

Close together but a world apart

**A comparative history of research practices during the
formative years of Brazilian academic science (1934 – 1955)**

Thesis

Submitted in fulfilment of the requirements for the Degree of Doctor of
Philosophy at the University of Oxford

by

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Preface

The most rewarding aspect of this research has been the work with primary sources. The discovery, cataloguing and analysis of these documents became a stimulating routine that helped me to endure moments when the end appeared impossibly distant. While the scientific articles revealed a professionally constrained speech, the popular press offered the voices of the reading public. The simultaneous study of these two groups of documents had the motivating effect of taking me back to the time when I spent months trying to understand the context of the scientists studied here. This daily concentration on sources, however, was just the outcome of a long process that had started in Brazil around eight years ago, when I began studying scientific practices in Curitiba. At that point, I had recognised the existence of a considerable amount of sources still underexploited in the historiography. Over the years, I continued to discover an even greater number of neglected sources and archives, both in Curitiba and Porto Alegre. One of the objectives of this thesis is to demonstrate the necessity for preserving these records.

Full recognition of the value of these archives only occurred after I had moved to Oxford. It was my supervisor, Dr. Pietro Corsi, who helped me realize the real significance of those documents. Although he specialises in a different historical period and topic, he was experienced in the study of scientific communities through the methodical study of archives often overlooked by mainstream historiography. Even before I had identified the methodological possibilities open to my work, he understood that my knowledge of Brazilian archives and academic science might result in an interesting research project. I owe a great debt of gratitude to Professor Corsi for his belief in my project and his enduring help to improve the final work. Insights into the politics of science discussed in this thesis are the result of continuous discussions of drafts that were written, reviewed and rewritten several times during the six years of my D.Phil.

Whereas Professor Corsi guided me through the different stages of the research in Oxford, I also depended upon the support of individuals in Brazil. André Carvalho helped me to locate and digitise thousands of pages of manuscripts and primary sources in Curitiba. At the same time, in Porto Alegre, Carla Rodrigues helped me to digitise sources from Rio Grande do Sul, São Paulo and Rio de Janeiro. She also provided crucial assistance in locating overseas sources that were in Brazilian archives. Although I could have found the same titles in England, it was necessary to confirm their presence in Brazil; therefore, we decided to use the original documents found there.

When the archival work began to substantiate a coherent narrative, I relied on the invaluable assistance of other individuals. The final text of the thesis is more approachable because of the help provided by Frank Harris, Eileen Shaw and Sarah Swenson in proofreading earlier versions of the thesis. Besides this instrumental support, the final structure of the thesis has undergone important changes as a result of comments from Drs. Karen Brown and Jens R. Hentschke, my confirmation of status interviewers. I must thank them for opening my eyes to the demands of academia. Finally, I wish to show gratitude to my wife Flavia who, throughout this entire journey, has offered me unconditional support and boundless love.

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List of Abbreviations

B.D.P.A – Boletim da Diretoria da Produção Animal – Rio Grande do Sul
B.F.T. – Boletim Fitossanitário
B.J.H.S. – British Journal for the History of Science
B.O.S.P. – Boletim de la Oficina Sanitária
bTB – Bovine Tuberculosis
C.E.Q. – Chácaras e Quintais Journal
Fiocruz – Oswaldo Cruz Foundation
I.B.T.R. – Institute of Biological and Technological Research
I.P.V.D.F – Instituto de Pesquisas Veterinárias Desidério Finamors
I.V.R.D.F. – Institute of Veterinary Research Desiderio Finamor
J. A. V. M. A. – Journal of American Veterinary Medical Association
M.I.O.C. – Memórias do Instituto Oswaldo Cruz
PUC-RS – Catholic University of Rio Grande do Sul
PUC-SP – Catholic University of São Paulo
R.E.A.V.R.S. – Revista da Escola de Agronomia e Veterinária do Rio Grande do Sul
R.M.P. – Revista Médica do Paraná
R.M.R.S. – Revista de Medicina do Rio Grande do Sul
SDAIC – State Department of Agriculture, Industry and Commerce (Porto Alegre)
TB – Tuberculosis
UFBA – Federal University of Bahia
UFF – Fluminense Federal University
UFMG – Minas Gerais Federal University
UFPR – Federal University of Paraná
UFRGS – Federal University of Rio Grande do Sul
UFRJ – Federal University of Rio de Janeiro
UFV – Viçosa Federal University
UNB – Brasília University
UNICAMP – Unicamp University
UNISC – Santa Cruz do Sul University
UPR – University of Parana
USP – University of São Paulo

Introductory Chapter

Choices and Methods

A bold move: Dutra's masterplan

On 30 November 1950, Brazilian president Eurico Gaspar Dutra presented the National Congress with a nationalisation project that would revolutionise the country's higher education system. In that document, he authorised the nationalisation of several universities that had previously been the responsibility of state governments. By doing so, President Dutra laid the foundations for a network of federal universities that exist to this day in almost every capital of the twenty-seven Brazilian states. More importantly for the objective of this thesis, nationalisation had a direct impact on the scientific capabilities of the country; over the following decades, almost eighty per cent of all scientific research undertaken in Brazil was concentrated in public universities where federal institutions played a major role.¹

Dutra's initiative became a symbol of innovation because it set in motion a massive reorganisation of the entire higher education system while still accommodating local interests that came to the fore after the Vargas dictatorship (1930-1945). Under Vargas, federal subventions were used to limit the autonomy of individual universities in an attempt to control the intellectual elite of the country.² President Dutra's reform signalled that a new page in the academic history of Brazil had been turned and the full autonomy of individual universities

¹ Jacqueline Leta, Wolfgang Glänzel and Bart Thijs, 'Science in Brazil', *Scientometrics*, 67 (2006), 87-105: p. 90. There are three modalities of public higher education institutions in Brazil, namely those sponsored by the federal government, by state administrations and by individual towns. In 2000, there were 39 federal universities, 25 state universities and four sponsored by individual towns. Scholars have considered the ones sponsored by the federal government the most important institutions in each state except for São Paulo, see Luiz Antônio Cunha, 'Ensino superior e universidade no Brasil', in Luiz Antônio Cunha and E. M. T. Lopes (eds.), *500 anos de educação no Brasil*, (São Paulo, 2000), pp. 151-204: pp. 201-202; The University of São Paulo is an exception because of its unusually large scale. In terms of scientific output, 45 per cent of all Brazilian research state budgets is concentrated in São Paulo because the University of São Paulo is responsible for 25 per cent of all doctorates given in the country. The University of São Paulo also contributes to the fact that 50 per cent of all national scientific output comes from the Southeast region, see Kirsten Bound, *Brazil, the natural knowledge economy*, (London, 2008).

² Ana W. P. C. Mendonça, 'A universidade no Brasil', *Revista Brasileira de Educação*, 14 (2000), 131-50.

would be restored. His successful reform strategy was to propose an arrangement from which both sides felt they benefitted. Universities would continue to decide their curricula, select Chair holders, and elect their second and third echelons. In return, the president would have the final say in the choice of deans and sometimes even in hiring directors of individual faculties. With all assets of the universities transferred to the state, Chair holders and employees became civil servants and thereby enjoyed full benefits, including job stability and lifetime pensions that were highly cherished at that time.

One crucial part of Dutra's plan was to avoid impinging upon the power and status of Chair holders, who eventually decided collectively to include their universities in the nationalisation programme. Although in the short term this particular aspect secured a fast and far-reaching reform for the government, the maintenance and consolidation of the Chair system was considered highly damaging to the development of academic science over the following years.³ Chair holders received guarantees that they would continue to literally own their Chairs and would be able to hold their professorship until the day they retired. They would handpick assistants, decide what to teach and be allowed to make their own schedules.

Though the Chair system was just one of the aspects reinforced by Dutra's act, it has been considered by historians to have been counterproductive to the development of Brazilian academic science. Thus, little attention has been given to the nationalisation campaign as a whole. Because 1968 was the year in which the higher education system was completely reformed, including the elimination of the Chair system, it is usually considered to mark the beginning of academic science in Brazil.⁴ However, this thesis will argue that nationalisation

³ Criticisms concerning the negative effect of the Chair system are common among scholars of Brazilian education, for instance, Luís Antônio Cunha, *A universidade crítica* (São Paulo, 2007); Carlos Benedito Martins, 'A reforma universitária de 1968', *Educ. Soc.*, 30 (2009), 15-35; Mendonça, 'A universidade no Brasil', p. 132.

⁴ For example, Micheline Cordeiro, 'Reflexão sobre a reforma universitária de 1968', *IV Colóquio Internacional Educação e Contemporaneidade*, (2010), 1-10; Arthur Roquete Macedo et al., 'Educação superior no século XXI', *Ensaio: Avaliação e políticas públicas em educação*, 13 (2005), 127-48; Martins, 'A reforma universitária de 1968', p. 17; José Carlos Rothen, 'Os bastidores da reforma universitária de 1968', *Educação & Sociedade*, 29 (2008), 453-75.

had a direct influence on the research culture of federal universities, which later became some of the most prominent institutional settings for scientific research in Brazil. Substantial new evidence presented here indicates that in the early 1950s, President Dutra, perhaps inadvertently, forced research-minded academics to consider the possibility of adapting their research projects to their nationalised institutions. These individuals not only found ways to deal with the inflexible Chair system but also inaugurated long-lasting academic research programmes. As discussed at length below, the supposedly negative consolidation of the chair system must be analysed in a context of profound disciplinary changes, new research problems, funding alternatives, and state research infrastructure. When these elements are analysed together, it becomes clear that academic life went well beyond university campuses; moreover, professors were not passive participants or victims of an inflexible system but committed agents acting within a dynamic context in which major changes in science and research were underway, particularly after 1945. As Simon Schwartzman observed, after World War II scientists took on a higher political profile as they became more confident that they had an important social role to perform. In Latin America, researchers began an active exchange with their North American colleagues who helped to strengthen the new idea that progress would only be achieved through scientific development and investment in research.⁵ In this context, there were plenty of opportunities for research-minded academics for whom nationalisation was not an obstacle. As discussed in different parts of this thesis, stagnation and insularity of chairs usually resulted from the personality and interests of its holders rather than from elements brought about by nationalisation. Some decided to continue their research outside the academic environment, but others attempted to change the academic culture towards research from the inside. Case studies discussed in this thesis will reveal these and other reactions to

⁵ Simon Schwartzman, 'América Latina', in Simon Schwartzman (ed.), *Pesquisa universitária em questão* (São Paulo, 1986), pp. 21-35: pp. 25-26.

nationalisation and suggest that this process initiated a transformation in the academic culture of Brazilian universities with regard to scientific research. Moreover, it will be demonstrated that it was the pivotal role played by Chair holders in this transformation that eventually led to a lasting research tradition inside universities.

On the other hand, this thesis will acknowledge that changes in the research cultures of academia did not occur in the same way and at the same pace in all regions of the country.⁶ Differences in the scientific development of Brazilian higher education system are indeed well documented in the historiography. Nationalisation only sanctioned a pre-existing, markedly regional concentration. In 1982, thirty-two years after President Dutra's project was implemented, 90.5 per cent of all Brazilian scientific output was concentrated in the South and Southeast regions, which together make up less than twenty per cent of the country's total area and fifty per cent of its population.⁷ This concentration existed both in regional terms and at the institutional level. Approximately eighty per cent of research was localised in public universities in these two regions, including those nationalised from the 1950s onwards.⁸ There were also major differences across various disciplines. Full-time positions, for instance, would only be adopted in specific subjects that eventually flourished in particular states, such as Physiology Departments in Rio Grande do Sul and Entomology Departments in Paraná.⁹ By exploring regional peculiarities, this thesis will reveal that scholarship has only begun to understand the variations within a supposedly uniform national system. One of the main arguments put forward here is that current assumptions about the history of higher education

⁶ For more studies on marked interregional contrasts, see Fernando Antônio F. Barros, 'Os desequilíbrios regionais da produção técnico-científica', *São Paulo em Perspectiva*, 14 (2000), 12-9; Clélio Campolina Diniz, 'Celso Furtado', *Nova Economia*, 19 (2009), 227-49; Edson Paulo Domingues and Ricardo Machado Ruiz, 'Os desafios do desenvolvimento regional brasileiro', *Ciência e Cultura*, 58 (2006), 42-4.

⁷ Cláudio Moura Castro, 'Há produção científica no Brasil?', in Simon Schwartzman (ed.), *Pesquisa universitária em questão*, (São Paulo, 1986), pp. 190-224: p. 207; George Martine, *A redistribuição espacial da população brasileira*, (Rio de Janeiro, 1994), pp. 12-13.

⁸ Bound, Brazil, the natural knowledge economy, p. 56.

⁹ For example, Fabiano Ardigó 'Uma ciência improvável', in Fabiano Ardigó (ed.), *Histórias de uma ciência regional* (São Paulo, 2011), pp. 101-76.

systems, such as the negative role of chair holders, require a precise geographical reference; they cannot be ascribed to the entire higher education system.

The necessity of regionalised studies on the development of academic science is demonstrated in this thesis through a focus on specific areas of universities that achieved remarkably different research records despite their geographical proximity. By considering these regional and institutional imbalances and concentrating on a specific discipline, epidemiology, the question could be formulated as follows: why, for example, did tuberculosis studies that were essential to public health initiatives develop at different speeds within similar academic departments, leading to, in some cases, the significant loss of human lives? Equally in the case of agricultural research, why did studies on pest control, though at the top of the agenda of some faculties of agronomy, receive little attention elsewhere, even when crops and harmful insect species were similar? Several other questions are formulated, all leading to the same central issue: despite geographical proximity, shared language, common social and economic challenges, and identical regulatory and funding systems, academic research programmes tend to concentrate and prosper in some nationalised faculties rather than others. One of the original insights of this thesis is to suggest that these distinct rates of development may be ascribed to local cultures of research that were only superficially consolidated by nationalisation. Evidence will suggest that, during the crucial first years after nationalisation, important elements of local academic cultures can be traced to the research practices in place during the 1940s. A comparative study of the differences and similarities between ongoing practices at different nationalised universities enables an analysis of the extent to which nationalisation did not occur in a historical vacuum; rather, it enhanced and legitimised deeply rooted academic traditions that came to shape the research cultures of federal universities after 1950. The regional concentrations and disciplinary differences found over the following years can be linked to the main elements of these research cultures. This thesis will focus on two

universities – the University of Rio Grande do Sul and the University of Paraná – to explore the factors that shaped pre-1950 cultures of research. Initially, Dutra's act was directed at seven universities, which together would serve as a pilot project for the nationalisation programme. If the project was successful, the campaign could be expanded. In fact, from 1950 onwards, the original project was expanded to include an additional thirty institutions throughout the country. The universities of Rio Grande do Sul and Paraná were in the initial pilot scheme and, therefore, are suited to the analysis of the early impact of nationalisation on prevailing research cultures in different Brazilian states. More importantly, their geographical proximity and the marked contrast between their research projects will highlight the necessity of region specific narratives about the history of academic research in Brazil.

This introduction will sketch the conceptual framework guiding these and other methodological choices made in this thesis. The objective is to introduce readers to the sequence of chapters, the reason for their comparative nature, and the objects of comparison. The discussion of ways in which the following case studies have been devised, ordered and organised will highlight and make more explicit the single thread that unites the entire thesis despite the particularities of individual case studies. The common element bonding the chapters together is an interest in understanding the ways in which nationalisation impacted the research culture of universities involved in the early stages of that project.

The 1950s nationalisation campaign in context

By highlighting the ways in which Dutra's act affected pre-existing academic cultures, this thesis will suggest that an understanding of nationalisation actually lends greater coherence to traditional chronologies of Brazilian academic science. Two major landmarks are usually highlighted in these narratives by the historiography: the creation of the University of Sao Paulo in 1934 and the educational reform of 1968. There is a consensus among scholars that the foundation of the University of Sao Paulo (hereafter USP) was the first successful experience with academic science in Brazil.¹⁰ During the 1930s, the USP had emerged as a vigorous intellectual centre in which foreign scholars headed the departments. In the humanities division were such names as Fernand Braudel and Claude Lévi-Strauss.¹¹ From 1934 to 1942, no less than forty-five foreign university teachers and additional foreign research assistants worked at the USP.¹²

The second major landmark of Brazilian academic science that has been highlighted in the historiography is the 1968 reform.¹³ This reform introduced a new set of measures, including the creation of post-graduate courses, the elimination of the Chair system, and the organisation of academic departments. As most of these innovations persist to this day, the history of academic science in Brazil is usually divided into two phases: before and after 1968.¹⁴ Most scholars of education present the beginning of a research culture in academia as a product of the 1960s. It was, it is claimed, the result of pressure from external groups, such

¹⁰ Simon Schwartzman, *A space for science*, (Pennsylvania, 1991); Ana Maria Fernandes, 'The scientific community and the state in Brazil', (unpublished Oxford University Ph.D. thesis, 1987); Shozo Motoyama, *Prelúdio de uma história*, (São Paulo, 2004).

¹¹ Nívio Campos, 'Intelectuais Paranaenses e as concepções de universidade 1892-1950', (unpublished UFPR Ph.D. thesis, 2006), p. 14.

¹² Fernandes, 'The scientific community and the state in Brazil', p. 93.

¹³ Cunha, 'Ensino superior e universidade no Brasil', p. 157; Ana Maria Fernandes, *A construção da ciência no Brasil*, (Brasília, 1990); Martins, 'A reforma universitária de 1968'; Motoyama, *Prelúdio de uma história*, pp. 320-354; Rothen, 'Os bastidores da reforma universitária de 1968'; Simon Schwartzman and Lúcia Klein, 'Higher education policies', *Higher Education*, 25 (1993), 21-34.

¹⁴ Martins, 'A reforma universitária de 1968', 16-23.

as student organisations and scientist associations, which eventually convinced academics that it was necessary to combine teaching and research.¹⁵

This thesis will suggest that a better understanding of the nationalisation programme provides a deeper appreciation as to why 1934 and 1968 are seen as two landmarks in Brazilian academic science. The foundation of the USP undoubtedly represented a great leap forward in bringing research into Brazilian academia, but the ways in which its foundation actually affected other parts of Brazil are still scantily understood. As Schwartzman noted, further studies on the ways in which research traditions that originated in the USP and a few other independent research centres in the Southeast region came to influence other Brazilian states are still necessary.¹⁶ By investigating the decade prior to nationalisation, this thesis will present evidence that begins to address this issue. In the case of Paraná, for instance, during the 1940s researchers who were trained at the USP would tutor students and thereby help to develop an incipient research culture. This was the case with the German zoologist, Ernst Marcus, who was invited to hold the chair of zoology. When Marcus arrived at the USP, he was the author of fifty-six published works that largely focused on coleopterans, bryozoans, and tardigrades. He devoted himself to the study of systematics and to research on invertebrates. Both were new disciplines in the country, and up until the 1930s, zoology research in Brazil had been limited to applied medicine and agriculture. The German scientist made Brazil his new home and never returned to Germany. When he died in the early 1960s, he had written 216 papers in which he described a broad group of new species.¹⁷ Generations of researchers trained at the University of São Paulo by professors like Ernst Marcus directly and indirectly influenced scientists working in universities throughout Brazil, including Curitiba, as will be discussed in Chapters Four and Six. On the other hand, this thesis will also present evidence that in Rio Grande do

¹⁵ Cordeiro, 'Reflexão sobre a reforma universitária de 1968'; Martins, 'A reforma universitária de 1968'.

¹⁶ Simon Schwartzman, *Um espaço para a ciência*, (São Paulo, 1979).

¹⁷ For example, Fabiano Ardigó, 'Uma ciência improvável', pp. 101-76.

Sul the influence of the first generation of USP scholars was more limited. The trajectory of researchers in Porto Alegre undertaken here suggests that research centres in Rio de Janeiro were much more respected than those located in Sao Paulo. Moreover, this thesis will also demonstrate that the USP was not alone when it brought foreigners to teach. As explained in Chapter One, the Faculty of Engineering of Porto Alegre had done this already in the 1920s with similar, positive results. Foreign professors trained a generation of researchers who in turn shaped the local research culture over the following decades.

The adoption of 1968 as a landmark similarly requires a better appreciation. This is particularly the case regarding the unflattering tones surrounding descriptions of Chair holders before that year's reform.¹⁸ The Chair system in Brazil is as old as the country's first university, created in 1909.¹⁹ Consolidated in 1950, Chairs then became the heart of the higher education system. A group of chairs made a module, and several modules created a course.²⁰ However, the Chair system has been identified as one of the most pernicious features of the higher education system in the 1960s. The portrait painted of the Chair system is usually derogatory, and its elimination in 1968 is presented as one factor that allowed academic research to expand. Chair holders were accused of curtailing scientific creativity and often of openly opposing academic research.²¹ Scholars have recently begun to highlight the problems surrounding these generalisations concerning Chair holders. Maria Guimarães, for example, has highlighted the importance of Chairs in the discussions leading to the 1968 Reform in Rio de Janeiro.²²

Several examples presented in this thesis similarly suggest that the traditional interpretation of the role of Chair holders is too simplistic. Solid evidence will indicate that several Chair holders occupied important research positions in independent institutions that

¹⁸ For example, Mendonça, 'A universidade no Brasil', p. 143.

¹⁹ At first, they were called *Letras* but had the exact same role and administrative obligations.

²⁰ Cunha, *A universidade crítica*, p. 15.

²¹ Maria Amélia Dantes, 'Paixão pela Botânica', *Ciência Hoje*, 32 (2002), 66-73.

²² Guimarães, Maria R. C., 'Os catedráticos de clínica médica', (unpublished Fiocruz University Ph.D. thesis, 2009).

worked alongside faculties. As discussed below, the presence of these individuals in areas such as entomology and veterinary medicine demonstrates the necessity of questioning why active researchers who also held Chairs were in the minority. What were the conflicts between research oriented Chair holders and the majority of their colleagues who opposed academic research? Why did groups opposed to academic research appear to prevail, at least until 1968? As suggested throughout this thesis, these are questions that can only be answered by looking at individual trajectories of research minded Chair holders who participated in the 1950 nationalisation.

