestions for schemes under the Education Act 1918; 7 Mar. 1919

UCN/E/10/15 Report of the University Grants Committee; 3 Feb. 1921

UCN/E/10/18 Embossed folder containing Treasury Minutes on University Grants in Aid; 1905

UCN/E/11 Papers dealing with an East Midlands University; 1919 1921

UCN/E/11/1 Case for an East Midlands University; n.d.

UCN/E/11/2 The Functions of a University, and matters relating to a Provincial University; n.d.

UCN/E/11/3 'Report of the Sub Committee of the Senate appointed to consider how best to make the work of the College more widely known'; n.d.

UCN/E/11/4 Financial Proposals for an East Midlands University; 22 Feb. 1921

UCN/E/11/5 Report of the Drafting Sub Committee concerning the proposed East Midlands University; 22 Feb. 1921

UCN/E/11/6 Draft Statutes of an East Midlands University; n.d. [c. Feb. 1921]

UCN/E/11/7 Summary of Draft Charter and Statute of an East Midlands University; n.d. [c. Feb. 1921]

UCN/E/11/8 Draft of Charter of Incorporation of an East Midlands University; n.d.

UCN/E/11/9 Details of Committees in proposed East Midlands University; n.d.

UCN/E/12 Letters from the Registrar of University College Nottingham dealing with Superannuation and Income Tax; 1907

UCN/E/12/1 Letter from the Registrar P.H. Stevenson to the Inland Revenue; 4 Jun. 1907

UCN/E/12/2 Letter from the Registrar P.H. Stevenson to the Inland Revenue; 4 Jun. 1907

UCN/E/13 University College Nottingham and University Extension; c.1910 1918

UCN/E/13/1 Minutes of a meeting of the University Extension and Tutorial Classes Joint Committee; 14 Sep. 1918

UCN/E/13/2 Prospectus of Single Lectures and Short Courses of University Extension and Tutorial Classes Joint Committee; c. 1910

UCN/E/14 Miscellaneous papers referring to University College; 1876 c.1890

UCN/E/15/2 List of University Extension Lectures given in Nottingham and numbers of students attending Lectures and Classes from first term of first session 1873 to first term of seventh session 1879; 1879

UCN/E/15/3 Particulars concerning Income and Expenditure of University Extension Lectures, Nottingham, 1873 1880 and of Government Science classes,

Nottingham 1871

UCN/E/15/4 Letter from Richard Enfield to S.G. Johnson, Town Clerk; 30 Nov. 1874

UCN/E/15/5 Reports of the Cambridge Local Lectures Syndicate, 1877 1880; 1880

UCN/E/15/6 Syllabus of University Extension Lectures, Nottingham, Second Term; 1880 1881

UCN/E/15/7 Syllabus of University Extension Lectures, Nottingham for the course 'Studies in Shakespeare's Dramatic Art'; 1880

UCN/E/15/8 Report of a Conference on the Local Lectures of the University, reprinted from the Cambridge University Reporter; 11 Jun. 1883

UCN/E/16 Papers relating to Government Science Classes held in Nottingham; 1868 1880

UCN/E/16/1 Government Science Classes held in Nottingham 1868 1879

UCN/E/16/2 Report of Government Science Classes held at the Nottingham Mechanics' Institute 1875 6; 1877

UCN/E/16/3 Report of Government Science Classes held at the Nottingham Mechanics' Institute 1876 7; 1878

UCN/E/16/4 Report of Government Science Classes held at the Nottingham Mechanics' Institute 1877 8; 1879

UCN/E/16/5 Report of Government Science Classes held at the Nottingham Mechanics' Institute 1879; 1880

UCN/E/16/6 Report of Government Science Classes, Mechanics' Institute 1880; 1881

UCN/E/16/7 List of Government Science Classes in Nottingham; 1880

UCN/E/17 Papers relating to organisation of local colleges; 1874 1882

UCN/E/17/1 First Annual Report of the Yorkshire College of Science, Leeds; 1874 1875

UCN/E/21 Miscellaneous papers and ephemera; 1869 1939

UCN/E/22/10 Programme for the Opening Ceremony for University College Nottingham; 30 Jun. 1881

UCN/E/23/7 File of draft text for University Appeal; n.d. [1921]

UCN/E/23/8 File of draft text for University Appeals and draft slip for responses to appeal; n.d. [1921]

UCN/E/23/9 File of miscellaneous documents relating to East Midlands University; 1920 1924

UCN/E/23/10 Report of Council into University for East Midlands; 29 Jan. 1918

UCN/E/23/11 Report of Conference with County and Borough Councils and Education Committees into proposed East Midlands University; 9 Jan. 1919