In addition, scholars have assumed that the resilient research traditions that have continued to the present day originated in the post-graduate courses created in 1968.²³ By 1964, the number of federal universities had increased to thirty-seven. Nationalisation enabled a growth rate in new admissions on the order of 12.5 per cent a year, as opposed to 2.4 per cent during the previous decade. Although in 1965, the number of students in higher education had increased to 200,000, of which eighty per cent were in the state system, the demand by far outgrew the academic infrastructure, and urgent expansion was required. Meanwhile, as the top rank of the new federal universities, Chair holders enjoyed complete autonomy in deciding how to adapt to the growing number of students. Scholars suggest that the Chair system did not allow the necessary flexibility to keep up with the rapid expansion of the student body. With the abolition of this system and the creation of postgraduate courses, new professors could not only be trained in larger numbers, but they also could fill teaching positions faster.²⁴ A consequence of this urge for a new configuration to meet growing demand has been considered the catalyst for the thorough reform undertaken in 1968. However, scant empirical evidence

²³ Cunha, 'Ensino superior e universidade no Brasil', pp. 179-187; Luiz Antônio Cunha, 'Desenvolvimento desigual e combinado no ensino superior', *Educação & Sociedade*, 25 (2004), 795-817; Cunha, *A universidade crítica*; Martins, 'A reforma universitária de 1968', pp. 16-18.

²⁴ Inês Regina Waitz, 'Políticas públicas para o ensino superior', *Anuário da produção acadêmica docente*, 3, (2009), 251-64.

seems to support the idea that a thriving research culture resulted from the search for ways to train new professors. Analysis of universities in the years leading to nationalisation reveals that degree requirements have rarely been a pre-condition for a permanent and thriving research culture. Previously, the theses written as part of the application for a Chair usually represented the only research work carried out by the professor. If forming new professors was the main goal after 1968, the PhD programmes became the new statutory way of securing a job through a title. If this hypothesis is correct, the chair holder title was simply exchanged for the PhD title. Thus, the creation of a fast track to the doctoral degree does not constitute an empirically based explanation of the ways in which science was eventually introduced into academia; on the contrary, it attests to the continuity of a culture in which research was only a means to obtaining a title to secure a job, a job, it should be added, that did not require further research work.

The fact that the year 1950 has received little scholarly attention thus appears to be an inconsistency in the interpretation of the evolution of academic science in Brazil. The thriving research culture that effectively took place in some regions of the country between 1934 and 1968 cannot be uniquely ascribed to the intellectual powerhouse that the USP became in the 1930s. It remains however true that research communities throughout Brazil were directly affected by the research practices initiated at USP. Placing the foundation of the USP in relation to other states would only further justify its adoption as a landmark in national terms. Likewise, this thesis will suggest that changes introduced by the 1968 Reform constitute a further chapter in the story of the struggle between conservatism and reform within specific disciplinary contexts and within different academic groups with distinct agendas and cultural values. Between the two undoubted landmarks, 1938 and 1968, the 1950 nationalisation campaign provides the necessary elements to lend coherence to the whole.

“Peripheral” communities: The selection of comparable elements

In order to understand the choice of geographical units as the units of analysis in this thesis, it is necessary first to briefly map out the Brazilian academic context of “peripheral” states in the second half of the 1940s.²⁵ The developments leading to nationalisation may be traced back to events prior to the USP foundation. In 1931, for example, Francisco Campos, Vargas’ Minister of Education, issued the Statute of Brazilian Universities, thereby reinforcing the competence of the central government in controlling higher education in the country. Campos provided the framework for higher education in Brazil, which included both universities and isolated faculties. The decree also defined ways in which the higher education system would operate, including the existence of congregations, with members of all faculties equally represented, as well as the central role of Chair holders, the admission process, and other administrative aspects of the university system. In addition, Campos’ statute established that it would be mandatory to have engineering, medicine, and law courses to be considered a university. Although this standardisation was the first attempt to give uniformity to the country’s higher education system, it did not help to expand the number of places available to new students. The universities in Rio Grande do Sul and Paraná, for example, went through this period with little change.²⁶ During the Second Republic (1930-1945), demand for higher education increased as a result of rural migration and women’s increased access to education, among other factors, and the higher education system quickly became outdated and overstrained.²⁷ Politicians in the capital, Rio de Janeiro, were forced to take action after protests from students who felt they

²⁵ This analysis greatly benefited from the insight of works by Ana Carneiro and her colleagues on peripheral communities, see Ana Carneiro, Ana Simões and Maria Paula Diogo, ‘Enlightenment science in Portugal’, *Social studies of science*, 30 (2000), 591-619; Maria Paula Diogo, Ana Carneiro and Ana Simões, ‘The portuguese naturalist Correia da Serra (1751-1823)’, *Journal of the History of Biology*, 34 (2001), 353-93.

²⁶ Erica Piovan Cintra, ‘Sciencia e labor no palácio de luz’, (unpublished UFPR Ph.D. Thesis, 2010); Ulf G. S. Baranow and Márcia Delladone, *Universidade Federal do Paraná*, (Curitiba, 2007); Marília C. Morosini and Maria E. D. P. Franco, ‘Escola de engenharia de Porto Alegre (1896-1934)’, *História da Educação*, 19 (2006), 39-58.

²⁷ Cunha, *A universidade crítica*, pp. 73-94.

were excluded from the educational system as well as from state governors who could not meet the increasing costs of their educational institutions. A political solution appeared in 1945 when a new decree made the 1931 requirements for universities more flexible. For instance, as long as there was one Faculty of Philosophy, Science and Letters; plus two others (among law, engineering and medicine), an institution could be considered a university.²⁸ Then, in 1950, the ambitious campaign of nationalisation was set in motion. After nationalising the first group of universities, the central government poured an unprecedented amount of resources into them in order to meet the demands of their respective states. If that strategy worked, the same concept could be adopted in the rest of the country.

Nationalisation – *federalização* in Portuguese – was not imposed on any of the institutions that participated in the initial programme; the first universities to request nationalisation did so voluntarily. They were located in the five capitals of Recife, Bahia, Belo Horizonte, Porto Alegre and Rio de Janeiro. As the plan to nationalise these universities became public, the university in Curitiba and five individual faculties requested to be included. Eventually, the original decree created the first group of six nationalised universities in Brazil, located in Recife, Bahia, Belo Horizonte, Porto Alegre, Rio de Janeiro, Curitiba, and a further eleven faculties, mostly in the southeast and northeast regions. The pilot scheme was considered so successful that the authorities decided to expand the programme. Four years later the number of nationalised universities had grown to eleven and in 1964, to thirty-seven. The federal system then has changed little since 1964; it is well known that, after nationalisation, successive governments did not create new public universities.²⁹ As a result of the lobby by private universities, the government only expanded institutions already nationalised rather than creating new ones.³⁰ Until the year 2000, there were only thirty-nine federal universities in

²⁸ Márcia Delladoni Siqueira and Etelvina Trindade, *Rumos da Pesquisa*, (Curitiba, 1998).

²⁹ Martins, 'A reforma universitária de 1968', pp. 23-28.

³⁰ Cunha, 'Desenvolvimento desigual e combinado no ensino superior', pp. 800-803.

Brazil.³¹ The slow expansion from 1950 to the present day thus indicates the significance of the nationalisation of the first six universities. They provided evidence that a nationalised system was viable and could be expanded. It was in these first federal universities that discussions about academic science began and later, with the 1968 educational reform, where academic research became concentrated in Brazil. As mentioned already, the present study of the impact of nationalisation on pre-1950 research cultures concentrates on two of the most productive universities of Latin America. The University of Rio Grande do Sul occupies first place in productivity outside the states of Sao Paulo and Rio de Janeiro whereas the University of Paraná holds the fourth position in the same ranking.³²

The universities in Curitiba and Porto Alegre present several characteristics that are conducive to a comparative study. The academic community of Curitiba, in particular, has already proved its relevance as a group through which knowledge accumulation and scientific exchange outside the main Brazilian scientific centres could be studied.³³ The research-mindedness of its members and their interactions with the outside world is attested by publications that were planned, executed and printed in Curitiba. Moreover, it cannot be denied that professors from the University of Paraná produced work at a level recognised by Brazilian and foreign peers. The entomologist Jesus Moure, Professor of Natural History, became a renowned specialist in the systematics of the vast family of neotropical bees, whereas Professor Reinhard Maack, a geology professor, was one of the first to gather evidence from Brazil to support Alfred Wegner's theory of plate tectonics.³⁴ However, even without adopting a Eurocentric definition of valid scientific knowledge, the use of science to legitimise political

³¹ Cunha, 'Ensino superior e universidade no Brasil', p. 151.

³² D. Babini, 'Acceso abierto a la producción científica de América Latina y el Caribe', *Revista Iberoamericana de Ciencia, Tecnología y Sociedad CTS* 6 (2011), 1-24: p. 11.

³³ Fabiano Ardigó, (ed.), *Histórias de uma ciência regional: cientistas e suas instituições no Paraná, (1940-1960)*, (São Paulo, 2011); Elizabeth Lunardi, 'O IBPT' in Fabiano Ardigó (ed.), *Histórias de uma ciência regional*, (São Paulo, 2011), pp. 27-100.

³⁴ André de Souza Carvalho, 'Jesus Moure', in Fabiano Ardigó (ed.), *Histórias de uma ciência regional*, (São Paulo, 2011), pp.177-230; Alessandro Casagrande, 'O incansável explorador Reinhard Maack', in Fabiano Ardigó (ed.), *Histórias de uma ciência regional*, (São Paulo, 2011), pp. 267-325.

and social initiatives in Curitiba deserves careful consideration in itself. In the 1940s, the largest institution in the town was the Institute of Biological and Technological Research; it hired almost three hundred employees, including several professors from the University of Paraná.³⁵ The use of science for agricultural purposes was the justification for creating this institute, but as will be explored in detail in the following chapters, some strategic divisions, such as the Division of Entomology, rarely showed any long-term determination to fulfil that objective.

In addition, there were methodological reasons for selecting the University of Paraná for comparison, such as the preliminary identification of archival resources. One of the main problems in studying the scientific traditions of peripheral regions in Brazil during the mid-twentieth century is the almost total absence of scholarly work from which to start. Without previous surveys, archival work is often punctuated by dead ends and false starts. Reconstructing even the basic features that characterised scientific activities, such as the existence of journals and their relevance, proved extremely complicated as it required the perusal of scores of publications just to map out the issues in which we were interested. Evidently, this is not only a problem for the south of Brazil. Scholars investigating other regions and states have indicated similar difficulties.³⁶ As institutional topographies in most Brazilian peripheral states have not been mapped out and networks are still mostly unknown, reliable surveys of the highly fragmented and scattered archives are rare, threatening any enterprise constrained by the time limit expected of a DPhil thesis. In this sense, the University of Paraná

³⁵ Ardigó, *Uma ciência improvável*, pp. 142-164.

³⁶ Nelson Rodrigues Sanjad, 'A coruja de minerva', (unpublished Fiocruz Ph.D. thesis, 2005); Júlio C. Schweickardt, *Ciência, nação e região*, (Rio de Janeiro, 2011); Fernando Costa Straube, 'A contribuição das expedições zoológicas polonesas (1910-1924)', *Boletim do Instituto Histórico e Geográfico do Paraná*, 52 (2002) 53-82; Fernando Costa Straube and Pedro Scherer-Neto, 'História da Ornitologia do Paraná', in Fernando Costa Straube and Pedro Scherer-Neto (eds.), *Ornitologia sem Fronteiras*, (Curitiba, 2001), pp. 43-116, Tamara Rangel Vieira, 'Centro ou periferia?', (unpublished Fiocruz Ph.D. thesis, 2008).

was a justifiable choice not only because its institutional scene had been sketched out but also because archives had been identified, providing a reliable starting point.

The University of Rio Grande do Sul was also a justifiable choice because it hosted an active research community. In the early 1980s, it already ranked fourth in the top ten most productive research centres in Brazil.³⁷ This high position stemmed from the fact that during the first years of nationalisation many sectors of the university were dedicated to research. For instance, the University of Porto Alegre created the first Brazilian centre of research as well as an undergraduate course in oceanography in 1953.³⁸ Similar programs were created in geology in 1957 and veterinary parasitology in the early 1960s, and both were the first departments in these subjects in Brazil.³⁹ The presence of cultural values and practices related to academic research coincides with scholarly observations on the existence of strong positivistic ideas permeating intellectual and academic life in Porto Alegre since the beginning of the twentieth century, as will be explained in detail in Chapters One and Two.⁴⁰ In addition, Porto Alegre was notorious for its strong regionalist tradition, a characteristic that was well suited to comparative study.⁴¹ Although this tradition has been studied most often in its relevance to political history, a similar attitude prevailed in the area of public health, one of the main focuses of this thesis.⁴² For instance, in the early 1940s, Couto Barcelos, professor in the Faculty of Medicine of Porto Alegre, argued that standards used to analyse milk samples in the country's capital, Rio de Janeiro, could not be used in the capital of Rio Grande do Sul. Barcelos maintained that public health authorities in Porto Alegre should establish local standards to

³⁷ Jacqueline Leta and L. Meis, 'A profile of science in Brazil', *Scientometrics*, 35 (1996), 33-44.

³⁸ Aziz Nacib Ab'Sáber and Antônio Christofolletti, 'Geociências', in Shozo Motoyama and Mário Guimarães Ferri (eds.), *História das ciências no Brasil*, (São Paulo, 1980), pp. 117-238: p. 152.

³⁹ Ibid., p. 206; João Lúcio Azevedo, 'A pesquisa agropecuária', in João Lúcio Azevedo and Simon Schwartzman, *Ciência e tecnologia no Brasil*, (São Paulo, 1994), 1-73: p. 61.

⁴⁰ Joan Lamaysou Bak, 'Some antecedents of corporatism', (unpublished Yale University Ph.D., thesis, 1977), p. 27.

⁴¹ Joseph Leroy Love, *Rio Grande do Sul and Brazilian Regionalism*, (Stanford, 1971).

⁴² For an in-depth analysis of the regionalist tradition in Porto Alegre and Rio Grande do Sul, see Love, *Rio Grande do Sul*.

regulate and control its dairy industry. According to Barcelos, milk from Rio Grande do Sul herds differed from the rest of Brazil and therefore could not be analysed by standards defined elsewhere.⁴³

Systematic comparison of the universities in Porto Alegre and Curitiba attested to the fact that the differences between them were indeed significant between the years 1934 and 1949, which prompted the title of this thesis. In Brazilian terms, the universities of Rio Grande do Sul and Paraná are “close” together since only seven hundred kilometres separate them. The historiography has lumped their capitals as peripheral to the metropolitan centres of Sao Paulo and Rio de Janeiro, which usually occupy the main focus of studies on scientific development. However, the comparative analysis carried out in this thesis reveals the significant differences that existed in the so-called provincial settings. For instance, institutional arrangements, disciplinary boundaries and networks were quite distinct despite the fact that they were sometimes organised under similar disciplinary labels. There were groups identified as epidemiologists and medical entomologists in both universities, but when their reaction to certain practices and technologies is studied, supposedly similar disciplinary boundaries fall short of explaining the reality of an intricate process of selecting, adapting and, at times, neglecting new ideas.

It could be argued that the two centres were located in remote corners of the country, in states still dedicated predominantly to rural activities. By 1940, Curitiba’s population was no more than 200,000 whereas the population of Porto Alegre was closer to 400,000. Although there were extremely active researchers, there was no prominent leader of a research school in these two towns that can be compared to those in Rio de Janeiro and Sao Paulo.⁴⁴ The history

⁴³ Couto Barcelos, ‘Alguma considerações em torno do exame físico-químico e bacteriológico do leite’, *Arquivos Rio Grandenses de Medicina*, 20 (1942), 53-64: p. 64. Similarly, veterinary specialists working in the Bureau of Animal Industry located in Porto Alegre argued that Rio Grande do Sul must have its own policy in the area of zoonosis prophylaxis, see Francisco Morais Teixeira, ‘Plano nacional de combate a brucelose’, *B. D. P. A.*, 9 (1953), 44-6.

⁴⁴ George Zarur, *A arena científica*, (Campinas, 1994).

of Brazilian academic research has indeed been traditionally told from the standpoint of main centres, particularly Sao Paulo.⁴⁵

From this perspective, the academic communities of Curitiba and Porto Alegre might be considered peripheral communities, isolated in the south of the country. This characterisation, however, must be placed within recent debates in the historiography of science. Although the role of place has become increasingly important for historians of science, it is noteworthy that the selection of geographical units of analysis has remained, to a great extent, arbitrary. According to David Chambers, historians have understood the definition of a scientific locality to be a simple frame of reference within which they ‘usefully examine the role of knowledge construction and interaction’.⁴⁶ Places provide heuristic frameworks wherein primary sources can be organised and hypotheses tested.⁴⁷ More importantly, the relevance and coherence of certain geographical units of analysis can only be realised *post facto*; that is, after the historical research has been carried out. Aprioristic definitions of what places are worth studying imply the use of anachronistic definitions of proper scientific practice and often distort views of how scientific practices have been articulated in the past. As Pietro Corsi states, ‘the a priori and anachronistic definition of the core of authors worth investigating, and of sources that the historian of science is entitled to deal with, constitutes a final, major obstacle to asking questions’.⁴⁸ Similarly, David Chambers has convincingly argued against aprioristic categories of valid knowledge, which he considers to be a heritage of models of scientific development that defined Western European science as the gold standard and all other forms of knowledge as inferior.⁴⁹ According to Chambers, if scientific knowledge is to be

⁴⁵ For instance, Motoyama, *Prelúdio de uma história*, pp. 249-316 ; Schwartzman, *A space for science*, pp. 105-138.

⁴⁶ David Wade Chambers and Richard Gillespie, ‘Locality in the history of science’, *Osiris*, 15 (2000), 221-40: p. 228.

⁴⁷ The heuristic character of theoretical models is discussed in Pietro Corsi, ‘The politics of theory in the history of science’, in Fabiano Ardigó, *Histórias de uma ciência regional*, (São Paulo, 2011), pp. 355-363.

⁴⁸ Pietro Corsi, ‘The revolutions of evolution’, *Bulletin du Musée d’Anthropologie*, (2012), 1-41.

⁴⁹ Chambers and Gillespie, ‘Locality in the history of science’.

understood at all, historians must investigate ‘every locality in which it appears’, otherwise science must be understood ‘as a knowledge factory successfully established only in certain (principally European) strongholds.’⁵⁰

On the whole, years of scholarship on the theme of science and place have demonstrated that the most important question is not *what places* to look at, but *what to look at* in each place. Thomas Gieryn, for example, argues that ‘intangible cultural norms, identities, memories and values’ are embedded and secured by specific places that therefore must be part of any historical narrative about science.⁵¹ However, Gieryn could not prescribe aprioristic criteria to the selection of places. He argued that places have three defining features – ‘location, material form, and meaningfulness’ – that cannot be disentangled and can only be understood after careful investigation. David Livingstone agrees with this perspective when he declares that ‘in different towns and cities, in different counties and provinces, in different municipalities and parishes, scientific endeavours have been shaped by subregional particularities’.⁵² Therefore, attribution of scientific status to certain ideas, the different arrangements that enable knowledge production, and the particularities of local scientific practices are expected to vary from place to place. Understanding these unpredictable variations then becomes the objective of a place conscious historiography; and, more importantly, any attempt to pre-determine what to look at is a denial that these variations are worth studying.

Another important aspect related to the selection of a unit of analysis is that scale does not have an explanatory potential in itself. As pointed out by micro-historians, empirical breadth frequently proves to be more revealing than does over attention to scale. Marion Gray, for instance, used the work of the historian David W. Sabeen to highlight this position. Sabeen dedicated six years of full-time research to produce an overview of a single German village

⁵⁰ Chambers, ‘Locality and science’, in A. Lafuente (ed.), *Mundializaion de la ciencia y cultura nacional*, (Madrid, 1991), pp. 605-19: p. 611.

⁵¹ Thomas Gieryn, ‘A space for place in sociology’, *Ann. Rev. Sociol.*, 26 (2000), 463-96.

⁵² David N. Livingstone, *Putting science in its place*, (London, 2003), p. 105.

from 1700 to 1870.⁵³ Although, in terms of scale, this geographical unit of analysis might at first appear irrelevant, the result of Sabeian's research, a three-volume work of more than 1,300 pages, was considered to be a ground-breaking, micro-historical treatise that has led to reconsideration of major historiographical issues, such as the role of kinship, in continental Europe.⁵⁴

The Comparative Framework

The decision to focus on two universities rather than one has been consciously undertaken in order to enable a comparative work. If, on the one hand, analysis of a single institution would have allowed a more in depth analysis, this choice would have incurred the inherent difficulty of working with case studies to discover a way of relating the specific to the general, the local to the global, or as Peter Galison suggested, carrying out a history of science without being naively grounded in typicality.⁵⁵ This is a challenge, given that the concept of typicality itself is one of 'social history's proudest achievements'.⁵⁶ On the other hand, as Oliver pointed out, the comparative approach had been originally conceived as an antidote to excessive regionalism in historical writings.⁵⁷ The attempt to problematize inward-looking narratives is ascribed to March Bloch, who is considered the main precursor of the comparative perspective.⁵⁸ Scholars argue that after Bloch, comparative narratives continuously proved to be effective in challenging nationalistic and provincially parochial historical writings.⁵⁹

⁵³ Marion Gray, 'Microhistory as universal history', *Central European History*, 34 (2001), 419-31.

⁵⁴ David Warren Sabeian, *Power in the blood*, (Cambridge, 1984); David Warren Sabeian, *Property, production, and family in Neckarhausen, 1700-1870*, (Cambridge, 1990); David Warren Sabeian, *Kinship in Neckarhausen, 1700-1870*, (Cambridge, 1998).

⁵⁵ Peter Galison, 'Ten problems in history and philosophy of science', *Isis*, 99 (2008), 111-24; Manuel Mino Grijalva, 'Existe la historia regional?', *História Mexicana*, 51 (2002), 867-97.

⁵⁶ Nicole Eustace, 'When fish walk on land', *Journal of Social History*, 37 (2003), 77-91: p. 88.

⁵⁷ Graciela Oliver, 'As ciências agrícolas e suas perspectivas para estudos comparativos', in Fabiano Ardigó, *Histórias de uma ciência regional*, (São Paulo), pp. 327-53.

⁵⁸ Neyde Theml and Regina Bustamante, 'História comparada', *Revista de História Comparada*, 1 (2007) 1-23.

⁵⁹ Diego Olstein, 'Comparative history', in Benjamin Z. Kedar (ed.), *Explorations in comparative history*, (Israel, 2009), pp. 37-52.

Although Bloch's initial antidote to nationalism was conscientious cross-national comparison, his advice can also be applied to intraregional studies. The use of this geographical level for comparative studies has proven to be an insightful and original approach even for areas already well developed in the historiography. For instance, the substantial scholarship on slavery in North America has benefitted from inter-regional comparisons, which nowadays complement transnational studies on the topic.⁶⁰ This was particularly the case in the work *Slave Counterpoint*, written by the historian Philip Morgan.⁶¹ Morgan compared the states of Virginia and South Carolina in order to investigate similarities and differences between the two slave societies. Despite their geographical proximity and similar staple-based economies, Morgan demonstrated the existence of significant differences in race relations and economic development. He argued that comparison between American states worked as an 'indirect experiment' to show that although both societies appear indiscernible from the outside, each one 'looked different in the light of the other'.⁶²

In the case of the historiography of science, transnational comparisons have traditionally been more common than inter-regional studies. The works of Joseph Ben-David and Robert Merton are among the two most well-known early surveys adopting the cross-national dimension.⁶³ Both scholars attempted to contrast national styles of research in order to identify causal influences on differential rates of scientific development. These stimulating initiatives gave rise to a plethora of comparative histories of science, which continued overwhelmingly to be undertaken on the cross-national level. However, even when different nations were compared, their individual examples consisted of well-defined case-studies

⁶⁰ Thomas Bender, 'Strategies of narrative synthesis in american history', *The American Historical Review*, 107 (2002), 129-53.

⁶¹ Philip Morgan, *Slave Counterpoint*, (London, 1998).

⁶² *ibid.* For a similar perspective in the area of religious studies, see E. Digby Baltzell, *Puritan Boston and Quaker Philadelphia*, (New Jersey, 1996).

⁶³ Joseph Ben-David, *The scientist's role in society*, (Chicago, 1971); Robert K. Merton, *The sociology of science*, (Chicago, 1973). For a survey of similar contemporary works, see Lewis Pyenson, 'Comparative history of science', *History of Science*, 40 (2002), 1-33.

circumscribed by modest geographical boundaries. Generalisations about “national” scientific styles became increasingly rare. For example, in the study of the international reception of Darwinism, individual institutions and leading scholars were selected as representative examples of local responses in certain countries rather than as normative descriptions of national reactions to Darwin’s ideas.⁶⁴ The increasing preference for well-controlled and sensibly placed case studies occurred alongside an overall tendency within the historiography of science to move towards more refined geographies of science. Overarching narratives about national styles of science, such as those presented by Ben-David and Merton, were replaced by studies on narrower geographies and more constrained spaces, such as regions, towns, and even single streets.⁶⁵ Simon Naylor suggests that science has come to be ‘understood within the context of a region – certainly in the case of the British county, the French département, the American state, or the Canadian province’.⁶⁶ In Britain, historians investigated the ‘regionally inflected character’ of science in several counties including Cornwall, Yorkshire, and Staffordshire.⁶⁷ The same applies to the city of Manchester, which had been considered an ideal locus for the study of the use of science as an instrument of ‘social legitimisation’: it was both geographically isolated and central to the industrial revolution.⁶⁸ But even a single street has proven to be a representative locus for the study of scientific activity. The historian Deborah

⁶⁴ Pietro Corsi and Paul J. Wendling, ‘Darwinism in Germany’, in David Kohn and Malcolm Kottler (eds.), *The Darwinian Heritage*, (Princeton, 1985), pp. 683-729.

⁶⁵ For more recent debates, see Diarmid A. Finnegan, ‘The spatial turn’, *Journal of the history of Biology*, 41 (2008), 369-88; Livingstone, *Putting science in its place*, pp. 17-86; Simon Naylor, ‘Historical geographies of science’, *BJHS*, 38 (2005), 1-12; Richard C. Powel, ‘Geographies of science’, *Progress in Human Geography*, 31 (2007), 309-29.

⁶⁶ Naylor, ‘Historical geographies of science’, p. 7.

⁶⁷ *ibid.* Similar examples can be found in studies about Italy, Greece, Portugal and France, see respectively Pietro Corsi, ‘How to use centres in the periphery’, in Pietro Corsi and Robert Fox (eds.), *Centre and periphery revisited* (Oxford, 2003), pp. 51-68; Pietro Corsi, ‘Much ado about nothing’, *Earth Sciences History*, 26 (2007), 97-126; Kostas Gavroglu, ‘The centre from the periphery’, in Pietro Corsi and Robert Fox (eds.), *Centre and periphery revisited*, (Oxford, 2003), pp. 11-32; Mary Jo Nye, *Science in the provinces*, (Berkeley, 1986); Carneiro, Simões and Diogo, ‘Enlightenment science in Portugal’, pp. 591-619; Ana Carneiro, Ana Simões and Maria Paula Diogo, ‘Building the republic of letters’, in Pietro Corsi and Robert Fox (eds.), *Centre and periphery revisited*, (Oxford, 2003), pp. 33-50; Ana Carneiro, ‘Outside government science’, *Annals of Science*, 62 (2005), 141-204.

⁶⁸ Arnold Thackray, ‘Natural Knowledge in Cultural Context’ *The American Historical Review*, 79 (1974), 672-709.

Harkness compellingly argued that Lime Street in London concentrated such an active community of naturalists during the Elizabethan period that it deserves the same scrutiny that previous generations of scholars have dedicated to entire nations. As these new geographies of science are more precisely mapped out, comparative studies increasingly appear more promising. As noted above, the comparative perspective used for national comparisons may also be applied to other geographical boundaries as long as they present, at the same time, similarity between the observed phenomena and dissimilarity between the environments in which they occur. Continental countries are particularly well-suited to providing such a contrast because their massive dimensions offer blatant regional distinctions. Brazil, for example, is the fifth largest continental country in the world and has four major regions with quite distinct economic, social, and environmental contexts.⁶⁹ For example, the Southeast region encompasses four states including the political centre of the country and the capital during the 1940s, Rio de Janeiro, and the richest state, Sao Paulo. In all, Brazil had twenty-two states whose integration through national policies has always been a challenge, the example of education being no exception.⁷⁰ A national curricula and standardised higher education protocols only came into existence in 1950 and even then they were still flexible enough to allow regional adaptations. Because of its remarkable geographical contrasts, intra-regional comparisons in Brazil have proven to be both compelling and insightful.⁷¹ For instance, in the comparative study *Cobras, Lagartos e Outros Bichos*, Jayme Bechimol and Luiz Teixeira

⁶⁹ Summaries of the large body of scholarly work on regional inequalities in Brazil may be found in Barros, 'Os desequilíbrios regionais', pp. 12-9; Célio Diniz, 'Recent and prospective regional changes', *University of Oxford Centre for Brazilian Studies Working Paper Series* (1998), 1-39; Diniz, 'Celso Furtado', pp. 227-49; Domingues and Ruiz, 'Os desafios do desenvolvimento', pp. 42-4; Olímpio J. de Arroxelas Galvão, 'Comércio interestadual por vias internas', *Revista Brasileira de Economia*, 53 (1999), 523-58; Vicente Guimaraes, 'Sistemas de inovação em países periféricos', (unpublished UFRJ M.Phil. dissertation, 2005); Eli Napoleão Lima, 'Revisitando a "questão" regional no Brasil', in Eli Napoleão Lima, Nelson Giordano Delgado, and Roberto José Moreira (eds.), *Mundo Rural IV*, (Rio de Janeiro, 2007), pp. 23-38; Flávio José Peixoto, 'O local e os sistemas de inovações', (unpublished UFRJ M.Phil. dissertation, 2005); Fábio Carlos Silva, 'Política da ciência e tecnologia', *Amazônia: ciência e desenvolvimento*, 2 (2007), 137-57.

⁷⁰ Love, Rio Grande do Sul, p. 4.

⁷¹ Pyenson, 'Comparative history of science', p. 16.

explored the rivalry between the Vital Brazil Institute in Sao Paulo and the Oswaldo Cruz Institute in Rio de Janeiro.⁷² Both were created at the same time and had similar objectives, but despite their geographic proximity, they were sufficiently separated to house different scientific cultures.⁷³ This comparative study was well-suited to the analysis of research practices and enabled the investigation of singularities and differences based on specific contrasts within the same region. The flexibility of the comparative perspective and its adoption by different scholarly communities has led historians of science to argue that comparative history has been ‘the most innovative and the most durable of scholarly undertakings’ in their field over recent decades.⁷⁴ The effectiveness of generating significant discussion and stimulating new areas of inquiry in a variety of geographical scales attests to the suitability of this approach for the investigation of peripheral scientific communities in Brazil like those in Porto Alegre and Curitiba.⁷⁵

In order to impose a delimitation on the comparative elements, a parameter was necessary; as Jurgen Kocka points out, ‘one cannot compare totalities’.⁷⁶ The University of Paraná in 1949 had seven faculties and around four thousand students. In Porto Alegre, there were nine faculties and around six thousand students. The delimitation adopted in this thesis consists of the selection of two specific faculties, the faculties of medicine and the faculties of agronomy and veterinary medicine.⁷⁷ Faculties of medicine were chosen both because they

⁷² Jaime Larry Bechimol, *Cobras, Lagartos e outros bixos*, (Rio de Janeiro, 1993). For further insight into intraregional comparisons, see Flavio M. Heinz (ed.), *Experiências nacionais, temas transversais*, (São Leopoldo, 2009); Elaine Maschio and Eliane Mimesse, ‘Imigrantes italianos nas províncias de São Paulo e Paraná’, *Revista de História Comparada*, 2 (2008), 1-20 ; Maria Ligia Coelho Prado, ‘Repensando a história comparada da América Latina’, *Revista de História*, 153 (2005) 11-33; Theml and Bustamante, ‘História comparada’. For a summary of the small number of works on the comparative history of education in Brazil, see Clarice Nunes, ‘História da Educação e Comparação’, in Sociedade Brasileira de História da Educação, *Educação no Brasil* (Campinas, 2001), 53-72.

⁷³ Inter-regional comparisons in Brazil have attracted further scholarly attention, see Ricardo A. Gutierrez, *Between knowledge and politics*, (unpublished John Hopkins University Ph.D. thesis, 2007); Heinz, *Experiências nacionais*; Maschio and Mimesse, ‘Imigrantes italianos nas províncias de São Paulo e Paraná’.

⁷⁴ Pyenson, ‘Comparative history of science’, p. 4.

⁷⁵ *ibid.*

⁷⁶ Jürgen Kocka, ‘Comparison and beyond’, *History and theory*, 42 (2003), 39-44.

⁷⁷ In both universities, the Faculties of Agronomy and Veterinary Medicine were considered a single institution.

benefited most from nationalisation in financial terms and because there was a long tradition of medical research in Brazil.⁷⁸ The fact that scholars in Porto Alegre and Curitiba had access to a wealth of medical research produced both in Brazil and overseas facilitated comparison of the ways in which they understood, adapted, and discarded ideas.⁷⁹

Faculties of agronomy and veterinary medicine were chosen because they were linked to remarkably prolific research institutions.⁸⁰ As explained in Chapters One and Four, in Curitiba and Porto Alegre the largest research centres consisted of state research departments dedicated to agriculture and veterinary medicine research, and many of their employees were

⁷⁸ For the background of faculties of medicine in the country, see Jaime Larry Benchimol, 'A instituição da microbiologia e a história da saúde pública no Brasil', *Genética & Saúde Coletiva*, 5 (2000), 265-92; Jaime Larry Benchimol, *Febre amarela*, (Rio de Janeiro, 2001); Simone Kropf, *doença de Chagas*, (Rio de Janeiro, 2009); Simone Kropf, 'Ciência, saúde e desenvolvimento' *Tempo*, 19 (2005), 107-24; Guimarães, 'Os catedráticos de clínica médica'; Ana M. F. A. Rosemberg, 'Guerra a peste branca', (unpublished PUC-SP Masters dissertation, 2008); D. S. Sheppard, 'Brazilian medical literature about the white plague', *História, Ciência, Saúde*, 8 (2001), 172-92; Antonio Ruffino Netto, 'Tuberculose', *Revista da Sociedade Brasileira de Medicina Tropical*, 35 (2002), 51-8; Roberta Campos and Celso Pianta, 'Tuberculose', *Bol. da Saúde*, 15 (2001) 61-71; José L. F. Antunes, E. A. Waldman and M. de Moraes, 'A tuberculose através do século', *Ciência & Saúde Coletiva*, 5 (2000), 367-79; Marta F. A. Mendes, 'Uma perspectiva histórica da divulgação científica' (unpublished Fiocruz Ph.D. thesis, 2006), pp. 128-152; Luiz Otávio Ferreira, Maria R. F. Fonseca and Flávio Coelho Edler, 'A Faculdade de Medicina do Rio de Janeiro', in Maria A. Dantes (ed.), *Espaços de Ciência no Brasil*, (Rio de Janeiro, 2001); Schwartzman, *A space for science*, pp. 63-104; Nancy Stepan, *Beginnings of Brazilian science*, (New York, 1981), pp 55-105.

⁷⁹ Interestingly, faculties of medicine, which formed the largest departments at the moment of nationalisation and, therefore, received the greatest amounts of funding, did not proportionally excel in research outputs when compared to departments that received less funding, such as Earth Sciences. By the early 1980s, Earth Sciences had three times more international journal's articles than Health Sciences. Castro, 'Há produção científica no Brasil?', p.200.

⁸⁰ For the background of Faculties of Agronomy and Veterinary Medicine in Brazil, see Eva-Maria Swidler, 'The politics of economics' (unpublished Temple University Ph.D. thesis, 2004); N. A. Araújo, 'A escola agrícola de São Bento das Lages', (unpublished UFBA Masters dissertation, 2006); N. A. Araújo, 'Pioneirismo e Hegemonia' (unpublished UFF Ph.D. thesis, 2010); L. S. Barbosa, 'Roupa nova para velha senhora agrária', (unpublished UFV Masters dissertation, 2004); Ana M. E. S. Braga, 'Educação agrícola no Brasil e na UFRGS', (unpublished UFRGS Ph.D. thesis, 1999); F. M. G. Coelho, 'A construção das profissões agrárias', (unpublished UNB Ph.D. thesis, 1999); L. Ferreira, 'Imprensa agrícola no império, na primeira república e no estado novo' (unpublished UNB Masters dissertation, 1989); M. H. Freitas, 'Considerações acerca dos primeiros periódicos científicos brasileiros', *Ciência da Informação*, 35 (2006), 54-66; E. Malavolta, 'Escola superior de agricultura Luiz de Queiroz', (Piracicaba, 1970); Z. Martins, *Agricultura Paulista*, (São Paulo, 1991); R. A. Meloni, 'Ciência e produção agrícola', (unpublished USP Masters dissertation, 1999); S. R. Mendonça, *Agronomia e poder no Brasil*, (Rio de Janeiro, 1998); Graciela Souza Oliver, 'O papel das escolas superiores de agricultura', (unpublished Unicamp University Ph.D. thesis, 2005); Graciela Souza Oliver and S. F. M. Figueirôa, 'Características da institucionalização das ciências agrícolas no Brasil', *Revista da Sociedade Brasileira de História da Ciência*, 4 (2006), 104-15; José Pastore, 'Brazilian agricultural research', in L. Yeganiantz (ed.), *Brazilian agriculture and agricultural research* (Brasília, 1984), pp. 99-115; Renato P. Pereira, 'O instituto biológico', (unpublished USP Masters dissertation, 2006); L. O. Ramos Filho, 'O papel da pesquisa científica e tecnológica no desenvolvimento da citricultura paulista' (unpublished UNICAMP Masters dissertation, 1999); F. T. S. Reis, *O ensino agrícola na escola Luiz de Queiroz*, (São Paulo, 1921); C. M. Rodriguez, 'A pesquisa agropecuária federal no período compreendido entre a República Velha e o Estado Novo', *Cadernos de Difusão Tecnológica*, 4 (1987), 129-53; J. P. Romero, *ESALQ Centenária*, (São Paulo, 2001).

professors at the local faculties studied in this thesis. The main focus of this thesis is on the professional trajectories of these veterinarians, physicians, agronomists, and entomologists who were at the heart of the transformation brought about by nationalisation. Their individual perspectives on what was occurring around them and the ways in which their research practices were altered by Dutra's act reveal individual strategies for tackling the challenges and taking advantage of the opportunities brought about by nationalisation.

Selecting individuals

The criteria for selecting individuals for the eight case studies presented in this thesis were threefold. First, selected individuals occupied similar academic or professional positions in Porto Alegre and Curitiba. The second criterion was that, as a result of their social status, they were considered experts in at least two specific areas, tuberculosis diagnostics tests and pest control. These areas were related to issues of high importance, both in terms of public health and agricultural productivity, as explained below. Thirdly, and inevitably, following the first two criteria, the final selection of individuals also depended on whether there were sources written by them and about them.

After the preliminary work to define those individuals meeting the above criteria was completed, the same line of investigation guided the study of secondary, but mostly, primary sources. The questions used to put together this collection of biographies were formulated by taking as a reference the scholarship on research schools. Although there was no research school, in the usual sense, in either of the towns studied, ideas on how to investigate successful research groups that were usually led by a charismatic figure worked as a useful heuristic device to guide the empirical work on the individuals involved in the nationalisation project.⁸¹

⁸¹ The scholarship on research schools is vast and has been used to serve purposes similar to those of my thesis, see Gerald L. Geison, 'Scientific change, emerging specialties, and research schools', *Hist. Sci.*, 19 (1981), 20-40: pp. 20-27; Gerald L. Geison, 'Research schools and new directions in the historiography of science', *Osiris*, 8

For instance, individuals were initially studied through detailed research into their scientific background, their early career interests, and their tutors; these elements are also important in the study of research into school leaders. Whenever possible, information about the individuals' social, academic and professional backgrounds was also gathered. Following the commencement of the individuals' scientific careers, their reputation among peers was investigated together with whether or not they had access to public outlets to publish their works. Individual styles, such as whether they showed interest in becoming leaders and whether they were charismatic, were also duly noted.

Still in line with the rationale for research schools, the institutional settings of the individuals investigated also received detailed attention. Dramatic institutional shifts alongside remarkable continuities were, after all, the most relevant features brought about by nationalisation. Some institutional landmarks that towered over the landscape would disappear in the 1950s, whereas others would continue to stand, challenging the gigantic academic overhaul. This thesis is not, however, another study of scientific institutions. Scholarship on Brazilian institutional history is extensive and has explored the trajectories of the main research centres in detail.⁸² The interest in institutional histories was concentrated on the identification of the main issues related to each individual's academic environment. For instance, it was asked: what were the main characteristics and peculiarities of his faculty? Equally important

(1993), 227-38: pp. 228-230; Stella V. F. Butler, 'Centers and peripheries', *Journal of the History of Biology*, 21 (1988), 473-500: p. 474; Maurice Crosland, 'Research schools of chemistry from Lavoisier to Wurtz', *The British Journal for the History of Science*, 36 (2003), 333-61, p. 336; Júlia Gaspar and Ana Simões, 'Physics on the periphery', *Historical Studies in the Natural Sciences*, 41 (2011), 303-43; Dennis Michael Aaron, 'Accounting for research', *Social Studies of Science*, 17 (1987), 479-518; Fiona Alice Miller, 'Dermatoglyphics and the persistence of mongolism', *Social Studies of Science*, 33 (2003), 75-94; Agustí Nieto-Galan, 'Free radicals in the european periphery', *The British Journal for the History of Science*, 37 (2004), 167-91: p. 188; Mary Jo Nye, 'National Styles?', *Osiris*, 8 (1993), 30-49: p. 32; Nancy G. Slack, 'Are research schools necessary?', *Journal of the History of Biology*, 36 (2003), 501-29; Pierre Teissier, 'Solid-state chemistry in France', *Historical Studies in the Natural Sciences*, 40 (2010), 225-58; Zarur, *A arena científica*, pp. 83-109.

⁸² Critical overviews can be found in Maria A. Dantes, 'Institutos de pesquisa científica no Brasil', in Shozo Motoyama and Mário Guimarães Ferri (eds.), *História das ciências no Brasil*, (São Paulo, 1980), pp. 341-80; Maria A. Dantes (ed.), *Espaços da ciência no Brasil*, (Rio de Janeiro, 2001); Simon Schwartzman, *Universidades e desenvolvimento na América Latina*, (Rio de Janeiro, 2008).

was the identification of the external ramifications of the scholar's academic environment: were he linked only to state research centres or did professional associations also play an influential role? More importantly, what was the configuration and research ethos of these external settings? Were they, for example, well-funded and well-supplied; and was technical expertise available? It was also critical to understand the position of individuals studied in these external research centres as this influenced their inclination towards scientific research in general and academic research in particular.