UCN/E/23/12 Paper on financial proposals for East Midland University; 29 Oct. 1919

UCN/E/23/13 Petition of Council of University College to City Council re Financial Position of the College; 27 Sep. 1920

UCN/E/23/14 Memorandum on University Extension Scheme; n.d. [1920]

UCN/E/23/15 Draft Minutes of the Conference between Drafting Sub Committee and representatives of Leicester; 8 Oct. 1920

UCN/E/23/16 Draft report of Drafting Sub Committee, East Midlands University; 22 Feb. 1921

UCN/E/23/17 Draft Charter of Incorporation (4 versions); Feb. Aug. 1921

UCN/E/23/18 Draft Statutes of the East Midlands University; Feb. 1921

UCN/E/23/19 Financial Proposals for East Midlands University; 22 Feb. 1921

UCN/E/23/20 Letter from W.J. Board, Town Clerk, Guildhall, Nottingham

enclosing various documents relating to East Midlands University Conference and calling further meetings of the Conference; 16 Aug. 1921

UCN/E/23/21 Report of Conference of Delegates in East Midlands area for East Midlands University; 6 Oct. 1921

UCN/E/23/22 'University for the East Midlands', reprint from 'The Trader and Citizen'; 15 Oct. 1921

UCN/E/23/23 'Case for an East Midland University'; 10 Mar. 1922

UCN/E/23/24 Extracts from Minutes of Council, Drafting Committee, Conferences etc. in connection with the East Midlands University; 1 Jan. 1918 9 Feb. 1927

UCN/E/24 Forms, reports and job advertisements for positions at University College Nottingham; 1884 1904

UCN/E/24/1 Volume of printed forms, correspondence and job advertisements; 1888 1904

UCN/E/24/2 Bundle of forms, reports and job advertisements, possibly removed from another volume; 1884 1900

UCN/E/25 File of papers concerning a Board of Education inspection into University College Nottingham in 1910 and other papers; 1893 1918

UCN/E/25/2 Grants to University College Nottingham; 1882 1909

UCN/E/25/3 Account of University College Nottingham Receipts; 1906

UCN/E/25/4 Account of University College Nottingham Payments; 1906

UCN/E/25/7 Extracts from the Minutes of the Council of University College Nottingham; 1906 1909

UCN/E/25/8 Printed form for returns to Board of Education concerning Parliamentary Grants to Universities and University Colleges; Sep. 1909

UCN/E/25/15 Letter from Philip H. Stevenson to the Board of Education and their reply; 16 26 Nov. 1910

UCN/E/25/18 Typescript notes from a Principals' Meeting concerning Government Grants to Universities and University Colleges; 29 Apr. 1911

UCN/E/25/23 Board of Education Report on an Inspection of University College Nottingham; 6 10 Nov. 1911

UCN/E/25/24 Transcript of a Meeting between the Council of University College Nottingham and the Board of Education Inspectors; 21 Nov. 1911

UCN/E/25/25 Observations on Board of Education Inspection Report; n.d. [c. Nov. 1911]

UCN/E/25/26 University College Nottingham Annual Report; 22 Dec. 1911

UCN/E/25/27 Accounts of University College, Free Library and Museum, etc; 1911 1912

UCN/E/25/28 City of Nottingham. Report of the Advisory Committee on co ordination of evening educational work in the city; 14 Mar. 1912

UCN/E/25/29 Letter from L.A. [?] Selby Briggs of the Board of Education to the Principal of University College Nottingham; 1 Apr. 1912

UCN/E/25/30 Report of the Advisory Committee on the distribution of Exchequer Grants to Universities and University Colleges in England; 28 Mar. 1912

UCN/E/25/31 Letter of resignation from Professor Arthur Morley to the Council of University College Nottingham; 28 May 1912

UCN/E/25/32 Correspondence between the Vice Chancellors of University College Nottingham and the University of Sheffield; Jan.

UCN/E/25/33 Letter from William Robinson to the Chairman of the College Council; 1 Jun. 1912

UCN/E/25/34 Letter from William Robinson to J.A.H. Green concerning the Engineering Dept; 4 Jul. 1912

UCN/E/25/41 Return of Evening Students; n.d. [c. 1911 1912]

UCN/E/25/42 Return of Part time day students; 1911

UCN/E/25/43 Return of Full time day students; 1911

UCN/E/25/44 Return showing the number of Full time Day Students living at home, inlodgings or at the Hostel; n.d. [c. 1911

UCN/E/25/45 Geographical Distribution of Full time Day Students; n.d. [c. 1911

UCN/E/25/46 Letter from C. Reintjes [?], second normal mistress in the Day Training College, requesting a pay increase; n.d.