Context is also an important aspect in studying research schools, and it has received equal attention in the case studies presented in this thesis. Timothy Lenoir, for example, suggests that the objective of a contextualist perspective is not just to focus on scientific theories or published products (scientific texts) but also to examine scientific work, considering the objective conditions that impacted the creation, circulation, and reproduction of the products of any given field.⁸³ Although the author draws primarily on Pierre Bourdieu's sociology of science, attempting to counter claims concerning the realist-objectivist conception of science advocated by Merton and Ben-David, he emphasises that the use of contextualisation does not necessarily lead to an 'externalist' history. Neither does it treat individuals' intellectual positions as 'reflections' of their class nor their scientific works as 'disguised forms of their social interests'.⁸⁴ Rather, the focus on context enables the perspective that scientists 'are only the most visible node of a whole network of social relations', which includes authors of other scientific texts as well as 'publishers, instrument makers, lab. assistants, university and state administrators' with whom they argue or from whom they draw support.⁸⁵ Therefore, the context of each of the main individuals studied in this thesis was analysed on two levels. First, it was necessary to understand the ways in which researchers and professors dealt with issues

⁸³ Timothy Lenoir, *Instituting Science*, (Stanford, 1997), p. 14.

⁸⁴ *ibid.*

⁸⁵ *ibid.*

of dependence on and independence from other scientific communities. Local contexts were also extremely important and generated questions such as what was the level of interaction with potential users? To what extent was this interaction influenced by the scholars' research topics and agendas? Were there pools of recruits and loyal disciples? In what system of accountability – peers, users, press – were the researchers placed? Were political interests an issue in defining research agendas? What social issues directly affected researchers? With which issues did they feel compelled to engage?

As justified in more detail below, the final line of enquiry, concerning each individual's projects, was more directly related to research practices. For instance, the question of whether research interests were focused on a single topic or spread over different areas was investigated. Likewise, it was imperative to understand these interests as they related to research practices. The research techniques deployed were also important, particularly as the social and scientific contexts in which they were placed came into focus. Experimental approaches were analysed by looking at the adaptation, incorporation, or neglect of ideas generated by external communities. The objective of this analysis was to identify not only signs of originality, innovation or conformity but also to ascertain whether an individual's work originated from secondary research practices.

Focusing on research practices: A reflexive position

Taken together, the personal backgrounds, individual research projects, institutional research ethos and contextual elements form a portrait of the eight individuals at the centre of each case study. More importantly, the elements that enable an overview from general aspects to particular issues constitute the core of what has been compared in this thesis. Although the main interest of this thesis has been to investigate individual trajectories, in order to do so, it has been necessary to carefully compare social, economical and political contexts as well as institutional particularities. As the main objective of this comparative framework is to understand the research practices of researchers and professors in their own terms and from empirical work that revealed their ‘priorities, worries and agendas’, a historicist stance may be ascribed to the thesis as a whole.⁸⁶ In the words of Frank Ankersmith, historicism consists of an understanding that the nature of things is to be found *only* in their history, therefore ‘only the most careful and scrupulous empirical historical research [...] may tell us how to conceive of the historical idea for one specific topic of investigation’.⁸⁷ Similarly, to Jürgen Kocka, historical events from a historicist perspective should be understood ‘on their own grounds and within their own contexts [...] instead of analyzing them in terms of general laws.’⁸⁸ Thus, the objective of this section is to explain the ways in which research practices have been selected as an analytical element to counter the usual issues raised against historicist narratives.

Although debates on the possibilities and challenges of the so-called new historicism within the historiography of science are still incipient, this approach has already drawn articulated criticisms.⁸⁹ Peter Galison, for example, argued that historicism can be problematic

⁸⁶ Pietro Corsi, ‘Before Darwin’, *Journal of the History of Biology*, 38 (2005), 67-83.

⁸⁷ Frank Ankersmit, ‘The necessity of historicism’, *Journal of the Philosophy of History*, 4 (2010), 226-40.

⁸⁸ Jürgen Kocka, ‘Theories and quantification in history’, *Social Science History*, 8 (1984), 169-78.

⁸⁹ Peter Galison, ‘Ten problems in history and philosophy of science’, p. 122, footnote 7. For debates on the revival of historicism within historiography, see Ankersmit, ‘The necessity of historicism’; Jaap Den Hollander, ‘Beyond historicism’, *Journal of the Philosophy of History*, 4 (2010), 210-25; pp. 210-220; Catherine Gallagher and Stephen Greenblatt, *Practicing new historicism*, (Chicago, 2000), pp. 1-2; H. Aram Veese, *The new historicism*, (New York, 1989), p. 5.

when used absentmindedly by historians of science. He defined ‘relentless historicism’ as a history of science where philosophers such as Ludwig Wittgenstein, Thomas Kuhn or Charles S. Peirce ‘enter the stage with the history, not before the account begins’.⁹⁰ He referred to an increasingly common practice in the historiography of science that leaves little room ‘for philosophy to resolve matters by reference to universal and unchanging principles’.⁹¹ Galison doubted that this judicious perspective could ever be achieved; for him, philosophy will always lie in wait until it eventually guides the historian’s gaze through a supposedly unblemished archival work. Yet it is remarkable how certain areas of the historiography of science thrive without an explicit reliance on theoretical models. The solid scholarship on evolutionary ideas during the nineteenth century is just one example in which meticulous work on the role of contingency often replaces abstract formulations to explain historical events.⁹² Moving beyond such well-developed fields, however, the ground appears less stable. Scholars from the social sciences, for instance, have shown concern for the fact that far too many historians view scientific activities as an empty box ‘to be filled by whatever empirical materials’ their enquiries throw up.⁹³ According to these critics, this position allows assumptions about specific parts only rather than the ‘whole of science’.⁹⁴

Literature on debates regarding what appears to be the proper level of theorisation in historicist enquiries is extensive and may be consulted for further reference.⁹⁵ This thesis will avoid taking sides in this debate by conceding that historicism might indeed become a hurdle if not properly addressed and localism must have a limit, as suggested by Peter Galison. Galison

⁹⁰ Galison, ‘Ten problems in history and philosophy of science’, p. 123.

⁹¹ *ibid.*, p. 122.

⁹² For example E. J. Browne, *Charles Darwin*, (New York, 2003); Pietro Corsi, *Science and religion*, (Cambridge, 1988); Adrian Desmond and James Moore, *Darwin’s sacred cause*, (Boston, 2009).

⁹³ Elisabeth Crawford, *Nationalism and Internationalism*, (Cambridge, 1992), p. 13.

⁹⁴ *ibid.*

⁹⁵ Summaries of these debates can be found in John Law, ‘Theory and Narrative in the History of Technology’, *Technology and Culture*, 32 (1991), 377-84; Thomas Nickles, ‘Philosophy of Science and History of Science’, *Osiris*, 10 (1995), 138-63; Margaret R. Somers, ‘The narrative constitution of identity’, *Theory and Society*, 23 (1994), 605-49.

wondered what would be the limit if historians continued to fill their journals with ever more case studies and pack encyclopaedias ‘with dozens of microscopic inquiries into every laboratory, field station, and observatory of any weight anywhere’.⁹⁶ The answer that the limit is defined by the availability of empirical evidence does not work as well in the case of Brazil as it does for other countries. In the absence of systematic surveys on the past of Brazilian scientific activity, linking case studies to theoretical concerns is a way of lighting up a landscape that remains, to a great extent, immersed in darkness.

However, the main argument of this thesis is that careful methodological design may address theoretical concerns as effectively as an explicit allegiance to specific theoretical models does. Using Galison’s terms, it is not that theory does not come before the account begins; actually, theoretical concerns may guide the entire empirical work and the way findings are explored. To an uninitiated observer, however, these theoretical concerns will be everywhere and, at the same time, nowhere to be seen. The design of this thesis, which contrasts case studies in order to explore research practices taking place simultaneously in two towns, is, for example, a methodological choice guided by the theoretical importance of research practices as analytical elements in the historiography of science. This design not only aims at providing a clear exposition of the comparative dimension but also addresses the concerns held by critics of the historicist approach by systematically focusing on an element with strong theoretical ramifications. Scholars such as James Secord have argued that the focus on practices is an effective answer to typicality. Moreover, Secord argued that such focus has been the ‘single most significant transformation’ of the historiography of science over the previous two decades.⁹⁷ He was referring to the possibility of understanding practices as activities that enable, hinder, and guide the circulation of scientific knowledge. Similarly, Robert Kohler

⁹⁶ Galison, ‘Ten problems in history and philosophy of science’, p. 121.

⁹⁷ J. A. Secord, ‘Knowledge in transit’, *Isis*, 95 (2004), 654-72: p. 658.

defined scientific practices as ‘the activities that practitioners understand to define them as communities: the things they do with particular relish and effect, and that distinguish them from others and mark crucial alliances’.⁹⁸ Kohler argued that practices are one of the fundamental elements that may bring different case studies together regardless of specific scientific fields or historical periods; he states, ‘practices differ widely, but all scientists have them.’⁹⁹ Both Kohler and Secord agree that a focus on practices has been increasingly explored throughout the historiography of science. For example, historians have used the idea of practices in detailed investigations of the dissemination of scientific knowledge, both among the general public and specific communities. Secord, for instance, investigated practices of reading during the Victorian period as a way of exploring the reception of evolutionary ideas among the general public. He focused on reading practices such as ‘diary keeping, letter writing, debating, and displaying’ since his argument was that one cannot understand the impact of a scientific text without understanding how it was read. This assumption may appear self-evident, but for a long period, scientific texts were studied because of their internal coherence, their relationship with other contemporary texts, and even, taken at face value, as a guide to the internal mechanisms of scientific practice.¹⁰⁰ For Timothy Lenoir, a focus on practices also enables the investigation of the active process of evaluation and incorporation of scientific ideas by scientific communities. According to Lenoir, the theoretical and experimental interests of scientists usually govern their choice of what to select and what to ignore.¹⁰¹ For this reason, a study of practices must also take into consideration ‘innovations in

⁹⁸ Robert E. Kohler, ‘A generalist’s vision’, *Isis*, 96 (2005), 224-9: p. 227.

⁹⁹ *ibid.*

¹⁰⁰ James A. Secord, *Victorian Sensation*, (London, 2000).

¹⁰¹ Lenoir, *Instituting science*, p. 14.

theoretical or technical practice’ to gain insight into the ‘distribution and access to material and conceptual resources within local contexts’.¹⁰²

The common point in these justifications of a focus on research practices is that they reveal both theoretical concerns and, at the same time, help to inform the design of empirical enquiries. Theoretical concerns addressed by a focus on research practices serve to tackle the anxiety of critics of historicist narratives. Practices are found in all scientific endeavours, regardless of specific fields or historical periods; therefore, they may be used as elements that allow the unification of historical works, without which the ‘whole of science’ cannot be understood. Focus on practices also contributes to scholarship by allowing the formulation of new questions, particularly those related to the role of contingency over scientific development. In terms of design, a focus on practices helps to guide empirical work by informing precisely which elements are suited for investigation and how they should be investigated. This point is made very clear in the work of Pietro Corsi, who argued that scientific practices take place in a ‘complex social stratigraphy’ that must be considered when selecting social groups, research topics and institutional settings as objects of investigation.¹⁰³ For Corsi, practices have ‘cultural, social and political articulations’ that require attention not only to scientists and researchers but also to a wider population, including ‘amateurs, journalists, novelists and religious writers, politicians and educators.’¹⁰⁴ In order to have this encompassing view, Corsi suggested that historians must consider ways in which their current conception of proper scientific practice might influence the way they read the past.¹⁰⁵ A focus on practices therefore provides a valid answer to what Galison called ‘relentless historicism’. It allows judicious

¹⁰² *ibid.*, p. 35. For further discussions on the potentially fruitful approach to research practices, see Jan Golinski, ‘The theory of practice and the practice of theory’, *Isis*, 81 (1990), 492-505; Vassiliki Betty Smocovitis, ‘Contextualizing Science’, *PSA*, (1994), 402-12.

¹⁰³ Pietro Corsi, ‘Introduction to thematic set of papers’, *Earth Sciences History*, 26 (2007), 5-12: p. 8.

¹⁰⁴ Pietro Corsi, ‘The politics of theory in the history of science’, p. 358; Corsi, ‘The revolutions of evolution’, p. 3.

¹⁰⁵ Pietro Corsi, ‘Idola Tribus’, in A. Fasolo (ed.), *The theory of evolution*, (Milan, 2012), pp.11-36: p.17.

empirical work with a solid theoretical basis that is formed by an element already identified by scholars as having important theoretical and methodological ramifications.

The structure

The first three chapters of the thesis focus on faculties located in Porto Alegre whereas the following three are concentrated on Curitiba. All chapters follow the same pattern based on the methodological choices outlined so far: the narrative moves from the general – that is, from social, economic and political contexts of each geographical setting – to the specific, namely, to the investigation of individual research practices. Beyond having the same structure, the chapters follow a similar chronological order. The first two chapters on each town refer to the period before 1950, whereas the third explores the first five years after nationalisation. Each of the four chapters focusing on the period before 1950 is divided into two case studies whose main arguments are briefly outlined below.

The case studies of Chapter One focus on research practices of two professors from the Faculty of Agronomy and Veterinary Medicine of Porto Alegre. The first professor is Outubrino Correa who, during the 1940s, acted as adjunct to the Chair of Parasitic and Infectious Diseases of Domestic Animals before he was eventually appointed Chair in 1951. During this period, Correa was one of the most active veterinary researchers in Rio Grande do Sul in the area of bovine tuberculosis. He also published extensively on a variety of other animal diseases in local and national journals. Correa's trajectory will reveal the unproblematic co-existence and clear distinction between universities and independent research centres in Porto Alegre in the area of veterinary medicine before 1950.

The second case study of Chapter One focuses on Professor Ramiro Gomes da Costa, who was active in a research environment dedicated to the study of plant pathologies and agricultural pests as well as the ways to destroy them. The main challenge to Gomes da Costa

and his colleagues was the significant range of threats that occurred simultaneously. Unpredictable and devastating locust attacks, for instance, were among the emergencies Gomes da Costa and his colleagues had to tackle. The ways in which they found solutions to the problem of these and other insects will reveal originality, commitment and competence fostered by state research facilities. As evidence will suggest, in both cases it was outside the academic environment that a thriving research culture was fostered because professors like Correa and Gomes da Costa did not undertake research inside their departments. The research projects of these two professors will reveal an initial co-existence between the academic environment and independent research centres that eventually became a complete separation after nationalisation.

An analysis of the research practices of professors from the Faculty of Medicine in Porto Alegre is the objective of the case studies presented in Chapter Two. The central figure of the first is Raul di Primio, who became one of the most prolific researchers of the Faculty of Medicine of Porto Alegre during the first years after nationalisation. The analysis of his career before 1950 will uncover the practices and institutional environment that enabled his substantial output. His training period outside Rio Grande do Sul, his links to a state research laboratory, and the existence of local competition in his field of expertise are some of the characteristics that will be also be explored in detail. Primio will be cited as an example of a professor who was actively engaged in a highly visible social issue, the problem of *malária* and Chagas disease, and who was nevertheless able to remain independent in terms of his methodological approach to those two diseases.

The second professor studied in more detail in this chapter is Jandyr Maya Faillace, who during the 1940s devoted himself to the study of communicable diseases. Faillace's main concern was child respiratory diseases, in particular tuberculosis, a topic that he pursued for almost two decades through his research on BCG, the vaccine that immunised infants against

tuberculosis meningitis. Faillace led the only laboratory in Brazil outside Rio de Janeiro to produce the BCG. In order to test the efficacy of his vaccine, Faillace used tuberculin. His research practices regarding tuberculin will provide key elements for comparison with similar practices carried out in Curitiba. Faillace's research, his institutional environment and the separation between his teaching duties and his research interests are among the elements analysed in the second part of this chapter. The examples of Primio and Faillace attest to the fact that professors from the Faculty of Medicine of Porto Alegre who engaged in research were not isolated cases. They were active in independent research centres that worked as external catalysts for high quality work. Although both professors focused on different areas, they shared the same institutional environment, namely, the laboratories of the State Department of Health. Study of the activities of both Primio and Faillace in this Department will complement the evidence presented in the previous chapter to show that during the pre-nationalisation period, state research centres were indeed important landmarks of local academic life in Porto Alegre and its metropolitan region.

Chapter Three will analyse the ways in which nationalisation affected the central figures of these four initial case studies. Some of the researchers working prior to 1950 gave space to a new generation that continued their research traditions. For example, Emir Kober was the pupil of Ramiro Gomes da Costa, who continued his work on pesticides after nationalisation. However, new generations also brought rupture. Fernando Carneiro, whose trajectory is discussed in this chapter, publicly declared that the practices carried out by Jandyr Faillace were outdated. This disagreement – which was voiced while Faillace still held a position in the Department of Health of Rio Grande do Sul – will reveal that sometimes important developments in academic disciplines maximized the changes introduced by nationalisation.

Chapters Four through Six will then go back in time – again to the late 1930s – and change the geographical focus of analysis; the second part of the thesis will be dedicated to

Curitiba. The objective of the case studies in Chapter Four is to analyse the research practices of professors at the faculties of Agronomy and Veterinary Medicine in Curitiba. Two chair holders will be given particular attention since they represent similar examples of academic research existing simultaneously in both faculties. The first of them is Oscar Krebs Palmquist, Chair of Microbiology at the Faculty of Veterinary Medicine of Curitiba. Despite his teaching position, Palmquist worked in an independent research centre where research funds for epidemiological studies were available. This research centre also offered him an environment conducive to zoonosis research and, more importantly, legal prerogatives that allowed Palmquist to impose strict sanitary controls based on tuberculin results. These characteristics existed in a context in which there was strong evidence that milk arriving at Curitiba was highly contaminated with the bovine strain of tuberculosis. However, Palmquist carried out the first tuberculin tests in Paraná rather late, when only a few researchers in Brazil were actually focusing on the bovine tuberculosis epidemic. This late beginning will be used to illustrate the priorities and practices of professors of veterinary medicine in the years leading to nationalisation.

The second case study describes the trajectory of Lycio Castro Velloso, the Chair of Phytopathology and Agricultural Microbiology at the Faculty of Agronomy of Curitiba. As part-time researcher in a non-university centre, Velloso and his colleagues faced the same threats that their colleagues in Rio Grande do Sul fought against. This was the case with locusts, for example, which after attacking farms in Rio Grande do Sul migrated to Paraná where they would wreak similar havoc. Other crises triggered by insects were caused by different species but had similar characteristics. Whereas leaf-cutter ants were a far-reaching pest in Rio Grande do Sul, in Paraná the coffee berry borer presented an equally devastating and permanent threat. However, like Palmquist, Velloso did not engage directly with these issues, even though he was in charge of an Entomology Division conceived to study agricultural pests and methods to

combat them. The similar attitudes of both professors illustrate the resilience of a research culture that was unrestricted by availability of funds, technical expertise, skilled manpower or, above all, major social problems demanding urgent solutions. For the purpose of this thesis, it is noteworthy that these characteristics would not end with nationalisation; they would actually be transferred to the nationalised university as the professors studied in this chapter consolidated their academic positions after 1950.

The objective of Chapter Five is to analyse the research practices of individuals who had professional links with the Faculty of Medicine of Curitiba. Two chair holders will be given more attention as they represent distinct positions of academic research existing simultaneously in the Faculty of Medicine. The first is Milton Erichsen Carneiro, who will be used here as an example of an influential person within a Faculty that was extremely reluctant to accept that professors could incorporate research practices into their academic tasks. Not by chance, research on the potential impact of pesticides on vectors of insect-borne diseases did not flourish whilst he was the Chair of Parasitology, despite the fact that outbreaks of *Malária* and Chagas disease in Paraná offered him many opportunities to engage with the topic. While researchers from other states seized upon these opportunities, Carneiro chose to concentrate on his teaching duties and left public health officials to decide whether or not to acquire large quantities of pesticides.

João Ernani Bettega, in charge of the Phthisiology Chair of the Faculty of Medicine, is the researcher occupying the central position of the second case study. Unlike Carneiro, Bettega was directly involved in the creation of a research programme in the area of tuberculosis after nationalisation. The rationale and motivation for this programme were related to the context of his discipline and the epidemiological situation of Curitiba when he took over his position. These specific circumstances will be explained in detail in this chapter in order to assess the continuities and changes in his research practices after nationalisation.

Chapter Six will focus on the ways in which nationalisation affected the research practices of the individuals examined in previous chapters who worked in Curitiba before 1950. Unlike the case of Porto Alegre, continuity can be observed in a more marked way in Curitiba. Although in some cases pupils replaced their professors, deeply rooted traditions remained and sometimes hindered the development of scientific research in the recently nationalised faculties. The University of Paraná will stand out as evidence that the power of traditional Chair holders was only one aspect among many that complicated the extent to which research could be improved through nationalisation.

Although comparisons will begin to be made from Chapter Four onwards, the main comparative analysis will be undertaken in the conclusion. One of the tenets of the comparative approach is the consideration that when two or more similar phenomena occur in different places they might have the same origin. Conversely, if two or more phenomena differ markedly when distinct places are compared, then there might be local conditions driving these differences.¹⁰⁶ As this thesis is interested in understanding the impact of nationalisation on research practices after 1950, it pays detailed attention to both sets of elements. In order to focus on the differences, first similarities are identified. Only by understanding the similarities is it possible to isolate the elements that are different and study them at length. This will be the objective of the concluding chapter of this thesis.

¹⁰⁶ Benjamin Z. Kedar, 'Outlines for comparative history', in Benjamim Z. Kedar (ed.), *Explorations in comparative history*, (Jerusalem, 2009), pp. 1-28; pp. 1-2.

The Social Issues: Tuberculin and pesticides

The last part of this introduction will provide a brief outline of the technologies studied by the central figures of each case study. It has been explained so far why particular faculties were chosen and why specific individuals working on them were selected. A further necessity was to choose one topic among these individuals' broad range of interests. The first factor used for this selection was to identify an area of study related to an important social problem. Two areas clearly stood out in most of the primary sources selected: technologies to diagnose tuberculosis and the invention of organochlorine pesticides.