UCN/E/25/48 Annual Report of the University College Council; 1912

UCN/F Financial papers and accounts of University College Nottingham; 1879 1951

UCN/F/1 Nominal Ledgers; 1904 1932

UCN/F/2 College Account Ledgers; 1915 1938

UCN/F/3 Payments books; 1908 1933

UCN/F/4 Daily Cash books; 1913 1942

UCN/F/7 Purchases and Sales Ledgers; 1921 1932

UCN/F/9 Income and Expenditure ledgers; 1921 1923

UCN/F/10 Expenditure books, Departmental Maintenance; 1921 1923

UCN/G Papers relating to the governance of University College Nottingham; 1887 1955

UCN/G/1 Foundation and Constitutional documents ; 1903 1939

UCN/G/1/2 Papers relating to Charter of Incorporation; 1903 1905

UCN/G/1/2/1 Typescript Draft of Charter of Incoporation; 1903

UCN/G/1/2/2 Printed copies of Charter of Incorporation; 27 Aug. 1903

UCN/G/1/2/3 Printed copies of Charter of Incorporation; 27 Aug. 1903

UCN/G/1/2/4 Printed copies of Deed of Settlement; 28 Jul. 1904

UCN/G/1/2/5 Printed copy of Statutes made by Court of Governors; 11 Apr.

1904

UCN/G/1/2/6 Printed Draft Charter for University College Nottingham; n.d. [1903]

UCN/G/1/2/7 Printed copies of Charter of University College, Nottingham; n.d. [1903]

UCN/G/1/2/8 Printed copies of petition for incorporation; n.d. [1903]

UCN/G/1/2/9 Embossed folder containing Incorporation Petition and Charter; 1904 1905

UCN/G/1/3 Petition for supplemental statutes with draft supplemental charter and statutes; 1937

UCN/G/3 University College Nottingham Council Minutes [bound with Court and various committee minutes]; 1904 1948

UCN/G/3/1 University College Minute Book; May 1904 to June 1909

UCN/G/3/2 University College Minute Book; July 1909 to Jan. 1913

UCN/G/3/3 University College Minute Book 8; Jan. 1913 to Jan. 1917

UCN/G/3/4 University College Minute Book 9; Feb. 1917 7488

UCN/G/3/5 University College Minute Book 10; July 1920 8583

UCN/G/3/6 University College Minute Book 11; July 1923 to Jan. 1926

UCN/G/4 Volumes of Council, Committee and Senate Copy Minutes; 1904 1947

UCN/G/4/1 University College Council Minutes Book 1. [Copy]; 1904 1911

UCN/G/4/2 University College Council Minutes [Copy]; 1911 1915

UCN/G/4/3 University College Council Minutes [copy]; 1915 1919

UCN/G/4/4 University College Council Minutes [copy]; Oct. 1946 Sep. 1947

UCN/G/4/5 University College Council Minutes [Copy]; 1919 1920

UCN/G/4/6 University College Council Minutes [Copy]; 1921 1924

UCN/G/4/7 Senate Minute Book copy; 1911

UCN/G/6 Senate Minutes and Papers; 1904 1948

UCN/G/6/1 Senate Minute Book 1; 1904 1918

UCN/G/6/2 Senate Minute Book 2; Oct. 1918 Apr. 1926

UCN/S Papers relating to student administration [Central UCN only] at University College Nottingham; 1881 1950

UCN/S/1 Government Art and Science Classes Student Registers; 1881 c. 1900

UCN/S/1/1 Register of Students in Science and Art Classes; 1881 1886

UCN/S/1/2 Register of Students in Science and Art Classes; 1886 1890

UCN/S/1/3 Register of Students in Science and Art Classes; 1890 1895

UCN/S/1/4 Register of Students in the Science School; undated [c.1895 1900]