In the 1940s, tuberculosis was by far the biggest killer in the southern region of Brazil, as will be explained in detail in Chapters Two and Four. The disease posed such a serious threat to public health that several researchers looked at various aspects of it during the 1940s. One of the main topics discussed was the diagnostic test called tuberculin. This substance was administered subcutaneously to children to test vaccine immunisation and to adults to assess tuberculosis infection. In both groups, the test was carried out in two stages. In the first, the substance was injected under the skin of the patient who was then monitored for forty-eight hours. If there was no reaction, a more concentrated dose was used. In the second stage, the reaction was measured with a millimetre rule. The extent of the reaction was classified from one plus (+) – one centimetre – to four plus (+++++) – four centimetres; a four plus reaction in newborns was considered evidence of immunization as well as a certain indication of the disease in adults.¹⁰⁷ Debates on the efficacy of tuberculin and its administration methods divided specialists. In the years leading to nationalisation, academics and researchers voiced their diverging opinions and the evidence backing them. These discussions are used in this

¹⁰⁷ 'Prova tuberculínica em saúde pública', *Encontro Regional dos Técnicos do Serviço Nacional de Tuberculose*, (1962), 65-74: pp. 69-74.

thesis not only to explore individual research practices but also to undertake a systematic comparison of different groups of specialists.

Contemporary literature has revealed that both the human and the bovine strain of tuberculosis were known to exist in this period and that tuberculin was also used to diagnose the disease in cattle. The bovine test consisted of administering a standard dose of tuberculin, normally in a flap on the animal's tail. The veterinarian would then check the local area of the injection after three days for any swelling. If swelling was found, the animal would be considered a positive reactor. Although this intradermal method was extremely simple, it was prone to produce false negatives. This was particularly the case when tuberculin was highly diluted, which was a common practice to reduce costs.¹⁰⁸ False negatives were a problem because the results of tuberculin tests were used to determine the necessity of slaughtering infected animals. Specialists in the south of Brazil also disagreed about the reliability of tuberculin results as the basis of public health campaigns when it was used for the first time in Porto Alegre (1937) and in Curitiba (1949). Therefore, animal tuberculin is also well suited for a comparative study of the pre-nationalisation research practices in both towns.

In the years leading to nationalisation, a large number of academics were also interested in one of the greatest inventions of the 1940s, the organochlorine pesticides. Among the two most well-known in this category were DDT and BHC that were introduced to both Porto Alegre and Curitiba a few years before nationalisation. Professors from faculties of Agronomy and Medicine in both towns had the opportunity to engage with this new technology, which was initially believed to be effective against disease vectors and agricultural pests. DDT was synthesised for the first time by the German chemist Othmar Zeidler in 1874, though he registered the chemical compound without ascribing any specific use to it.¹⁰⁹ In 1939, DDT

¹⁰⁸ Alan L. Olmstead and Paul W. Rhode, 'An impossible undertaking', *The Journal of Economic History*, 64 (2004), 734-72: pp. 738-40.

¹⁰⁹ Heidelore Fiedler and V. Borja-Aburto, *Persistent Organic Pollutants*, (Berlin, 2003).

was used against insects for the first time as a result of the work of the Swiss researcher Paul Mueller.¹¹⁰ In a few years, the product would be produced in enormous quantities. China alone would administer around 270,000 tons of the product whereas India would use around 330,000 tons until the 1960s.¹¹¹ Whereas DDT was the organochlorine pesticide used against malária and yellow fever vectors, BHC soon became the standard weapon used in agriculture. Researchers both in Porto Alegre and Curitiba were aware of the advertised potential of these pesticides, and the ways in which their research practices related to their use during the years before nationalisation are compared here.

¹¹⁰ *ibid.*

¹¹¹ *ibid.*: p. 74.

Chapter One

Research Practices in the Faculty of Agronomy and Veterinary Medicine

Porto Alegre, 1935-1949

1.1 – Managing epizootics in a context of diversity

By 1940, two thirds of the population of Rio Grande do Sul depended exclusively on agriculture and animal husbandry for their livelihood.¹¹² For hundreds of thousands of ‘gauchos’, agriculture was still a family business. Almost ninety-seven per cent of all 341,000 registered rural properties in the state were considered small in size.¹¹³ At that point, small properties consisted of less than 500 hectares, with the vast majority extending to no more than five hectares, or 50,000 square meters.¹¹⁴ The fragmentation this caused was even greater in the north of the state, where the majority of Italian and German immigrants settled during the second half of the nineteenth century. These settlers inhabited a region that contained a larger number of valleys and hills with a high degree of original vegetation. Over the steep yet fertile hills, generations of descendants specialised in cultivating olives, grapes and a variety of other staples. This terrain, therefore, was the opposite of that found in the long, level valleys of grassland that were used for intensive livestock farming in the south.¹¹⁵

Both in the north and the south of the state, daily rural life was hard going. Tractors and harvesters had only slowly been introduced, and they generally were reserved for a privileged few.¹¹⁶ Furthermore, given the scarcity of equipment, the common farmer could hardly gain access or credit to buy such machinery. There were few public subsidies, and it would not be

¹¹² ‘A viagem do ministro’, *Correio do Povo*, (7 Feb. 1947), 6.

¹¹³ ‘Propriedades existentes’, *Correio do Povo*, (7 Jan. 1949), 7.

¹¹⁴ In some regions 400 small properties could be found within 100 square kilometres, Arlindo J. Klein, ‘A classe do pequeno agricultor’, *Correio do Povo*, (13 Dec. 1946), 8.

¹¹⁵ In the early 1940s, the herd of Rio Grande do Sul had grown to almost ten million, ‘População pecuária’, *Correio do Povo*, (5 Dec. 1947), 6.

¹¹⁶ Celeste Gobbato, ‘Pró intensificação da lavoura mecânica’, *Correio do Povo*, (26 Mar. 1946), 8.

until late in the 1940s that the first rural cooperatives would appear. Therefore, in a routine of day-to-day backbreaking work, the soil was mostly tended by hand and with the help of animals.¹¹⁷ At a time when chemical fertilizers did not exist, small farmers generally grew only two or three crops per year, and the soil was usually exploited until all its nutrients were exhausted.¹¹⁸ Eventually, the only option was to move to another area or turn to animal husbandry.¹¹⁹ Even when farmers dealt with these challenges and managed to achieve good harvests, they were still faced with the absence of proper roads. Connections between different parts of the state were precarious until the 1950s, when interstate roads were eventually expanded and improved upon.

Besides soil exhaustion, lack of equipment, insufficient availability of credit, and infrastructural bottlenecks, small farmers endured the scourge of agricultural pests. The leafcutter ant, for example, is a pest that was constantly mentioned in the literature because it impeded efficient agriculture in Rio Grande do Sul and was particularly harmful to small properties.¹²⁰ In terms of crops, there is evidence that this species posed a significant threat to properties growing wheat, beans, lentils, rice, maize and tungue.¹²¹ Furthermore, the threat was exacerbated by the fact that these crops were among the most vital sources of income for Rio Grande do Sul; they amounted to an annual production of over two million tons.¹²²

Forced by soil exhaustion to abandon their staple crops, the farmers who turned to

¹¹⁷ Poli M. Espirito, 'Aspectos da mortalidade infantil', *Arquivos do Dept. Estadual de Saúde*, 9 (1951), 81-93, p. 88.

¹¹⁸ Soil retained its fertility for fifteen to twenty years, see, for example, Edmundo Navarro Andrade, 'O eucalipto não esgota o terreno', *C.E.Q.*, 63 (1941), 50.

¹¹⁹ Several smallholders moved out; some of them to virgin areas, others to the suburbs of large towns. Massive waves of urban migration had begun in Brazil by this time, when the first *favelas* also began to appear around major cities. Porto Alegre was no exception. By 1950, there were thirteen small *malocas* – they were not yet called *favelas* – around the city. Machado, Leonidas Soares, 'Vila de malocas', *Boletim Mensal de Bioestatística*, 14 (1952), 20-3.

¹²⁰ Cincinnato R. Gonçalves, 'O gergelim no combate à saúva', *B.F.T.*, 1 (1944), 19-27; Luiz Azevedo Marques, 'O tatú e as saúvas', *C.E.Q.*, 54 (1936), 559; Oscar Monte, 'Os insetos daninhos', *C.E.Q.*, 54 (1936), 69-72.

¹²¹ Tungue is the tree from which was extracted tung oil. Celeste Gobbato, 'Necessidade de câmaras de expurgo', *Correio do Povo*, Assuntos Rurais, (17 May 1946), 8; Celeste Gobbato, 'Não devem desanimar os cultivadores de tungue', *Correio do Povo*, (11 July 1947), p. 10.

¹²² 'Produção agrícola no Estado', *Correio do Povo*, (9 May 1947), 8.

animal husbandry also eventually faced damaging epizootics.¹²³ For example, in 1946, bovine tuberculosis was recognised as a serious public health problem for both rural and urban populations. Luiz Gonçalves Vieira, a veterinarian working for the National Department of Agriculture in Rio de Janeiro, knew first-hand the condition of countryside dairy barns, having worked extensively as a sanitary inspector. He argued that to keep a reactor among the herd was a criminal act and believed in the summary destruction of contaminated animals, regardless of their commercial value or yield. To substantiate his extreme position, he quoted foreign researchers who had demonstrated that contamination from animal to man was continuing to accumulate.¹²⁴ At this point, the annual consumption of milk in Porto Alegre was estimated to be around sixteen million litres.¹²⁵

The combination of these challenges and difficulties was a constant fixture of the rural context, which was characterised by the great diversity of cultures it produced. However, public authorities were aware of the problems faced by these hinterland communities. Successive administrations attempted to provide solutions in order to foster greater agricultural diversification. Indeed, the main source of Rio Grande do Sul's income was the sale of agricultural products to other Brazilian states. Therefore, diversity was seen as an advantage, not an obstacle. The state had twenty-six main cultures that were grown in almost 1.7 million hectares (or 17,000 square kilometres) of land.¹²⁶ The top ten crops included rice, corn, wheat, tobacco, potato, manioc, beans, onions, sweet potato and alfalfa.¹²⁷ This variety stood in sharp contrast to Sao Paulo or Paraná, where farmers depended on monocultures, and in particular

¹²³ Comments concerning the lack of formal and technical assistance of the ranching activity were common, for example, 'Noticiário', *R.E.A.V.R.S.*, 2 (1959), 97-103. By the 1940s, cattle ranches were still big business, controlled by wealthy rural elite. There were plenty of open fields for grazing, and animals were raised with almost no technical assistance. This was the way it had been done for almost two centuries. Love, *Rio Grande do Sul*, pp. 1-15.

¹²⁴ Luiz Gonçalves Vieira, 'Profilaxia da tuberculose', *A Granja*, 2 (1946), 19-23.

¹²⁵ M. Quintana, 'Abastecimento de leite à Porto Alegre', *Revista Agrônômica*, 4 (1940), 831-4.

¹²⁶ 'Principais produtos agrícolas do Estado', *Correio do Povo*, (4 Mar. 1949), 8.

¹²⁷ The predominance of polyculture in Rio Grande do Sul was often described as an advantage of the local agriculture, see Gaspar Dilermando Ochoa, 'O agrarismo rio grandense', *Revista Agrônômica*, 1 (1937), 12-5.

coffee, which was by far the most profitable crop in both states.

Animal husbandry in Rio Grande do Sul was also diverse, although the state was commonly identified with its long-standing cattle-raising tradition.¹²⁸ The vast 'Pampas' had been used for cattle-raising since the seventeenth century, when Spanish Jesuits established the first settlements in the region. At that point, Rio Grande do Sul was 'officially' under control of the Spanish crown. It was only in the second half of the eighteenth century that the Portuguese expanded their colony further south. During this period, the Jesuits' herds, comprising thousands of animals, were taken by Brazilian settlers who were increasingly expanding in number. This expansion continued until the 1940s with little technical change. In the early 1940s, animal husbandry occupied almost fifty-eight per cent of Rio Grande do Sul's territory, which raised almost twenty per cent of the country's herd.¹²⁹ However, at that point, animal husbandry in the state had diversified. For instance, a significant numbers of hogs, around four million heads, were raised, mainly in the north of the state. An even greater number of sheep were raised in Rio Grande do Sul, comprising of approximately ten million heads that accounted for around sixty per cent of the country's herd.¹³⁰

While successive governors worked to foster this diversity, they were aware of the necessity of the state to develop capabilities to deal with several threats to agricultural activities. There was not a single major threat, but rather several problems and challenges that occurred simultaneously. In the area of plant pathology, no less than 224 diseases caused by fungi and bacteria were identified in Rio Grande do Sul.¹³¹ Furthermore, a vast number of

¹²⁸ For more about the history of ranching in Rio Grande do Sul, see 'O Rio Grande nasceu e cresceu na instância', *B.D.P.A.*, 10 (1954), 11-3; João David Folador, *Gaúchos*, (Curitiba, 2010); Dulphe Pinheiro Machado, 'História rural do Rio Grande do Sul', *B.D.P.A.*, 8 (1952), 140-60.

¹²⁹ F. João Pinheiro, *Programa nacional de pecuária* (Curitiba, 1977); Gastão Dias Castro, 'O papel das escolas de agronomia e veterinária', *Revista Agronômica*, 1 (1937), 5-8.

¹³⁰ 'Zonas de produção de ovinos', *B.D.P.A.*, 6 (1948), 53; W. P. Oliveira, 'Defesa e Controle da Peste Suína', *B.D.P.A.*, 8 (1952), 21-31.

¹³¹ The first and last papers that described each of these threats are respectively J. P. Costa Neto, 'Relação das doenças,' *Revista Agronômica* 1 (1937), 359-68; J. P. Costa Neto, 'Relação das doenças até agora encontradas, pelo Serviço de Biologia Agrícola, nas plantas cultivadas e algumas selvagens, no Rio Grande do Sul', *Revista Agronômica*, 1 (1937), 534-6.

insect species constantly threatened rural activities. In the area of animal husbandry no fewer than twenty-eight zoonosis made vulnerable not only the three main species being raised – cattle, sheep and hogs – but also horses and poultry; they were constantly monitored by veterinarian authorities.¹³²

This chapter will focus on the ways in which Rio Grande do Sul's administrators dealt with such challenges. The state's research infrastructure, higher education institutions and the open-arms policy regarding foreign specialists – identified in this chapter for the 1940s – were the outcome of traditions already consolidated. State initiative aimed at tackling the threats to Rio Grande do Sul's agriculture and fostering greater output. This complex set of elements, as this chapter will argue, shaped the research practices of individuals active in the region.

1.2 – Porto Alegre: The land of the Gauchos

In the late 1930s, the State Department of Agriculture, Industry and Commerce (hereafter SDAIC), located in Porto Alegre, was the governmental department directly in charge of supporting the diverse range of rural activities of Rio Grande do Sul. Porto Alegre, the state capital, enjoyed important features that favoured the Department in its area of control and supervision. First of all, between 1890 and 1945 Porto Alegre and its metropolitan region concentrated on several industries that processed agricultural raw materials coming from the hinterland.¹³³ The largest pasteurisation unit of the state, for example, was located in the capital. As Porto Alegre was on the delta of the main rivers of Rio Grande do Sul and at the extreme north of the largest lake of South America (the Lagoa dos Patos), its port was vital to the local economy. Before proper roads linked Rio Grande do Sul to the north of the country, Porto Alegre's harbour was the hub for goods bound for rural towns as well as the export gateway to

¹³² 'Mapa Zoosanitário do Rio Grande do Sul em 1951', *B.D.P.A.*, 8 (1952), 54.

¹³³ Célia Souza and Dóris Muller, *Porto Alegre*, (Porto Alegre, 2007).

other Brazilian states. Porto Alegre also hosted the largest veterinary research institute of the South region, the IVRDF, as explained below.

These geographical and institutional characteristics were coupled with a very specific public administration culture. For example, there was a strong tradition of administrative centralisation in Porto Alegre as the example below of Getúlio Vargas demonstrates. Before taking over the presidency of Brazil for close to twenty years (1930-1945 and 1951-1954) Vargas was governor of Rio Grande do Sul (1928-1930).¹³⁴ It was during his administration that important initiatives — characterised by the historiography as a local interpretation of positivism — were implemented. Vargas was a pupil of Borges de Medeiros, who had been a member of the Republican Party, and was strongly influenced by positivist ideals. Among the main achievements of local positivism were the centralisation of services in Porto Alegre, modernisation of agriculture, expansion of the north region, and the fostering of scientific education. These characteristics can be seen in the ways the government dealt with agriculture and livestock diversity as discussed above. For instance, it was during the Vargas administration that the Secretariat of Public Works was transformed into the SDAIC. Historians have studied in detail the Secretariat of Public Works because it was one of the most powerful sections of the Rio Grande do Sul government.¹³⁵ Flavio Heinz, for example, has analysed the trajectories of several civil servants who both headed the Secretariat of Public Works and participated in its activities.¹³⁶ He identified a strong positivist ideology as the trademark of the majority of individuals who worked in the Secretariat. The source of such positivist ideals can also be traced to the academic environment in which most of these civil servants had studied,

¹³⁴ João Goulart (1919-1976), twice elected vice-president after Vargas (1956-1960 and 1960-1961) at a time when vice-president candidates ran independently of the president, also came from that region. Goulart's family had ranches in Brazil and Uruguay with more than 30,000 animals, Duda Hamilton and Paulo Maakun, *1961*, (São Paulo, 2011).

¹³⁵ Leonice Aparecida de Fátima Alves, 'Estado, educação e modernização agrária', (unpublished Unisinos University Ph.D. thesis, 2008); Flavio M. Heinz, 'Positivistas e republicanos', *Revista Brasileira de História*, 29 (2009), 263-89; Morosini and Franco, 'Escola de Engenharia de Porto Alegre', pp. 39-58.

¹³⁶ Flavio M. Heinz, 'Positivistas e republicanos', pp. 263-89.

namely the School of Engineering of Rio Grande do Sul. Founded by a group of military engineers in 1896, the school had been originally conceived to provide technical instruction as opposed to the more commonly prevalent liberal arts curricula. Although the school had initially been a private undertaking, it had always received the full support of the government of Rio Grande do Sul. In 1908, a bill was passed granting four per cent of the state budget to the school. In return, the school invested in training programmes aimed at reaching out to different social groups that could benefit from technical instruction. For instance, courses were specifically created for the sons of farmers.

The school not only diversified its curricula but also made an effort to be more accessible to people living in different parts of the state. In 1917, the Borges de Medeiros Institute was established as an umbrella organisation under which courses of engineering in higher education, along with several other technical schools, were created.¹³⁷ One of the main characteristics of the Borges de Medeiros Institute was its broad geographical coverage. By 1915, the school was present in fifty-seven towns within the state.¹³⁸ This wide distribution of schools was in tune with the positivist rationale that progress could only be achieved through social order and technical education. This idea was based on an understanding that education was aimed at preparing individuals for industries, farming and the construction sector. As discussed below, the Borges de Medeiros Institute exercised a direct influence on agronomical and veterinary medical research with the creation of the Faculty of Agronomy and Veterinary Medicine.

¹³⁷ *Agronomia 80 Anos*, (Porto Alegre, 1990).

¹³⁸ *ibid.*

1.3 – The crown jewel of the Borges de Medeiros Institute: The Faculty of Agronomy and Veterinary Medicine

The creation of the Faculty of Veterinary Medicine occurred within the Borges de Medeiros Institute. Initially, the Institute hosted only a course in agronomy, which was established immediately after the engineering course was created in 1899. In 1923, when a veterinary medical course was established to complement the agronomy course, students were already trained to think about implementing their knowledge in Rio Grande do Sul in broader terms. At that point, the Borges de Medeiros Institute facilities, and the faculties connected with it, were firmly located in all parts of the state through technical schools and experimental stations dealing with a variety of crops and livestock.¹³⁹

Students entering one of the two faculties usually hoped to pursue three possible careers.¹⁴⁰ Two included the management of large properties and ranches, which attracted the sons of well-off farmers and stockmen.¹⁴¹ The bill authorising the creation of agronomy and veterinary courses explicitly stated that they were to teach primarily rural administrators and ‘farmers’ sons’.¹⁴² The word farmer (*fazendeiro*) was used differently than *agricultor* or *colono* were used; the latter terms might be translated as ‘peasants’, who were at that time usually the descendants of working class immigrants. The third possible alternative for students was to join the civil service, either as a field engineer or a researcher. One of the pre-conditions for applying to a public job in the areas of agronomy or veterinary medicine was attaining a higher-education degree.¹⁴³

¹³⁹ For a detailed history of the Faculty of Agronomy see ‘Escola de agronomia e veterinária do Rio Grande do Sul’, *Revista Agrônômica*, 17 (1954), 255-8; *Memória comemorativa do primeiro cinquentenário da faculdade de agronomia e veterinária*, (Porto Alegre, 1960); *Agronomia 80 Anos*, (Porto Alegre, 1990); Luiz Antônio Cunha and E. M. T. Lopes, ‘Ensino superior e universidade no Brasil’, in Luiz Antônio Cunha and E. M. T. Lopes (eds.), *500 Anos de Educação no Brasil*, (São Paulo, 2000), 151-204: p. 164; For the connection between the origin of the university and positivist values, see Morosini and Franco, ‘Escola de engenharia de Porto Alegre’, pp. 39-58.

¹⁴⁰ Alves, ‘Estado, educação e modernização agrária’, p. 227.

¹⁴¹ Fortunato Pimentel, ‘Um grande exemplo’, *Revista Agrônômica*, 13 (1949), 190-1.

¹⁴² Alves, ‘Estado, educação e modernização agrária’, p. 231.

¹⁴³ *ibid.*, p. 230.