UCN/S/2 Student Registers; 1900 1931

UCN/S/2/1 Register University College Nottingham men's sessions; 1900 1904

UCN/S/2/2 Register University College Nottingham men's sessions; 1904 1907

UCN/S/2/3 Register University College Nottingham men's sessions; 1907 1910

UCN/S/2/4 Register University College Nottingham women's sessions; 1900 1906

UCN/S/2/5 Register University College Nottingham women's sessions; 1906 1910

UCN/S/2/6 Register of Board of Education Registered Students; 1910 1911

UCN/S/2/7 Register of Board of Education Registered Students; 1911 1912

UCN/S/2/8 Register of students. Day classes, Men; 1900 1923

UCN/S/2/9 Register of students. Day classes, Men; 1923 1931

UCN/S/2/10 Register of students. Day classes, Women; 1900 1931

UCN/S/2/11 Evening classes, Women; undated

UCN/S/2/12 Students Register; 1910 1911

UCN/S/2/13 Register University College class book; 1905 1906

UCN/S/3 Day Student Registers; 1911 1948

UCN/S/3/1 University College Register of day students; 1911 1912

UCN/S/3/2 University College Register of day students; 1912 1913

UCN/S/3/3 University College Register of day students; 1913 1914

UCN/S/3/4 University College Register of day students; 1914 1915

UCN/S/3/5 University College Register of day students; 1915 1916

UCN/S/3/6 University College Register of day students; 1916 1917

UCN/S/3/7 University College Register of day students; 1917 1918

UCN/S/3/8 University College Register of day students; 1918 1919

UCN/S/3/9 University College Register of day students; 1919 1920

UCN/S/3/10 University College Register of day students; 1920 1921

UCN/S/3/11 University College Register of day students; 1921 1922

UCN/S/3/12 University College Register of day students; 1922 1923

UCN/S/3/13 University College Register of day students; 1923 1924

UCN/S/3/14 University College Register of day students; 1924 1925

UCN/S/3/15 University College Register of day students; 1925 1926

UCN/S/3/16 University College Register of day students; 1926 1927

UCN/S/3/17 University College Register of day students; 1927 1928

UCN/S/3/18 University College Register of day students; 1928 1929

UCN/S/4 Evening Student Registers; 1912 1945

UCN/S/4/1 Evening Students Register; 1912 1913

UCN/S/4/2 Evening Students Register; 1913 1914

UCN/S/4/3 Evening Students Register; 1914 1915

UCN/S/4/4 Evening Students Register; 1915 1916

UCN/S/4/5 Evening Students Register; 1916 1917

UCN/S/4/6 Evening Students Register; 1917 1918

UCN/S/4/7 Evening Students Register; 1918 1919

UCN/S/4/8 Evening Students Register; 1919 1920

UCN/S/4/9 Evening Students Register; 1920 1921

UCN/S/4/10 Evening Students Register; 1921 1922

UCN/S/4/11 Evening Students Register; 1922 1923

UCN/S/4/12 Evening Students Register; 1923 1924

UCN/S/4/13 Evening Students Register; 1924 1925

UCN/S/4/14 Evening Students Register; 1925 1926

UCN/S/4/15 Evening Students Register; 1926 1927

UCN/S/4/16 Evening Students Register; 1927 1928

UCN/S/4/17 Evening Students Register; 1928 1929

UCN/S/4/18 Evening Students Register; 1929 1930

Bibliography

Adams, R. J. Q. 1975. 'Delivering the Goods: Reappraising the Ministry of Munitions: 1915-1916', *Albion*, 7: 232-44.

Adams, R.J. Q. 1978. *Arms and the Wizard: Lloyd George and the Ministry of Munitions, 1915-1916* (Cassell: London).

Aldcroft, Derek. *The Development of British Industry and Foreign Competition 1875-1914* (George Allen & Unwin: London).

Altick, Richard Daniel. 1973. *Victorian People and Ideas: A Companion for the Modern Reader of Victorian Literature* (Norton: New York).

Andrade, Tonio. 2016. *The Gunpowder Age: China, Military Innovation, and the Rise of the West in World History* (Princeton University Press: Princeton).

Ashworth, William. 2006. *An Economic History of England, 1870-1939* (Taylor & Francis: Abingdon).

Bailey, S. B., and C. H. Bulleid. 1941. 'The Dynamic Absorber and its Application to Multi-Throw Crankshafts', *Proceedings of the Institution of Mechanical Engineers*, 145: 73-82.

Barnard, Howard Clive. 1969. *A History of English Education from 1760* (Univ. of London Press: London).

Becket, Edith. 1928. *The University College of Nottingham* (Henry B. Saxton: Nottingham).

Beckett, John. 2016. *Nottingham: A History of Britain's Global University* (The University of Nottingham, The Boydell Press: Woodbridge).

Belknap, Geoffrey. 2018. 'Illustrating Natural History: Images, Periodicals, and the Making of Nineteenth-Century Scientific Communities', *The British Journal for the History of Science*, 51: 395-422.

Berdahl, Robert Oliver. 1959. *British Universities and the State* (University of California Press: Berkeley).

Berghoff, H., and R. Möller. 1994. 'Tired pioneers and dynamic newcomers? A comparative essay on English and German entrepreneurial history, 1870-1914', *The*

Economic History Review, 47: 262-87.

Black, Thomas P. 1906. 'Über Den Widerstand Von Spulen Für Schnelle Elektrische Schwingungen', *Annalen der Physik*, 324: 157-68.