This interest in training researchers to join the civil service was one of the motivations behind hiring a large number of foreign professors. Research in the Faculty of Agronomy and Veterinary Medicine had a tentative beginning with the arrival of these professors: one French, three American, five Italian and five Germans.¹⁴⁴ Two of the German professors were veterinarians who had studied at the University of Berlin before becoming research assistants in the same institution. In Porto Alegre, these researchers carried out pioneering work on animal pathologies and in particular, bovine tuberculosis. In the words of contemporaries, most of these professors started undertaking laboratory work while learning Portuguese. In the process of mastering the language they were asked to set up laboratory facilities and devise experiments that could be repeated by students.¹⁴⁵

The Faculty of Veterinary Medicine had already set up an experimental station outside Porto Alegre, in the city of Viamão. Its main objective was to assist stockmen in selecting purebreds, a task that was an on-going concern for the state.¹⁴⁶ Viamão was also the training centre for rural technicians, where undergraduate students from the Faculty of Veterinary Medicine were allowed to teach. Although prior to the mid-1940s the Faculty of Veterinary Medicine had no laboratory facilities, the experimental station, coupled with the arrival of foreign professors, decisively influenced students who would later become professors. This was the case with Desidério Finamor, Delfim Barboas and Heitor Fabregás.¹⁴⁷ They would constitute the first generation of local professors trained and taught by the foreign professors. This new generation also received scholarships to complete their studies overseas, a tradition that continued into the 1940s.

As discussed further below, with the organisation of a local Institute of Veterinary

¹⁴⁴ *Agronomia 80 Anos*, (Porto Alegre, 1990), p. 7.

¹⁴⁵ Alves, 'Estado, educação e modernização agrária', p. 271.

¹⁴⁶ *Agronomia 80 Anos*, (Porto Alegre, 1990), p. 7. To this day the main area of research about livestock is still genetics see Azevedo, 'A pesquisa agropecuária', pp. 1-73.

¹⁴⁷ FAV-RS, MOM, *Atas Docentes Livres*, (30 Apr. 1945).

Research and the consolidation of the Bureau of Plant Industry by the mid-1940s, most of the experimental work carried out at the Faculty was gradually transferred to independent research centres. These centres were run by individuals such as Outubrino Correa and Ramiro Gomes da Costa, who held positions at both independent institutes and the main research centre.¹⁴⁸ In 1934, the Institute Borges de Medeiros, along with all of its schools and faculties, was incorporated into the recently created University of Porto Alegre.¹⁴⁹ This was the first step towards nationalisation, which would take place sixteen years later.

Proudly Provincial: The Faculty of Agronomy and Veterinary Medicine

By the mid-1930s, the Faculty of Agronomy and Veterinary Medicine was considered a leading educational centre in Rio Grande do Sul, and was one of the better funded divisions of the Borges de Medeiros Institute. One of the main peculiarities of the Faculty of Agronomy and Veterinary Medicine was in fact the great self-awareness and independence of its members.¹⁵⁰ Such self-awareness was attested by the way they openly challenged other renowned professional categories.¹⁵¹ Celeste Gobatto, for example, one of the first foreign professors hired from Italy to teach in the Faculty of Veterinary Medicine, publicly opposed unequal treatment of veterinarians and agronomists.¹⁵² Gobatto wrote on a variety of topics, primarily in agriculture and animal husbandry. He contributed to newspapers and journals in Porto Alegre and outside the Rio Grande do Sul, including the journal *Chácaras e Quintais*, which was published by the Oswaldo Cruz Institute in Rio de Janeiro. Regarding the question of unequal treatment in his profession, the main argument rested on the fact that academic training

¹⁴⁸ Milton Guerreiro, 'Estado atual dos trabalhos do I.P.V.D.F.', *A diretoria da produção animal*, (1956), 135-9.

¹⁴⁹ *Agronomia 80 Anos*, (Porto Alegre, 1990), p. 65.

¹⁵⁰ Leone A. Murano, 'O ensino agrônômico e a produção', *Revista Agrônômica*, 12 (1948), 6-7.

¹⁵¹ Pimentel, 'Um grande exemplo', p. 25.

¹⁵² Alves, 'Estado, educação e modernização agrária': p. 326.

was a precondition for the formation of veterinarians and agronomists. Given that the requirements and demands of both professions imposed great responsibilities, veterinarians and agronomists should not be assigned a status lower than that of physicians. The underlying premise of this argument was a debate regarding salaries of employees in the public sector. From the late 1940s, physicians earned higher salaries than did veterinarians and agronomists, even though they both held the same educational and career qualifications. Gobatto publicly opposed such discrimination, arguing that both professions should be paid the same amount.¹⁵³ Gobatto's plea on behalf of veterinarians and agronomists was seconded by Jorge G. De Oliveira, editor in chief of the *Revista Agronômica* and member of the Board of Directors of the Faculty of Agronomy and Veterinary Medicine. Oliveira also wrote several editorials opposing the salary difference between veterinarians and others, such as the medical professionals and physicians.¹⁵⁴

The opposition to unequal treatment was only possible because professors were confident in their own professional status. For instance, Heitor Fábregas, professor of the Faculty, argued that although young veterinarians and agronomists would have to cope with the lower salaries offered by the public service, their career was still promising. Self-motivated younger researchers who decided to pursue it would achieve rewarding results.¹⁵⁵ In the case of young veterinarians, Fabregas argued that they should not see themselves as mere nurses of dogs and cats. Instead, they should look at the examples of renowned scientists such as Louis Pasteur (1822-1895) and Jean-Marie Guérin (1872-1961), who were described also as veterinarians. Their names should be taken as an example of what could be achieved through diligent research. References to foreign science, particularly American agronomy and

¹⁵³ Celeste Gobatto, 'A carreira de engenheiro-agrônomo e de veterinário', *Revista Agronômica*, 12 (1949), 44-7.

¹⁵⁴ For example, Jorge G. Oliveira, 'Nova desigualdade de tratamento', *Revista Agronômica*, 13 (1949), 167.

¹⁵⁵ This argument was often repeated during the 1940s, see Heitor Fabregas, 'Conselhos e opiniões', *Correio do Povo*, (31 May. 1946), p. 6; Loris Melecchi, 'O veterinário', *Agronomia e Veterinária*, 1 (1947), 50-1.

veterinary medicine, were quite common. Throughout the 1940s, professors of the Faculty of Agronomy and Veterinary Medicine constantly discussed what their peers in North America were achieving. Desidério Finamor, for example, who belonged to the second generation of professors of the Faculty of Agronomy, constantly referred to veterinary medicine practised in North America as being superior to other forms of medical research and practice. In the case of the campaign against bovine tuberculosis, Finamor argued that the Americans had accomplished what no other country could even imagine, namely the complete eradication of the bovine strain of the disease.¹⁵⁶ Professor João Costa Neto also judged North American research to be a reliable benchmark that should be attained by his colleagues. He cited the example of pesticide development, a field in which the Americans were considered to be by far the most advanced nation.¹⁵⁷ The Dean of the Faculty, Gastão Dias de Castro, also liked to identify American universities as a model to be followed. The standard of higher education in America was deemed exceptional, and it was generally agreed that it should be set as an example for Rio Grande do Sul.¹⁵⁸ In fact, one of the influences of the faculty in its early stages was the adoption of the land-grant model already in place in the United States. Reference to other Brazilian centres is harder to find in the literature. Foreign science was usually the main reference point in the public arena, although specialists from Rio de Janeiro and Sao Paulo were invited to Porto Alegre to assist locals.

¹⁵⁶ Desidério Finamor, 'Finalidades e realizações da higiene veterinária', *Agronomia e Veterinária*, 6 (1948), 27-34.

¹⁵⁷ J. P. Costa Neto, 'Investigação e defesa sanitária', *Agronomia e Veterinária*, 1 (1947), 24-8.

¹⁵⁸ Gastão Dias Castro, 'O ensino agrônômico e veterinário e suas reformas', *Revista de Agronomia e Veterinária da UFRGS*, 1 (1947), 3-4.

1.4 – Ramifications of the Faculty of Agronomy and Veterinary Medicine

It has been argued above that one of the main characteristics of the former Secretariat of Public Works was the employment of a large number of students from the School of Engineering. This pattern, identified by the historian Flavio Heinz in the area of public works, is also evident in fields of agronomy and veterinary medicine. A great number of former students and active professors of the Faculty of Agronomy and Veterinary Medicine occupied positions in two specific departments within the SDAIC (former Secretariat of Public Works). As these external activities of chair holders are an important element of academic life before nationalisation, they will be analysed separately, first in the area of veterinary medicine and later in the area of agronomy.

The Bureau of Animal Industry

The first department of the SDAIC, the Bureau of Animal Industry, hosted a large number of professors from the Faculty of Veterinary Medicine. This bureau was in charge of keeping track of and tackling major zoonosis that threatened the livestock activity in the state and its original configuration was linked to the arrival of an external specialist from Rio de Janeiro. In 1943, a serious outbreak of foot-and-mouth disease (*Aphtae Epizooticae*) took place on the south border of Rio Grande do Sul. In a matter of months, the disease affected entire herds, and before the end of the year over 100,000 heads had died.¹⁵⁹ To handle this alarming situation, the veterinarian Sylvio Torres was summoned from Rio de Janeiro; he arrived in Porto Alegre a few weeks after the first diagnostics were conducted. Torres was selected to deal with the epidemic because of his renowned work on hematophagous bats, the vector of rabies, and for developing a process for improving the absorption rate of the anti-rabies vaccine.¹⁶⁰ In Porto

¹⁵⁹ Danilo Saraiva, 'Sylvio Torres', *Correio do Povo*, (6 Nov. 1984), 12.

¹⁶⁰ Torres was also known for his work with the vaccine against the foot-and-mouth disease, see Outubirino Correa, 'A transmissão da raiva', *Correio do Povo*, (4 Jan. 1946), 6; Saraiva, 'Sylvio Torres', p. 12.

Alegre, with the full support of local authorities, Torres rapidly set up a laboratory to produce the vaccine against foot-and-mouth disease. However, in doing so, he did not bring in laboratory assistants from Rio de Janeiro but instead employed local manpower to help. Researchers and assistants were recruited from two departments of the Bureau of Animal Industry, the first being the Laboratory of Animal Biology, created in 1929. This was where Outubrino Correa had worked when he first entered the public service. The second source of assistance to Torres was the Department of Sanitary Protection.¹⁶¹ In practice, this department's main task was administering prophylactic campaigns through outposts spread across the state.

A year after the arrival of Torres, the first signs of progress against the epidemic manifested; as a result, the outbreak of foot-and-mouth disease was under control by the end of 1944. The initial success of the campaign also secured funds to create a specialised laboratory, which remained in operation over the following decade, as well as justified the expansion of local programs to deal with zoonosis. The laboratory created by Torres was merged with the former Laboratory of Animal Biology to form one of the first research institutes exclusively dedicated to veterinary research in Southern Brazil, the Institute of Animal Biology, later renamed the Institute of Veterinary Research Desidério Finamor. It is here that Correa carried out most of his pioneering research, as discussed below.

The Bureau of Plant Industry

The second location where professors from the Faculty of Agronomy carried out research was the Bureau of Plant Industry. This division of the SDAIC was as broad and far-reaching as the Bureau of Animal Industry, and it was initially organised by Maximiliano von Parseval, one of the foreign professors invited to teach at the Faculty of Agronomy. Parseval was a German

¹⁶¹ The Department of Sanitary Protection had been created in the early 1930s, see Outubrino Correa, 'A brucelose', *Anais do II Congresso Brasileiro de Veterinária*, 2 (1943), 241-7.

agronomist who arrived in Porto Alegre in 1921, where he became Chair of Botany, Entomology and Plant Pathology. Beyond his academic duties, Parseval was asked by the Secretariat of Public Works to organise a laboratory that focused on plant pathologies. In 1936, his research centre was re-named the Laboratory of Agricultural Biology, and it became an official department of the SDAIC. Naturally, Parseval became its first director, and the research centre served as a school to many local entomologists and plant pathologists. Among these local specialists was José Porfírio da Costa Neto, a student of Parseval who later became the Professor of Phytopathology at the Faculty of Agronomy.¹⁶²

After Parseval's death in 1939, Neto took over the laboratory. Early in his administration (1939-1949), he established three new research divisions.¹⁶³ The first, the Division of Agricultural Entomology, was in control of studying agricultural pests such as insects, birds and rodents. The second was the Division of Phytopathology, responsible for the investigation of plant pathologies caused by bacteria, fungi, viruses and other microorganisms. The third department established by Neto was called the Division of Phytosanitary Certification, which planned and coordinated campaigns that tackled both plant pathologies and their parasites. Neto considered these three divisions to be equally important and deserving of equal attention, as their objective was to enable farmers to 'systematically explore' profitable crops.¹⁶⁴

It is noteworthy that Neto placed entomology at the forefront of the centre, in an effort to increase agricultural output and foster diversity in the region. He insisted that his laboratory needed at least six full-time entomologists to focus on different areas ranging from systematics to biological control. In a statement designed to anticipate criticism for taking this stance, he

¹⁶² José Porfírio da Costa Neto completed his undergraduate course in the Faculty of Agronomy in 1933, *Memória comemorativa do primeiro cinquentenário da Faculdade de Agronomia e Veterinária*, (Porto Alegre, 1960), p. 94.

¹⁶³ Costa Neto, 'Investigação e defesa sanitária', p. 791.

¹⁶⁴ *ibid.*

stated that, '[...] it might look a disproportionate indulgence the hours spent on taxonomical classification ... however, without a correct morphological study and correct species determination it is impossible to provide the right advice'.¹⁶⁵ Another critical point of his assertion that entomological research was vital was that the identification of harmful insects was only the beginning of such work. After successfully defending his position, researchers at Neto's centre often had to study the life cycle of various pests in laboratory conditions in order to devise the most efficient means of eradication.¹⁶⁶

Such enthusiastic support for state-sponsored entomological research was uncommon in the southern region of Brazil, and it only occurred in Porto Alegre as a result of the endeavours of researchers such as Parseval and Neto. Over the years, their efforts influenced the practices of a new generation of researchers who learned their trade in the Laboratory of Agricultural Biology. Like Parseval and Neto, other researchers from the Laboratory of Agricultural Biology became professors at the Faculty of Agronomy of Porto Alegre.¹⁶⁷ However, whereas Parseval's work represented a transition from the academic environment to the public sector, Neto's administration widened the gap between academic and state research facilities. During Neto's reign, one of the reasons for this move was the increasing focus on short-term problems requiring immediate solutions from his laboratory's division. The outcome was that academic priorities appeared and were, in fact, removed from the demands placed upon his researchers by the state. Due to the demands of the state, Neto's team realised during the 1940s that they would be able to study insects in depth as Neto had hoped; however, in return, they were also expected to deliver quick and concrete results. In the case of the locust outbreaks in the 1940s, discussed further below, public and state pressure affected the research

¹⁶⁵ *ibid.*

¹⁶⁶ *ibid.*

¹⁶⁷ José Porfírio da Costa Neto, became the Chair of Plant Parasitology in the Faculty of Agronomy in 1949, see *Memória comemorativa do primeiro cinquentenário da faculdade de agronomia e veterinária*, (Porto Alegre, 1960), p. 45.

priorities and practices of the Laboratory of Agricultural Biology.

Despite such pressures, the laboratory headed by Neto became one of the main departments of the Bureau of Plant Industry in Porto Alegre in the late 1940s. At that point, the Bureau had a total of 290 employees working in fifty-eight different towns throughout the state. There were several specialised experimental stations distributed across the Rio Grande do Sul according to the agriculture profile of different sub-regions. In the mountainous north, for instance, there was an experimental station dedicated to vineyards and winery. In the flat and wet areas of the southeast, another experimental station was dedicated to the study of different varieties of rice. One of the few services that was centralised in Porto Alegre, the Section of Phytosanitary Protection (Serviço de Defesa Sanitária Vegetal), answered requests from all the sub-regions covering four different areas: botany, entomology, phytopathology and phytosanitary protection. Ramiro Gomes da Costa led the prominent section specialising in entomology, and his research practices will be assessed in detail below.

Case Study One - Research Practices at the Faculty of Veterinary Medicine: The case of Outubrino Correa

The Institute of Veterinary Research Desidério Finamor – IVRDF

In Rio Grande do Sul, two research institutes were in charge of interpreting the latest developments in the important research area of bovine tuberculosis. The first was the Bureau of Animal Industry, which, as explained above, brought together a variety of divisions aimed at fostering livestock activities and tackling zoonosis. Among these divisions was the Institute of Veterinary Research Desidério Finamor (hereafter IVRDF) established by Sylvio Torres. As noted above, Torres was the first director of the Institute of Animal Biology and oversaw the construction of its new facilities. The new laboratory complex was located on the farm *Flor do Conde* donated by Secretary of Agriculture Desidério Finamor (1889-1949) for the purpose of building a laboratory that would make Rio Grande do Sul self-sufficient in the production of foot-and-mouth disease vaccines. The *Flor do Conde* originally had 4,350 hectares, a considerable area even by today's standards, and it was located in Eldorado do Sul, forty-six kilometres west of Porto Alegre. In 1949, Torres paid homage to its donor, Desidério Finamor, renaming his new laboratory the Institute of Veterinary Research Desidério Finamor.¹⁶⁸

Foot-and-mouth disease continued to be a priority for Sylvio Torres and his team in the new laboratory facilities. By the early 1950s, local production of the vaccine had reached over five million doses.¹⁶⁹ However, this considerable volume was not achieved easily. One of the main problems was the rapid mutation of the strain of live viruses present in the vaccine. Early batches produced in Torres' laboratory caused outbreaks of the disease in previously uninfected herds.¹⁷⁰ Other diseases would prove similarly challenging to researchers. In 1948, a major

¹⁶⁸ Iracema Santos and Alice Bock, 'Instituto de pesquisas veterinárias', *Lavoura Arrozeira*, 1 (1986), 29.

¹⁶⁹ Saraiva, 'Sylvio Torres', p. 12.

¹⁷⁰ Milton Guerreiro, 'Determinação de tipos de vírus aftoso', *B.D.P.A.*, 2 (1946), 21-32.

outbreak of hog cholera mobilised almost the entire structure of the Institute, and consequently, a new division was created to produce vaccines specifically against it.¹⁷¹ As with foot-and-mouth disease (against which over 200,000 were prepared) a large volume of vaccine against hog cholera was produced. The working ethos of the IVRDF was characterised by simultaneous efforts on several fronts, in line with the SDAIC tradition of fostering and supporting a diverse range of rural activities. Many of its researchers, including Correa, never worked on one topic alone, rather they tended to keep track of developments simultaneously on two or more zoonosis.

In the first years of the Institute, the battle against major zoonoses took place alongside the work of the Department of Sanitary Protection. This department worked, as did the IVRDF, under the Bureau of Animal Industry. The logistical advantages of the Department of Sanitary Protection were second to none. More than seventy towns had a resident veterinarian who served as a link to the Department's headquarters in Porto Alegre, where information was gathered and diseases monitored. The ensuing research of Correa on bTB was only possible because of this logistic support.

Equally important was the local availability of skilled manpower from the Faculty of Veterinary Medicine. As professors took up the head of divisions at the IVRDF, they brought their previous research projects with them. For example, the selection of thoroughbreds, as mentioned above, was gradually transferred from the Faculty of Veterinary Medicine to the Bureau of Animal Industry.¹⁷² However, this did not mean that professors who carried out research within the IVRDF considered their laboratory an extension of what they did in the classroom. What is clear is that they had a part-time commitment to both laboratory duties and to teaching. When visits from students to the laboratory did occur, they were formal and started

¹⁷¹ 'No sul, o pioneirismo', *Rev. Bras. Médico*, 6 (1984), 174; For more information about the hog cholera outbreak, see 'Laboratório de peste suína', *Secretaria da Agricultura de Porto Alegre*, 4 (1948), p. 52.

¹⁷² FAV-RS, ARE, Relatório 1946, (24 Oct. 1946).

only in the late 1940s. To a great extent, the two environments, the scientific and the academic, were kept separate, as the example of Correa below demonstrates.

Correa's research practices: Innovation in Tuberculin use

Outubrino Correa was one of the veterinarians personally in charge of adapting Porto Alegre and Rio Grande do Sul to the available tuberculin administration methods discussed overseas. The way Correa approached the task can be traced back to the experimental data he produced when he was still an undergraduate student. After completing his studies, he gathered together the research he had done under the supervision of German veterinary medicine professors and published a series of five papers on tuberculin. The main source Correa referred to in his first works was the series of reports published by the British Royal Commission on Tuberculosis. The Commission had been convened to study Koch's controversial assertion about the incommunicability of tuberculosis between man and cattle. At the head of the Commission was Louis Cobbett (1863-1947), who between 1901 and 1911 carried out detailed research on bTB. The results were serially published and eventually reached Porto Alegre. Cobbett's conclusion was that Koch was wrong, because according to his own research children were particularly susceptible to the bovine strain of tuberculosis. Cobbett and his colleagues did not suggest a specific prophylactic method. Instead, they described the tests carried out with tuberculin, pointing out the advantages and shortcomings of each alternative.¹⁷³

Correa's initial interest was testing the parameters as laid down by the Royal Commission. He probed the intradermal, subcutaneous and ophthalmological alternatives and concluded that each had its advantages and, when used in combination, provided strong indications of infection. He also considered that a fourth alternative could potentially be used

¹⁷³ John M. Grange, 'The British Royal commission on tuberculosis', *Journal of the Royal Society of Medicine*, 100 (2007), 6-8.

to confirm tuberculosis diagnosis: the inoculation of infected secretions in guinea pigs. Correa ascertained which animal was more susceptible for the test among rabbits, mice and guinea pigs. Considering the cost and time of reaction, he concluded that guinea pigs were, undoubtedly, the best alternative as they were inexpensive, had a high fertility rate, and reacted to the tuberculosis bacillus rapidly, dying in weeks. Correa concluded that inoculation in laboratory animals was the only way of achieving certainty of contamination by bTB.¹⁷⁴ The experiments also clearly showed that Correa was fully aware of the limitations of tuberculin.

Correa next carried out experiments to address the causes of the difficult problem of false-negatives in tuberculin tests. He first selected an animal with clear clinical signs of tuberculosis, which he described as ‘exceptional low weight, shortness of breath and lethargic movements’.¹⁷⁵ He then tried to administer different substances to force the calcification of tuberculosis lesions in the animal. At that point, calcification meant turning an active lesion into an inactive state. His hypothesis was that active lesions caused the negative reactions of tuberculin in sick animals. After some days, he again tested the selected animal with tuberculin and reported a negative reaction, confirming his hypothesis. To his surprise, however, later autopsy revealed that the animal was riddled with tuberculosis pustules, and only some of them had calcified. This indicated that although the animal was not cured, it had not reacted to tuberculin – a clear case of a false negative.¹⁷⁶

After graduating in veterinary medicine from the Faculty of Veterinary Medicine of Porto Alegre in 1936, Correa entered the public service as a veterinary assistant to the SDAIC, where he worked for the next thirty years. Soon after taking up his new job, Correa proved to be a prolific author.¹⁷⁷ In his second year as a civil servant, he published five articles on bovine

¹⁷⁴ Outubrino Correa, ‘Subsídio para o estudo da tuberculose bovina’, *Revista Agronômica*, 2 (1938), 837-40.

¹⁷⁵ *ibid.*

¹⁷⁶ Outubrino Correa, ‘Tuberculose, tuberculina, tuberculinização, inoculação experimental’, *Revista Agronômica*, 2 (1938), 421-3.

¹⁷⁷ He would soon also begin writing for journals outside Porto Alegre, for example, Outubrino Correa, ‘Vaca Schwitz estéril?’, *C.E.Q.*, 79 (1949), p. 342.

tuberculosis (bTB) from data he had collected during academic assignments. The recurrent focus on bTB in these works reveals his early devotion to the topic and an equally incipient interest in laboratory work. He explored with particular care the use of the tuberculin tests as a tool for diagnosing tuberculosis in cattle. There were still many questions to be answered about the efficacy of such a diagnostic tool, and Correa investigated all of them through experiments with cattle, poultry and swine. He was sure that they were all susceptible to infection, both among each other and from adults to their offspring. The next logical step was to explore the likelihood of the same communicability between animals and humans, a point of contention amongst those investigating the topic. Using the Royal Commission reports convened in England from the early 1900s as a reference point to study bTB, Correa argued that there was a real possibility of infection in humans and children were particularly at risk.¹⁷⁸

In 1943, Correa secured a position as adjunct professor at the Faculty of Veterinary Medicine and, at the same time, initiated a systematic mapping out of bTB in Rio Grande do Sul using the infrastructure of the Bureau of Animal Industry. In order to do such research he needed the help of the Department of Sanitary Protection outposts that were scattered throughout the state. Field inspectors active in these outposts were trained to administer the tests, and tuberculin was made available to them. Correa's recommendation was to use the intradermal method; when doubtful reactions were found, particularly in prized purebreds, the subcutaneous method was also allowed. After testing, outposts reported back the results and Correa compiled them in Porto Alegre. In 1943, he reported the results of the first six years of this study.¹⁷⁹ Although tests were not compulsory, and veterinarians only carried them out at the request of stockmen, almost 30,000 animals had been tested, with 9.44 per cent having positive reactions.¹⁸⁰

¹⁷⁸ Outubrino Correa, 'A produção leiteira', *A Granja*, 3 (1948), 28-9.

¹⁷⁹ Outubrino Correa, 'A profilaxia da tuberculose bovina no Rio Grande do Sul', *Anais do II Congresso Brasileiro de Veterinária*, 2 (1943), 453-7, p. 454

¹⁸⁰ *ibid.*

The ‘adoption’ of the North-American method

After revealing the figures of bTB in Rio Grande do Sul, Correa explained that he had decided to adopt the North American method. As explained above, when Correa mentioned the North American method of administering bTB, he knew his audience would consider it to be the best in veterinary medicine, given the high regard for North American veterinary medical practice.¹⁸¹ He emphasised that they would not follow the instructions provided by the Danish veterinarian Bernhard Bang and the German researcher Robert von Ostertag; instead, they would adopt the method that their North American counterparts had carried out.¹⁸² Correa informed the state in Rio Grande do Sul that it would be mandatory to produce certificates of negative tuberculin reaction for all animals imported from overseas or from other states.¹⁸³ However, it would have been more appropriate, regarding the North American method, if Correa had said that they were *adapting*, rather than *adopting* the method. Stockowners were not compensated in Rio Grande, and this had been a key element of the original plan carried out in the United States. Moreover, tuberculin administration was not mandatory, and only a small percentage of animals were actually tested. The accreditation of tuberculosis-free areas, which took place in the United States but not in Rio Grande do Sul, was also an important part of their campaign. In the United States, to be accredited required that the rate of infection was less than 0.5 per cent.¹⁸⁴ Such a low figure would never have been achieved in Rio Grande do Sul, where the average was 8.9 per cent. The single element on which both campaigns coincided was that when animals reacted they were immediately slaughtered. However, the measure failed to achieve the original hope of eradication since it was not carried out on a large scale.

¹⁸¹ Finamor, ‘Finalidades e realizações da higiene veterinária’; Pinheiro Machado, ‘Alimentação dos animais’, *Agronomia e Veterinária*, 9 (1948), 11-20.

¹⁸² Correa, ‘A profilaxia da tuberculose bovina’, p. 454

¹⁸³ Although Correa did not mention it, this mandatory requirement had been legitimised by the Brazilian Sanitary code issued in 1941.

¹⁸⁴ ‘Revised tuberculosis testing program’, *J. A. V. M. A.*, 118 (1951), p. 454.

In 1946, statistics published by the Bureau of Animal Industry suggested that bTB in the state was increasing.¹⁸⁵ The conclusion was that, unlike the case overseas, the disease in Rio Grande was found to have spread among open-range herds. More importantly, it was revealed that due to insufficient resources the bureau was only monitoring, rather than intervening to curb the increasing spread of the disease. Instead, stockmen were advised to avoid bTB by regularly testing their herd, giving particular attention to new purebreds, and eliminating sick animals. The remark about elimination is important because it did not mean destruction but, again, slaughter. Stockmen were advised to anticipate the slaughter of animals that clearly showed early signs of infection. It was the responsibility of the slaughterhouse to detect the disease. The importance of these results led to bTB being listed among eleven other diseases threatening, in some way, the state's livestock. However, even when aware that more than one million animals could be contaminated in Rio Grande do Sul alone, Correa continued to insist that the risk to humans was mostly among young children. In 1947, he published an article about hygiene in dairy barns in *A Granja*, a journal aimed at dairymen and sponsored by the Rural Association of Rio Grande. In giving advice on how to obtain clean and 'hygienic' milk, he prioritized children's vulnerability to harmful bacilli, rather than the risks to those involved the dairy activity or to the population in general.¹⁸⁶

After giving a detailed description of the procedures, Correa made a remark about the tiresome daily routine of dairy farmers who had to work in adverse environmental and weather conditions. He was referring to the thousands of small farmers who, he argued, wished to promote their welfare as any other professionals would and showed great interest in learning how to improve the quality of their products. Cattle raising was a common practice on small farms for the purpose of ensuring a steady supply of milk, which was a rare commodity in the

¹⁸⁵ 'Estado zoosanitário do Rio Grande do Sul em 1946', *B.D.P.A.*, 5 (1947), 31-4.

¹⁸⁶ Outubrino Correa, 'O problema higiênico-sanitário das nossas granjas leiteiras', *A Granja*, 3 (1947), 21-8.

poorer regions of the state.¹⁸⁷

One of the problems for milk consumption derived from technical limitations. For instance, the lack of electrical refrigerators. If a small dairy farmer wished to sell milk directly to households – a common practice, even in urban areas until the 1960s – he had to cool down the product by placing the milk bottles in a stream close to his property or in covered wells.¹⁸⁸ Otherwise, milk had to be drunk shortly after extraction or transformed into butter and/or cheese.¹⁸⁹ As for the precariously cooled milk bottles, they were loaded onto small carts or animal-drawn wagons and usually distributed before sunset. Correa knew this reality first-hand and argued that certain hygienic conditions demanded investment in proper equipment. Moreover, he believed that dairymen should be justly paid for the extra work demanded to deliver a high quality product. More importantly, he insisted that children were the main group at risk of contamination; it was this fact that justified such an investment.¹⁹⁰

By ignoring that the general population might also be at risk and focusing largely on children, Correa dismissed aspects of research on bTB that occupied other specialists. For instance, there was a debate on which kind of tuberculin was more effective. Different options were made available, each of them derivatives of the so-called Synthetic Tuberculin, which was prepared with a saline solution.¹⁹¹ Earlier tests suggested that tuberculin prepared in saline solutions was more efficient and steady in comparison with other varieties.¹⁹² These tests were replicated in several countries, such as neighbouring Argentina, where results eventually

¹⁸⁷ Even in regions where dairy farms were concentrated workers rarely had the chance to acquire the products of their work, see Poli M. Espirito, 'Aspectos da mortalidade infantil', p. 86.

¹⁸⁸ As suggested in Correa, 'O problema higiênico-sanitário das nossas granjas leiteiras. Continuação', *A Granja*, 3 (1947), 15-9.

, p.18.

¹⁸⁹ M. L. Arruda Behmer, 'Fabricação de manteiga', *Correio do Povo*, (24 Jan. 1947), 8.

¹⁹⁰ Correa, 'O problema higiênico-sanitário das nossas granjas leiteiras. Continuação', p. 18.

¹⁹¹ This was also called Old Synthetic Tuberculin, see 'Tuberculin studies', *Comparative Medicine*, 10 (1946), 93-102.

¹⁹² A. M. G., 'Review: Riglos, Alejandro. La tuberculina de Koch y las tuberculinas purificadas en la profilaxis', *Gaceta Veterinária*, 14 (1941), 197; Nine Choucroun, 'Sobre un antígeno sensibilizante extraído del bacilo tuberculoso', *Gaceta Veterinária*, 3 (1941), 151-4.

reached Porto Alegre.¹⁹³ In the case of Correa, if he continued to maintain only children were at risk, milk was then the most important and obvious vector of the disease. Other forms of tuberculosis, such as the avian type, could thus be ignored even though as an undergraduate student, Correa had focused on how to identify tuberculosis in several species, including poultry.¹⁹⁴ He had used tuberculin to test chickens and hens, which allowed him to discuss communicability between different animal species as well as between man and animal. But even though he often received journals demonstrating that the avian type continued to trouble sanitary authorities elsewhere, including, once again, Argentina, he did not continue his avian studies when he moved to the IVRDF.¹⁹⁵

Moreover, because he considered milk to be the most important vector, Correa also discarded the possibility of infection through meat. This was a topic of intense debate in several journals that reached Correa in Porto Alegre.¹⁹⁶ Until 1949, there was no consensus on the possibility of identifying tuberculosis bacilli in the blood stream of infected animals.¹⁹⁷ This might seem paradoxical given that tuberculin seemed to react to some elements in the blood stream. However, what exactly caused the tuberculin reaction was not clearly understood. The question remained open and became central to states like Rio Grande do Sul, where the beef industry was crucial and where occupational hazards could be a liability to large meatpackers. The high level of contamination among the workforce of these industries had, in fact, been the subject of several studies, but there is little evidence that veterinarians from the IVRDF studied this issue during the 1940s.

¹⁹³ J. F. Coviella and A. Rodriguez Loustau, 'Valor comparativo practico de algunos procedimientos empleados en el diagnostico de la tuberculosis', *Gaceta Veterinaria*, 4 (1942), 24.

¹⁹⁴ For example Francisco Rossi, 'Tuberculosis aviaria', *Gaceta Veterinaria*, 3 (1941), 167-83.

¹⁹⁵ *ibid.*

¹⁹⁶ C. P., 'El Problema de la tuberculosis en relación a la inspección de carnes', *Gaceta Veterinaria*, 8 (1946), 371-3; Helmut Raschdorff, 'Contribución a la comprobación por medio del cultivo de los bacilos tuberculosos', *Revista de Medicina Veterinaria*, 22 (1940), 152-69.

¹⁹⁷ Giovanni Mantovani, 'Contribucion al conocimiento de la patogenia de la infeccion tuberculosa en el bovino', *Gaceta Veterinaria*, 12 (1950), 22-36; E. Césari, 'La apreciación de los animales de carnicería tuberculosos', *Gaceta Veterinaria*, 4 (1942), 8-11.

In 1949, when Correa was finally invited to join Torres' team of researchers at the IVRDF, his position on the risk of contamination to adults did not appear to have changed much in spite of the fact that other Brazilian veterinarians were arguing the contrary. In 1949, Correa had also become director of the Animal Pathology Section in the recently created Institute of Veterinary Research Desidério Finamor. After Correa entered the IVRDF, he immediately increased the number of tuberculin tests in the state. They reached a peak in 1946 but decreased over the following two years when a major outbreak of hog cholera severely affected the Rio Grande do Sul. Veterinarians were relocated to help with vaccination campaign against hog cholera, and this affected the routine of regular tuberculin testing. However, by 1950, figures for the test increased again and continued to remain high throughout the 1950s. Correa was behind this effort to achieve greater control as he took over the bTB division at the IVRDF during this time.¹⁹⁸ These figures indicate that Rio Grande do Sul had the largest sample of tuberculin testing in Brazil, surpassed only by the wealthier and better equipped Sao Paulo.¹⁹⁹

The move to Torres' research team represented a consolidation in Correa's trajectory as a veterinary researcher outside academia. Although he became the director of the Faculty of Veterinary Medicine in the late 1950s, it was primarily in the IVRDF that he produced original research and bolstered his identity as an active and prolific researcher. But the path he would take as he reached professional maturity could already be seen by the late 1940s. First, Correa had full access to on-going scientific discussions, and he actively engaged with those working in his areas of expertise. He did not change his opinion on the risk of bTB to the overall population, but he also investigated two other diseases. The first was the illness caused by gasterophilus flies, known in Brazil as *gasterofilose*. Although it often went unnoticed, the fly

¹⁹⁸ 'Atividades do I. P. V. D. F.', *B.D.P.A.*, 10 (1954), 59-61.

¹⁹⁹ According to José Feldman, 'Tuberculose humana de origem bovina', (unpublished UFMG Ph.D. thesis, 1955).

could kill animals by starvation as the gastric parasites caused severe feeding problems. Correa also studied rabies, an even deadlier and more difficult disease that was transmitted by bats. The infection could kill a cow in fewer than eight days. Although a widely known vaccine, effective even after exposure to the virus was available, several reports pointed to deaths among herds in which the vaccine was administered.²⁰⁰ Correa carried out several tests to identify whether there was a problem with the vaccine. In doing so, he discovered that there were different strains of virus transmitted by the bats and the current vaccine was effective against only one strain.

Both lines of work involved laboratory experiments, fieldwork and bibliographic investigation. These activities were familiar to Correa because he had undertaken them in his undergraduate years, and continued to pursue them at the IVRDF. Evidence that Correa was respected for his work on *gasterofilose* and rabies is clear from the space granted to him by one of the most prestigious monthly agricultural journals, the *Chácaras e Quintais*. This journal was edited by the Oswaldo Cruz Institute, and Correa acted as a special advisor. During the 1940s, he answered letters from readers concerning haematophagous bats and *Gasterophilus* flies.²⁰¹ These two areas of research represented part of the broad range of interests that Correa displayed in the 1950s.

New opportunities had also presented themselves by the time Correa arrived at the IVRDF in the late 1940s. During the second half of the 1940s, brucellosis had garnered the attention of veterinarians, and several researchers had begun to discuss this zoonosis. Unlike the insidious character of bTB, brucellosis disease spread quickly and caused recurrent abortions. Another important difference between the bTB and brucellosis was that a cheaply made and readily available vaccine could prevent brucellosis. Production of this vaccine

²⁰⁰ Correa, 'A transmissão da raiva', p. 6.

²⁰¹ For example, Outubriño Correa, 'A orelha do cãozinho', *C. E. Q.*, 80 (1949), 307; Outubriño Correa and Glacy Pinheiro Machado, 'Problemas do criador de vacas leiteiras', *C. E. Q.*, 79 (1949), 293-4.

became the new goal for several laboratories in the Americas, including the IVRDF. Correa was present when the epidemic emergency occurred, and he seized the opportunity to get involved in a high profile field where research brought immediate gains to livestock owners. His important work on brucellosis will be further explored in the second part of this thesis.

Correa's shift to brucellosis coincided with the fact that the disease had begun to replace discussions of bTB in the literature. Scientific journals circulating in Porto Alegre revealed that a high proportion of the field researching bovine pathologies was shifting towards brucellosis, and Correa followed the pack in this respect. Given his interest and previous work, it is likely he would have noticed this change of direction rather early and shifted his focus away from bTB as a result. In making this decision, he did not consider the risk bTB posed not only to children but also to the entire population. His choice was probably due to the fact that raising the warning about the risk that bTB posed was likely to touch a raw nerve among stockholders regarding a disease. There was no reason to discuss bTB further in the years leading to nationalisation if the majority of researchers had turned their attention towards brucellosis. Availability of knowledge, funds, institutional environment and even a somewhat solid social status were not enough of an incentive to expand Correa's interests in bTB if further work on the disease would not bring the professional rewards that brucellosis research offered. The scope and depth of reform in higher education in 1950 would also further affect each one of these conditions that shaped Correa's trajectory. How this actually happened will be the topic of the final part of this thesis. Before that, in the next chapter, the study of tuberculin research in Curitiba will be used to compare it with what took place in Porto Alegre.

Case Study Two – Research Practices at the Faculty of Agronomy: The case of Ramiro Gomes da Costa

Tackling agricultural pests from Porto Alegre: The Laboratory of Agricultural Biology in context

The objective of this second case study is to explore the research practices of the Faculty of Agronomy of Rio Grande do Sul through the analysis of one of its most outspoken representatives before nationalisation, Ramiro Gomes da Costa. The first noteworthy aspect of Gomes da Costa's research interests is that they were spread over several areas, in line with the multifaceted action deployed by the SDAIC. In the years leading to nationalisation, Correa was involved in the study of several agricultural pests threatening farms in Rio Grande do Sul, including locusts. The ways in which Costa's laboratory dealt with this pest provide an explanation of the challenges and pressure placed on his research centre.

In the decade before nationalisation, one of the main challenges faced by the Laboratory of Agricultural Biology where Costa worked was caused by locust outbreaks. The species found in Rio Grande do Sul was *Schistocerca Paranensis*, a migrating insect from Argentina. It entered Brazil through the long border with Rio Grande do Sul and hit the state with full force.²⁰² Major outbreaks were chronologically unpredictable; they were registered in 1911, 1919, 1924, and in 1936, when the last major invasion took place.²⁰³ For farmers, both the adult organisms and the hatchlings caused the main damage. Each female of the *Schistocerca Paranensis* laid her eggs in a shallow pod, and on average each pod produced around twenty locust nymphs that then devoured a large variety of crops, including onions, wheat and

²⁰² This was the species identified in Rio Grande in the same year, see F. Otoyá; K. B. McMicken and A. S. Guido, 'A luta contra o gafanhoto', *Revista Agronômica*, 12 (1948), 80-4; Ary de Castro Silveira, 'Os focos de origem do gafanhoto', *Revista Agronômica*, 12 (1948), 170-2.

²⁰³ 'O combate aos gafanhotos', *Correio do Povo*, (19 Sept. 1947), p. 12; 'Extinção de gafanhotos', *Correio do Povo*, (9 Aug. 1911), 8.

cotton.²⁰⁴ Hatching depended on temperature and humidity, but each nymph would invariably pass through six moulting stages until, on the sixth, it could fly. Thus, for a considerable period of time, the crawling nymphs caused the main problem for farmers.

By the 1940s, the Laboratory of Agricultural Biology, a branch of the SDAIC, spearheaded the campaign against these gregarious insects. Previous occurrences already demonstrated that at the peak of the outbreak the performance of the laboratory was under greater scrutiny and public pressure. In the past, the response to locust attacks had always been organised by agronomists of the Secretariat of Public Works. In 1936, Urbano B. dos Santos, an agronomist working in the Division of Phytosanitary Certification, was sent to the countryside to organise the so-called ‘workers’ brigades’, which were responsible for putting into practice a coordinated attack against the locusts. In the first days of spring that year, when hundreds of thousands of infant locusts began to hatch and crawl from their pods, technicians and farmers combatted them by digging ditches and raising fences, which were used to direct infant locusts to large holes where they could be burned.

While brigades of peasants raised fences and dug ditches in the fields, back in Porto Alegre another important countermeasure was underway. Effective coordination of these countermeasures was a key element when dealing with locust advance. In 1936, the agronomist Ferreira Lima was in charge of the Phytosanitary Certification in the Laboratory of Agricultural Biology. He kept track of the advance of insects from town to town so that he could gather information about the routes the swarms of locusts took and make notes of the measures being enacted to tackle them.²⁰⁵ City mayors in the countryside called the Department of Agriculture to ask for help when swarms were approaching or if they had already arrived in the region. Sometimes, the request came too late for any effective help, but the call provided precise

²⁰⁴ Information about the life cycles and feeding habits were available in entomological manuals, see Carlos Moreira, *Entomologia agrícola brasileira*, (Rio de Janeiro, 1929).

²⁰⁵ A. D. Ferreira Lima, ‘Os gafanhotos e suas invasões’, *B.F.T.*, 1 (1944), 139-46.

information regarding the direction of the swarm. Moreover, the Secretariat of Public Works had experimental stations in the countryside that informed Porto Alegre when locusts were identified in their areas.²⁰⁶ In a time of precarious means of communication, this was the best way to keep track of the erratic advance of swarms from area to area. However, this ‘coordination’ strategy had a basic overall flaw: by waiting for city mayors to call, the Laboratory of Agricultural Biology usually knew about the attacks only after they had occurred, and little could be done to help cities in the path of the locusts to prepare for their imminent invasion.