Borsay, Peter. 2002. *The English Urban Renaissance: Culture and Society in the Provincial Town 1660 - 1770* (Clarendon Press: Oxford).

Brewster, David. 1831. 'Observations on the Decline of Science in England', *Edinburgh Journal of Science*, V: 1-16.

Bulleid, C. H. 1932. 'The Importance of Metallurgy to the Engineer', *Proceedings of the Institution of Mechanical Engineers*, 123: 767-72.

Campbell, John. 2020. *Haldane: The Forgotten Statesman Who Shaped Modern Britain* (C. Hurst & Co.)

Carr-Saunders, A. M., and D. Caradog Jones. 1985. *A Survey of the Social Structure of England and Wales* (Garland Pub: New York).

Chagnon, Marie-Eve, and Tomás Irish. 2017. *The Academic World in the Era of the Great War* (Palgrave-Macmillan).

Chapman, Arthur William. 1955. *The Story of a Modern University: A History of the University of Sheffield* (University of Sheffield: Sheffield).

Charlton, H. B. 1952. *Portrait of a University, 1851-1951* (University of Manchester: Manchester).

Childs, William MacBride. 1926. *The New University of Reading: Some Ideas for Which it Stands* (Bradley and Sons: Reading).

Clapp, B. W. 2004. *Owens, John (1790–1846), merchant and philanthropist* (Oxford University Press).

Clark, Peter. 2000. *British Clubs and Societies 1580-1800: The Origins of an Associational World* (Oxford University Press: Oxford ; New York).

Coats, A. W. 1963. 'Academic Freedom in England: The Case of University College, Nottingham, in the 1880's', *AAUP Bulletin*, 49: 328.

Cocroft, Wayne. 2000. *Dangerous Energy: The Archaeology of Gunpowder and Military Explosives Manufacture* (English Heritage: Swindon).

Collini, Stefan. 2012. *What Are Universities For?* (Penguin: London ; New York).

Consort, Albert Prince. 2013. *The Principal Speeches and Addresses of His Royal Highness the Prince Consort: With an Introduction, Giving Some Outlines of his Character* (Cambridge University Press: Cambridge).

Cross, Thomas. 1881. 'Josiah Mason', *Wesleyan-Methodist Magazine*: 820-27.

Csiszar, Alex. 2010. 'Seriality and the Search for Order: Scientific Print and Its Problems During the Late Nineteenth Century', *History of Science*, 48: 399-434.

Dewey, Peter, and John Beckett. 1997. *War and Progress: Britain 1914 - 1945* (Longman: London).

Dunne, Joseph. 2006. 'Newman Now: Re-Examining the Concepts of 'Philosophical' and 'Liberal' in The Idea of a University', *British Journal of Educational Studies*, 54: 412-28.

Edgerton, David. 2006. *Warfare State: Britain, 1920-1970* (Cambridge University Press: Cambridge, UK ; New York).

Edgerton, D. E. H., and S. M. Horrocks. 1994. 'British Industrial Research and Development Before 1945', *The Economic History Review*, 47: 213-38.

Elliott, Paul. 2000. 'The Birth of Public Science in the English Provinces: Natural Philosophy in Derby, c. 1690-1760', *Annals of Science*, 57: 61-100.

Elliott, Paul. 2003. 'The Origins of the 'Creative Class': Provincial Urban Society, Scientific Culture and Socio-Political Marginality in Britain in the Eighteenth and Nineteenth Centuries', *Social History*, 28: 361-87.

Elliott, Paul. 2005. ''Food to the Mind and Rapture to the Sense': Scientific Culture in Nottingham, 1740-1800', *Transactions of the Thoroton Society*, 109: 99-112.

Erickson, Charlotte. 1959. *Steel and Hosiery 1850-1950* (Cambridge University Press: Cambridge).

Fiddes, Edward. 1937. *Chapters in the History of Owens College and of Manchester University, 1851-1914* (Manchester University Press: Manchester).

Finch, Ernest. 1958. 'The Centenary of the General Council of Medical Education and Registration of the United Kingdom (the General Medical Council) 1858-1958 in Relation to Medical Education', *Annals of the Royal College of Surgeons of England*, 23: 321-31.

Finnegan, Diarmid A. 2005. 'Natural History Societies in Late Victorian Scotland and the Pursuit of Local Civic Science', *The British Journal for the History of Science*, 38: 53-72.

Fisher, H. A. L. 1917. *British Universities and the War: A Record and its Meaning* (The Field & Queen (Horace Cox) Ltd: London).

Freemantle, Michael. 2015. *The Chemists' War: 1914-1918* (Royal Society of Chemistry: Cambridge).

Gadsby, M. A. 1917. 'Finding Jobs for Great Britain Disabled Soldiers Provisions for Disabled Soldiers', *Monthly Review of the U.S. Bureau of Labor Statistics*: 1137-54.

Gilliver, Peter. 2016. *The Making of the Oxford English Dictionary* (Oxford University Press: Oxford ; New York, NY).

Goddard, John, Ellen Hazelkorn, Louise Kempton, and Paul Vallance. 2016. *The Civic University* (Edward Elgar Publishing).

Gooday, Graeme. 1990. 'Precision Measurement and the Genesis of Physics Teaching Laboratories in Victorian Britain', *The British Journal for the History of Science*, 23: 25.

Granger, Frank. 1928. *Memorials of University College, Nottingham* (Jenkins, James and Low: Nottingham).

Green, Vivian Hubert Howard. 1969. *The Universities* (Penguin: Harmondsworth).

Greenwood, A., and A. Bernardi. 2014. 'Understanding the rift, the (still) uneasy bedfellows of History and Organization Studies', *Organization*, 21: 907-32.

Gummett, Philip. 1980. *Scientists in Whitehall* (Manchester University Press: Manchester [Greater Manchester]).

Halstead, Timothy. 2017. 'The Junior OTC: Playing at Soldiers or Nation in Arms?', *British Journal for Military History*, 3.

Hamelius, Paul. 1914. *The Siege of Liège, a Personal Narrative* (T. Werner Laurie Ltd: London).

Harrison, Brian. 1966. 'Philanthropy and the Victorians', *Victorian Studies*, 9: 353-74.

Hartog, Philip Joseph. 2017. *Owens College, Manchester: A Brief History of the College and Description of its Various Departments* (Forgotten Books: London).

Haslam, M. J. 1982. *The Chilwell story: VC factory and ordnance depot* (RAOC Corps

Gazette: England).

Heyck, Thomas William. 1989. *The Transformation of Intellectual Life in Victorian England* (Lyceum Books: Chicago, IL).

Holt, James Clark. 1977. *The University of Reading: The First Fifty Years* (University of Reading Press: Reading).

Horn, Jeff. 2008. *The Path Not Taken: French Industrialization in the Age of Revolution, 1750-1830* (MIT Press: Cambridge, Mass.).

Horne, John. 2019. 'End of a Paradigm? The Cultural History of the Great War*', *Past & Present*, 242: 155-92.

Inkster, Ian. 1978. 'Scientific Culture and Education in Nottingham, 1800-1843', *Transactions of the Thoroton Society*, 82: 45-50.

Inkster, Ian. 1980. 'Robert Goodacre (1777-1835) and Popular Astronomy', *Journal of the British Astronomical Association*, 90: 245-52.

Irish, Tomás. 2015. *The University at War, 1914-25: Britain, France, and the United States* (Palgrave-Macmillan: Basingstoke).

Inkster, Ian. 2016. 'Scholarly Identities in War and Peace: The Paris Peace Conference and the Mobilization of Intellect', *Journal of Global History*, 11: 365-86.

James, Frank A. J. L. 2004. *Faraday, Michael (1791–1867), Natural Philosopher, Scientific Adviser, and Sandemanian* (Oxford University Press).

Jones, David R. 1988. *The Origins of Civic Universities: Manchester, Leeds & Liverpool* (Routledge: London).

Julia, Horne, and Pietsch Tamson. 2016. 'Universities, expertise and the First World War', *History of Education Review*, 45: 142-50.

Keith, Tribe. 2004. 'Chapman, Sir Sydney John (1871–1951), Economist and Civil Servant', *Oxford Dictionary of National Biography*.

Kenyon, David. 2015. "First World War National Factories: An Archaeological, Architectural and Historical review." In *Research Department Reports*, 265. Historic England.

Khan, B. Zorina. 2018. 'Human Capital, Knowledge and Economic Development:

Evidence from the British Industrial Revolution, 1750–1930', *Cliometrica*, 12: 313-41.

Kim, Dong-Won. 1995. 'J. J. Thomson and the Emergence of the Cavendish School, 1885–1990', *The British Journal for the History of Science*, 28: 191.

Kushner, Tony. 1999. 'Local Heroes: Belgian Refugees in Britain During the First World War', *Immigrants & Minorities*, 18: 1-28.

Landes, David S. 2003. *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present* (Cambridge University Press: Cambridge, UK ; New York).

Levin, Miriam R. et al. 2010. *Urban Modernity: Cultural Innovation in the Second Industrial Revolution* (MIT Press: Cambridge, Mass).

Levsen, S. 2008. 'Constructing Elite Identities: University Students, Military Masculinity and the Consequences of the Great War in Britain and Germany', *Past & Present*, 198: 147-83.

Lomas, Janis. 2000. ''Delicate Duties': Issues of Class and Respectability in Government Policy Towards the Wives and Widows of British Soldiers in the Era of the Great War', *Women's History Review*, 9: 123-47.

MacIntyre, Alasdair. 2009. 'The Very Idea of a University: Aristotle, Newman, and Us', *British Journal of Educational Studies*, 57: 347-62.

Marsh, David Charles. 1977. *The Changing Social Structure of England and Wales, 1871-1961* (Routledge, Kegan Paul: London).

Martin, Theodore. 2013. *The Life of His Royal Highness the Prince Consort Volume 4 Volume 4* (Cambridge University Press: Cambridge).

Massie, Robert K. 2007. *Dreadnought - Britain, Germany and the Coming of the Great War* (Vintage: London).

Mathers, Helen, Anthea Stephenson, and Sheffield University of. 2005. *Steel City Scholars: The Centenary History of the University of Sheffield* (James & James: London).

McLeod, Roy and Johnson Jeffrey A. (eds). 2006. *Frontline and Factory: Comparative Perspectives on the Chemical Industry at War, 1914–1924* (Springer Netherlands: Dordrecht).

McPherson, Robert. 1959. *Theory of higher education in nineteenth century England*

(University of Georgia Press: Athens, Georgia).

Minchinton, Walter. 1975. 'E. E. Williams: ‘Made in Germany’ and After', *Vierteljahrschrift für Sozial und Wirtschaftgeschichte*: 229-42.

Monaghan, J. 1968. 'Some Views on Education and Industrial Progress a Hundred Years Ago', *The Vocational Aspect of Education*, 20: 187-94.

Moodie, Graeme C. 1983. 'Buffer, coupling, and broker: Reflections on 60 years of the UGC', *Higher Education*, 12: 331-47.

Moodie, Graeme C., and Rowland Eustace. 2012. *Power and authority in British universities* (Routledge: London; New York).

Morgan, Kenneth and Morgan, Jane. 1980 *Portrait of a Progressive: Political Career of Christopher, Viscount Addison* (Oxford Universty Press)

Mountford, James. 1966. *British Universities* (Oxford University Press).

Muckle, James. 2008. 'Russian in the University Curriculum: A Case-study of the Impact of the First World War on Language Study in Higher Education in Britain', *History of Education*, 37: 359-81.

Musson, A. E., and Eric Robinson. 1989. *Science and Technology in the Industrial Revolution* (Gordon and Breach: New York).

Mutschmann, Heinrich. 1913. *The Place-names of Nottinghamshire, Their Origin and Development* (Cambridge University Press: Cambridge).

Newman, John Henry. 1873. *The Idea of a University, Defined and Illustrated* (Basil Montagu Pickering: London).

Owen, Tom. 1980. 'The University Grants Committee', *Oxford Review of Education*, 6: 255-78.

Perkin, Harold. 2002. *The Origins of Modern English Society* (Routledge: London).

Phillips, Melba. 1983. 'Laboratories and the Rise of the Physics Profession in the Nineteenth Century', *American Journal of Physics*, 51: 497-503.

Playfair, Lyon. 1852. *Industrial Instruction on the Continent: Being the Introductory Lecture of the Session 1852-1853* (George E. Eyre and William Spottiswoode: London).

Ransom, Roger L. 2016. 'Confidence, Fear, and a Propensity to Gamble: The Puzzle of

War and Economics in an Age of Catastrophe 1914–45', *Social Science History*, 40: 599-625.

Rideal, Rebecca. 2017. *1666: Plague, War and Hellfire* (John Murray: London).

Robbins, Keith. 1983. *The Eclipse of a Great Power: Modern Britain, 1870-1975* (Longman: London ; New York).

Robertson, Charles Grant. 1939. 'The Provincial Universities', *The Sociological Review*, a31: 248-59.

Rosen, William. 2011. *The Most Powerful Idea in the World: A Story of Steam, Industry and Invention* (Pimlico: London).

Rostow, W. W. 1991. *The Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge University Press: Cambridge).

Rumbold, Valerie. 2016. 'Reading The Tatler in 1710: Polite Print and the Spalding Gentlemen's Society', *Eighteenth-Century Life*, 40: 1-35.

Sadler, Michael. 1975. *The Universities in the Nineteenth Century* (Routledge and Kegan Paul: London ; Boston).

Salter, Brian, and Ted Tapper. 1994. *The State and Higher Education* (Woburn Press: Ilford, Essex, England ; Portland, Ore).

Sanderson, Michael. 1969. 'The Universities and Industry in England 1919-1939', *Bulletin of Economic Research*, 21: 39-65.

Sanderson, Michael. 1972. 'Research and the Firm in British Industry, 1919-39', *Science Studies*, 2: 107-51.

Scott, John C. 2006. 'The Mission of the University: Medieval to Postmodern Transformations', *The Journal of Higher Education*, 77: 1-39.

Secord, Anne. 1994. 'Corresponding Interests: Artisans and Gentlemen in Nineteenth-Century Natural History', *The British Journal for the History of Science*, 27: 383-408.

Shattock, Michael. 1996. *The Creation of a University System* (Blackwell Publishers: Oxford, OX, UK ; Cambridge, MA, USA).

Shattock, Michael, and Robert Berdahl. 1984. 'The British University Grants Committee 1919-83: Changing Relationships with Government and the Universities', *Higher Education*, 13: 471-99.

Sherington, Geoffrey. 1981. *English education, social change, and war, 1911-20* (Manchester University Press ; Distributed in North America by Humanities Press: Manchester : Atlantic Highlands, N.J).

Shinn, Christine Helen. 1986. *Paying the Piper: The Development of the University Grants Committee, 1919-46* (Falmer Press: London ; Philadelphia).

Silver, Harold. 1990. *A higher education: the Council for National Academic Awards and British higher education, 1964-89* (Falmer Press: London ; New York).

Silver, Harold. 2003. *higher education and opinion making in twentieth-century England* (Woburn Press: London ; Portland, OR).

Silver, Harold, and Sydney John Teague. 1970. *The History of British Universities, 1800-1969, Excluding Oxford and Cambridge: A Bibliography* (Society for Research into Higher Education: London).

Stuart, James. 1911. *Reminiscences* (Chiswick Press: London).

Szöllösi-Janze, Margit. 2017. "The Scientist as Expert: Fritz Haber and German Chemical Warfare During the First World War and Beyond." In, edited by Bretislav Friedrich, Dieter Hoffmann, Jürgen Renn, Florian Schmaltz and Martin Wolf, 11-23. Springer International Publishing.

Taylor, John. 2018. *The Impact of the First World War on British Universities* (Springer Berlin Heidelberg: New York, NY).

Thompson, F. M. L. 1990. *The Cambridge Social History of Britain, 1750-1950* (Cambridge University Press: Cambridge [England] ; New York, NY, USA).

Tight, Malcolm. 2009. *The Development of Higher Education in the United Kingdom Since 1945* (Open Univ. Press: Maidenhead).

Todd, John A. 1917. *The Mechanism of Exchange: a Handbook of Currency, Banking and Trade in Peace and in War* (Humphrey Milford: London).

Tomlinson, J. 2009. 'Thrice Denied: 'Declinism' as a Recurrent Theme in British History in the Long Twentieth Century', *Twentieth Century British History*, 20: 227-51.

Truscot, Bruce. 1951. *Red Brick University* (Pelican: London).

Turner, Frank M. 1980. 'Public Science in Britain 1880-1919', *Isis*, 71: 589-608.

Uglow, Jennifer S. 2002. *The Lunar Men: The Friends Who Made the Future ; 1730 - 1810* (Faber and Faber: London).

Vernon, James. 2017. *Modern Britain: 1750 to the Present* (Cambridge University Press: Cambridge, United Kingdom ; New York, NY).

Vernon, Keith. 2001. 'Calling the tune: British universities and the state, 1880-1914', *History of Education*, 30: 251-71.

Vernon, Keith. 2004. *Universities and the State in England, 1850-1939* (RoutledgeFalmer: London ; New York).

Vernon, Keith. 2014. ''we Alone Are Passive': The Committee of Vice-Chancellors and Principals and the Organisation of British Universities, <i>c</I> .1918–1939', *History of Education*, 43: 187-207.

Waddington, Keir. 2013. '"We Don't Want Any German Sausages Here!" Food, Fear, and the German Nation in Victorian and Edwardian Britain', *Journal of British Studies*, 52: 1017-42.

Wale, Matthew. 2019. 'Editing Entomology: Natural-History Periodicals and the Shaping of Scientific Communities in Nineteenth-Century Britain', *The British Journal for the History of Science*: 1-19.

Whyte, William. 2015. *Redbrick: A Social and Architectural History of Britain's Civic Universities* (Oxford University Press: New York, NY).

Wood, A. C. 1953. *A History of the University College, Nottingham* (B.H. Blackwell Ltd: Oxford).

Young, Warren, and Frederic S. Lee. 1993. *Oxford Economics and Oxford Economists* (Macmillan: Basingstoke).

* * *