Eventually, most of the towns that the swarms passed through had to devise their own counter-measures. For instance, they individually bought arsenic-based pesticides that were mixed with solvents so that they could be more easily spread over large areas with the available equipment. Although the use of pesticides was irregular and placed those handling them at great risk, the information gathered in Porto Alegre concerning what was and what was not effective taught technicians important lessons that would prove invaluable during future attacks, such as the one in 1947.

In that year, after almost a decade without a major outbreak, large swarms of locusts crossed the south border and invaded Rio Grande do Sul. This time, the gigantic swarm reached Porto Alegre, attacking the suburbs and entering houses and buildings through open windows.²⁰⁷ Hundreds of thousands of locusts arrived in the capital because sections of the main swarm broke up and lost their way, ending up in areas such as the residential region of Porto Alegre. This phenomenon also occurred on the beaches of Rio Grande do Sul where, in one year, tons of locusts were brought in by the tides to rot on the beaches after they had mistakenly headed east towards the open sea.²⁰⁸ But most of the time the swarm’s sense of

²⁰⁶ *ibid.*

²⁰⁷ Claudia Jurberg, ‘Elio Corseuil’, *Entomology Vectors*, 11 (2004), 563-88: pp. 564-565.

²⁰⁸ Lima, ‘Os gafanhotos e suas invasões’.

direction was – not figuratively – deadly correct, heading north, reaching the crops of Paraná some months after it had ravaged farms in Rio Grande do Sul. When the 1947 outbreak took place, the Laboratory of Agricultural Biology was directly involved. Two of its divisions were in charge of devising solutions that could be used against the locusts. In the Division of Entomology this task was assigned to Ramiro Gomes da Costa. Based on previous outbreaks, he suggested arsenic-based pesticides, which were bought in large quantities by the state and distributed in the countryside. In total, twelve tons of the highly toxic substance were used before the end of the 1947 outbreak.

Gomes da Costa applied experience he had gained in previous campaigns to suggest improved techniques. Because of his recommendations, hundreds of fences were erected and countless ditches were dug in areas where great numbers of depositions had been identified. Once again, fire was systematically used to tackle locusts, particularly those in their first phases of development. A new technology was also incorporated into the arsenal of workers' brigades, helicopters. Helicopters had already been used in Argentina, and the government of Rio Grande do Sul decided to buy two in order to more effectively spread different solutions of organochlorine pesticides, such as BHC, over the airborne swarms. Despite the fact that these pesticides were already known to be toxic in high quantities to warm-blooded organisms, they did little to mitigate the seriousness of the attack. Meanwhile, arsenic-based products were still widely in use on the ground.²⁰⁹

The Division of Phytosanitary Certification under the command of Neto was also involved in halting the 1947 outbreak. As noted above and as previous outbreaks had taught, tackling locusts was a matter of coordination, and Neto was in charge of keeping track of the locusts and deploying resources in the field in order to minimise the damage. The job of predicting the route of the swarm still relied on a good deal of guesswork, as the total area of

²⁰⁹ 'Guerra ao saltão', *Correio do Povo*, (1 Nov. 1946), 12.

the state was close to 300,000 square kilometres, roughly the size of Italy, and no less than thirty-three municipalities were invaded simultaneously.²¹⁰ Even so, Neto managed to put on the ground dozens of technicians, gather help from the Brazilian Army to provide transportation for workers' brigades, and concentrate on the areas that appeared to him to be most affected.

However, at the beginning of 1948, when swarms left the state and headed towards Paraná, farmers in Rio Grande do Sul voiced to the press their frustration with the results delivered by the Laboratory of Agricultural Biology. Reporters did not mince words when criticising the Department of Agriculture's response to the plight.²¹¹ They accused the Secretary of Agriculture, Desidério Finamor, of having failed to coordinate the campaign in different parts of the state. Moreover, the strategy and technique deployed were deemed inefficient or misconceived.²¹² They were considered inefficient because technicians were forced to work with improvised equipment that was inadequate for the task at hand. State-sponsored initiatives were also described as misconceived because authorities were accused of taking too long to react and when they did, it was already too late.²¹³

Finamor stood up for his department by arguing that its technicians were not solely responsible for tackling the locusts and that the rural population also had a part to play.²¹⁴ His department dispatched technicians to the affected areas, but each city had to provide transportation and follow their instructions to the letter. If neither logistical nor operational support were provided, the Department of Agriculture could not be made to answer alone for the meagre results achieved. Neto, who was in charge of coordination from Porto Alegre and who participated in some of the campaigns on the ground, gave a similar explanation. He

²¹⁰ A. D. Ferreira Lima, 'Para combater os saltões dos gafanhotos', *Criação e Veterinária*, 2 (1947), 178.

²¹¹ 'Os saltões e o plantio de primavera', *Correio do Povo*, (10 Oct. 1947), 12; 'Noticiário', *Correio do Povo*, (26 Sept. 1947), 12.

²¹² 'Guerra ao saltão', *Correio do Povo*, (1 Nov. 1946), p. 12.

²¹³ *ibid.*

²¹⁴ 'Noticiário', *Correio do Povo*, (1 Nov. 1946), p. 12.

argued that ‘... even if all the available human and material resources were appropriately coordinated and deployed, we could not do the impossible, which was to completely eradicate locusts from the immense area in which they were found’.²¹⁵ He also implicitly argued that authorities and the population had to work to minimise the damage and that the massive size of the outbreaks was so overwhelming that the resources necessary to completely neutralise it would easily surpass any gains of providing help to authorities and the population. While Neto could not simply say publicly that authorities were forced to watch passively as the swarms wreaked havoc in the countryside, he nonetheless described in detail everything that was done and highlighted the fast response his department had provided.²¹⁶

Another argument in favour of the Laboratory of Agricultural Biology was that the efficacy of the BHC was still a matter of debate, as many of its concentrations were still being tested. In the past, some natural predators had been recruited in South America to combat pest outbreaks. For example, seagulls were considered efficient predators against locusts, even when they had to fly more than forty kilometres to reach the swarms.²¹⁷ During the 1936 outbreak, it was calculated that around 40,000 seagulls were seen over a large area where the young locusts were hatching from their pods.²¹⁸ However, the increasing number of pesticides available, in particular BHC, attracted the attention of researchers who believed that a faster and safer solution would soon be found. The problem was that much of the information circulating about different BHC concentrations that worked in the early phases of the 1947 outbreak used commercial names that differed from country to country, and thus knowledge gathered in one country had to be adapted in others.²¹⁹ As a result, tackling locusts not only demanded concrete actions but also depended on adequate channels of communication between

²¹⁵ ‘A secretaria da agricultura e o combate ao gafanhoto’, *Correio do Povo*, (14 Mar. 1947), 12.

²¹⁶ *ibid.*

²¹⁷ Lima, ‘Os gafanhotos e suas invasões’.

²¹⁸ *ibid.*

²¹⁹ F. Otoyá, ‘Medidas tomadas para combater o gafanhoto no Equador’, *Revista Agrônômica*, 12 (1948), 82-4. , p. 82.

authorities, researchers and farmers. It is difficult to assess whether farmers were convinced by these arguments. It is clear, however, that practices carried out by the Laboratory of Agricultural Biology were likely to come under considerable public pressure.

The research practices of Ramiro Gomes da Costa: The case of Leafcutter Ants

The context presented so far indicates that agricultural entomology was understood by members of the Bureau of Plant Industry to be vital to the agricultural development of Rio Grande do Sul. Moreover, it was granted considerable visibility through the creation of the Laboratory of Agricultural Biology. On the other hand, the laboratory researchers were expected to recommend and deploy effective measures against pest outbreaks. Therefore, public opinion could be considerably critical when the SDAIC did not perform as expected. By looking at his work in context, it is possible to explore the research practices of Ramiro Gomes da Costa as head of the Entomology Division that developed against this particular background.

Gomes da Costa had studied agronomy in Sao Paulo and came to Porto Alegre to join Parseval's Laboratory in 1936, just before Neto took over.²²⁰ Before he had joined Parseval's team, he was Head of the Division of Entomology of the Laboratory of Agricultural Biology and held a professorship at the Faculty of Agronomy of Porto Alegre. It was Gomes da Costa who recommended arsenic-based pesticides against locusts during the controversial 1947 campaign. He had been studying ways of tackling pests throughout his entire professional career. When the locust outbreak took place in 1947, Gomes da Costa was focusing on leafcutter ants (genera *Atta*).²²¹ Although locust outbreaks were devastating, their occurrence was infrequent, and sometimes a decade passed between major strikes. On the other hand, leafcutter ants were a permanent plight, and they were more damaging because of their elusive behaviour,

²²⁰ Ramiro Gomes Costa, 'Os inimigos naturais das pragas das plantas cultivadas', *Secretaria da Agricultura de Porto Alegre*, 43 (1936), 118-122.

²²¹ For examples of earlier works published in Porto Alegre and Rio de Janeiro see *ibid.*, Ramiro Gomes Costa, 'Ainda as formiguinhas (sic) assucareiras', *C. E. Q.*, 55 (1937), 296.

remarkable resilience and widespread distribution. The problems caused by leafcutter ants were further exacerbated by the fact that they lived in colonies, which consisted of several subterranean chambers spread over several square meters and connected through a maze of passages from which they were able to reach the surface and attack plants. In each of the chambers, the ants grew so-called 'fungus gardens', which they used to feed their larvae. The 'gardens' also consisted of vegetable matter collected by adult ants to feed the fungi. More importantly, the queen could be located in any of the chambers, and unless she was killed, the anthill might completely recover from prophylactic measures. There was evidence of queen chambers located as deeply as 4.5 meters in underground colonies spread over an area of fifty square meters.²²²

By the late 1930s, the threat that the leafcutter ant posed was singled out as a top priority by the National Ministry of Agriculture, and a commission was set up to study and coordinate methods to combat them.²²³ What followed was a race among researchers from different Brazilian states hoping to be the first to offer a satisfactory solution to a national problem. The results ranged from homemade strategies, like poisoned meat baits and spicy tomato sauce, to several ingenious mixtures of a vast variety of chemical substances.²²⁴ Even top entomologists, such as Paulo Autuori, participated in this collective effort, working in the Biological Institute in Sao Paulo on the development of pesticides against ants.²²⁵ Autuori's reputation and consistent interest in the biology of leafcutter ants granted considerable visibility to the topic.²²⁶ A special commission was formed in Rio de Janeiro to assist each individual state, but each

²²² João Hygino Carvalho, 'Duas armas de combate à saúva', *Revista Agrônômica*, 3 (1939), 553-4.

²²³ Marques, 'O tatú e as saúvas'; Monte, 'Os insetos daninhos'.

²²⁴ 'Combate a saúva', *C. E. Q.*, 54 (1936), 468; Gonçalves, 'O gergelim no combate à saúva', p. 338; Monte, 'Os insetos daninhos'.

²²⁵ Ramiro Gomes Costa, 'Formigas "cortadeiras" do Rio Grande do Sul', (unpublished UFRGS, Entomology Chair Holder Application Thesis, 1954), p. 28.

²²⁶ Mário Autuori, 'Investigações sobre a biologia da saúva', *Ciência e Cultura*, 1 (1949), 4-11; Mário Autuori, 'Longevidade de uma colônia de saúva', *Ciência e Cultura*, 2 (1950), 285-6; Mário Autuori and Jayme Pinheiro, 'Infestação residual da formiga saúva em áreas onde foi combatida', *Ciência e Cultura*, 3 (1951), 273; Mário Autuori, 'O enxofre no combate as saúvas', *A Granja*, 7 (1951), 13-4.

local Department of Agriculture eventually tested and adapted the national guidelines to their own local conditions.

In Rio Grande do Sul, this task was assigned to Gomes da Costa. His work on ants dated back to the late 1930s, when he moved to Rio de Janeiro to learn about the two official pesticides adopted to eradicate the ants: carbon disulfide and a sulphur/arsenic mixture.²²⁷ Both highly poisonous substances were injected into anthills through the use of specially designed surface pumps. This equipment was manually operated and aimed at blowing the chemicals down and into the anthills. However, some years later, after subsidising the purchase of this equipment and issuing instructions on how to use it, the Department of Agriculture of Rio Grande do Sul concluded that this strategy was mostly ineffective. Gomes da Costa had identified that sulphur and arsenic-based pesticides were not fully effective because, in some areas, underground anthill chamber walls were made of a soil type that was so compact and impermeable that the fumes of those pesticides could not pass through when sprayed from the surface. As the ‘fungus gardens’ and the queen were located in these chambers, all the efforts of fumigating from the surface were in vain if they could not be reached.²²⁸

After years of frustrating trials with the official method, Gomes da Costa discovered a substance that would solve the problem of sealed chambers that were out of reach of fumigation from the surface. Costa’s solution consisted of the use of a substance called bromomethane, also known as methyl bromide, which was available in liquid form. Costa discovered that if the methyl bromide was pressurised it could be pumped into the ant colony in liquid form. He then adapted a long hollow tube at the end of the surface pump and inserted it from the surface down to the lower chambers of subterranean colonies. When the liquid reached the deep, hollow chambers, it came in contact with air, and its fumes rose from chamber to chamber,

²²⁷ Costa, ‘Os inimigos naturais das pragas das plantas cultivadas’.

²²⁸ ‘Formigol’, *Correio do Povo*, (16 Feb. 1950), 11; John B. Griffing, ‘Cloredano versus saúva’, *Correio do Povo*, (27 Feb. 1953), p. 11; R. Markus, ‘Combate à formiga’, *Correio do Povo*, (17 Feb. 1950), 11.

asphyxiating all the ants in those spaces. Instead of the mostly ineffective top-down spraying method, the bottom-up solution adopted by Costa guaranteed that all chambers would be reached. The advantage of this method was the low cost of deployment and its efficacy; as Gomes da Costa put it, ‘two men working together could extinguish up to 20 anthills in one day’.²²⁹ The discovery that methyl bromide was lethal to leafcutter ants would revolutionise the fight against the insect, changing the course of a battle previously deemed lost. A few months following Gomes da Costa’s publication explaining the new method, a company from Rio de Janeiro released a product labelled ‘Formicida Blemco’, which was basically methyl bromide in the form, quantity and package suggested by Gomes da Costa in the article where he had announced that the substance was lethal against ants.²³⁰ The product manufactured by this company became the standard pesticide adopted by the Brazilian government against leafcutter ants. In the 1950s, the government bought large quantities of the Formicida Blemco to distribute among its rural outposts, which provided assistance directly to farmers.²³¹

Gomes da Costa’s original work with methyl bromide reveals important characteristics of his research practices, among which fieldwork was the most evident. He repeatedly stated that he carried out experiments in the field, even appearing personally to demonstrate the fumigation of an anthill with methyl bromide.²³² Moreover, the study of leafcutter ants’ life cycles was essentially a project carried out in the field. The entire rationale behind the research that led to the methyl bromide discovery stemmed from first-hand knowledge of the different types of soils in which anthills could be found. This kind of knowledge could hardly be learned indoors as experimental anthills set up in entomological laboratories tended not to last as long as real ones did. Moreover, they could rarely replicate the variables in play with regards to

²²⁹ Ramiro Gomes Costa, ‘O brometo de metila no combate a saúva’, *Boletim do Campo*, 5 (1949), 21-2.

²³⁰ ‘Circular N° 108’, *Diário Oficial*, (25 Oct. 1950), 17268.

²³¹ ‘Departamento de Agricultura’, *Diário Oficial*, (13 Nov. 1954), 8969.

²³² Ramiro Gomes Costa, ‘Um novo formicida’, *Agronomia e Veterinária*, 3 (1949), 12-4: p. 13.

outdoor colonies.²³³ Such practices carried out in the field were the bedrock of the rationale that enabled Gomes da Costa to come up with original solutions. After his publication, several sources re-printed, transcribed and advertised his discovery.²³⁴ This positive response demonstrated the complexity of the problem, and how effective Costa's solution proved to be, considering that renowned experts in the country had previously refrained from endorsing specific pesticide uses.

As will be demonstrated in Chapter Three, after 1950, Gomes da Costa's work on pesticides influenced a new generation of researchers whose laboratory and fieldwork practices were similar to those he had developed in the 1940s.²³⁵ This new generation of researchers inspired by his work would represent the full blossoming and consolidation of a research centre envisaged by the German agronomist Maximiliano Parseval and organised by his pupil, Jose Costa Neto, both professors at the Faculty of Agronomy of Porto Alegre. However, Gomes da Costa's dedication to a major threat to Rio Grande do Sul farmers, the leafcutter ants, and the public scrutiny to which he was subjected illustrates the ways in which the Laboratory of Agriculture functioned independently of an academic environment. Although key researchers active in the laboratory held academic positions, they were part of a research environment open to the scrutiny of public opinion on issues involving potentially heavy economic losses to the State. This gap widened even further after nationalisation, and an understanding of the projects of Parseval, Costa Neto and Gomes da Costa will help to assess the even greater distance that came to exist between the Faculty of Agronomy and the Laboratory of Agricultural Biology.

²³³ Autuori, 'Investigações sobre a biologia da saúva'.

²³⁴ For example, Ramiro Gomes Costa, 'Formigas cortadeiras', *Ciência e Cultura*, 2 (1950), 303.

²³⁵ Gomes da Costa's method against ants would be used in Brazil until the 1990s when the product was banned due its proven harmful effects on the ozone layer, see Marina Silva, 'Portaria N.º 200', (2006).

Conclusion

Outubrino Correa was undoubtedly the most outspoken veterinarian from the Bureau of Animal Industry in the area of bTB, whereas Ramiro Gomes da Costa broke new ground with his research on pesticides against leaf-cutter ants in the Bureau of Plant Industry. The trajectories of their research up to 1949 placed them at the heart of the nationalisation process in Porto Alegre. In Chapter Three, the ways in which their research was affected by this process will be explored in detail. However, to do so, it is necessary first to summarise the main aspects shaping their career trajectories in the years leading to nationalisation.

Correa's early work on bTB was possible because he had access to a body of knowledge about the zoonosis cumulated since the late 1890s, rendering it a legitimate research topic. Correa's introduction to the topic of bTB occurred after he entered the Faculty of Veterinary Medicine and met professors from overseas who had experience in research. After he left the Faculty of Veterinary Medicine, the bulk of his research on bTB was published in a series of papers influenced by the British Royal Commission on tuberculosis. To a great extent, this knowledge remained the guideline of Correa's work, despite access to new data made available throughout the decade. The case of Ramiro Gomes da Costa was similar. The arrival of Parseval influenced both him and Costa Neto, his superior at the laboratory. Both researchers, at early stages of their careers, were encouraged by Parseval to see agricultural entomology as a promising and extremely important field. The determination of Costa Neto to organise a laboratory of entomology and of Gomes da Costa to head it, after both finished their undergraduate studies, can be traced to the positive influence of their tutor, Parseval.

An institutional environment conducive to research was also a key element in Correa and Gomes da Costa's careers. They each began to produce original work after entering the public service. Between 1937 and 1943, Correa managed to coordinate the testing of more than 50,000 animals, and from the results achieved, he called attention to the risk posed by bTB.

This was possible because of the logistic support and reach of the Department of Sanitary Control outposts. In the IVRDF, he found an institutional culture that rewarded flexibility, had funds and status, and enjoyed support from authorities. Correa also had the opportunity to study other diseases, such as rabies and *gasterofilose*, and he produced original work based on this research. Likewise, Ramiro Gomes da Costa carried out fieldwork that led him to realise the efficacy of methyl bromide in the Laboratory of Agricultural Biology. This discovery only occurred after several years of systematic work on pesticides that targeted a variety of agricultural pests. It is noteworthy that Gomes da Costa could choose which pests he would specialise on, but he was aware that in the case of a major outbreak, as with locusts, his department would be closely scrutinised by the public. Therefore, his research agenda focused on short-term results and straightforward recommendations. More importantly, the existence of active state research centres brings to light the ways in which professors carried out their research projects outside the academic environment. Both Gomes da Costa and Correa kept their research interests separate from their academic careers, and there is little evidence that they made any effort to link the two environments they inhabited.

Chapter Two

Research Practices in the Faculty of Medicine Porto Alegre 1935-1949

2.1 – The epidemiological context of Rio Grande do Sul

Nelson Fernando Boeira's assessment was accurate when he argued that prior to the 1890s 'no-one involved in public affairs [in Rio Grande do Sul] ignored the name of [August] Comte'.²³⁶ By retracing the origins of political positivism in the state, Boeira identified the multiplicity of meanings that the philosophical movement had acquired in a variety of areas, from literary criticism to political ideology.²³⁷ The presence of positivist assumptions can also be found in the origins of the State Department of Health of Rio Grande do Sul, the history of which is linked to a public administration rationale strongly influenced by Comtean ideals. One of the embodiments of positivism in Rio Grande do Sul was the stance called 'radical federalism', indicating a fierce opposition to federal intervention in local matters. The policy was applied to public health in Rio Grande do Sul when the first republican constitution firmly opposed intervention by the federal government in initiatives related to prophylaxis of epidemic diseases and the control of public health services.

Regardless of the changes introduced during the following decades, the tradition of independence would be maintained. In 1929, the physician Fernando Freitas Castro took over the leadership of the State Department of Health and deprived town councils of the responsibility for public health services which were to be centralised in the state government. City councils were left in charge of garbage collection and the administration of water and

²³⁶ Nelson Fernando Boeira, 'Comte in exile', (unpublished Yale university Ph.D. thesis, 1993), p. 1.

²³⁷ For further interpretations on the role of positivism in Rio Grande do Sul, see Love, *Rio Grande do Sul*; Jens R. Hentschke, *Positivism gaúcho-style* (London, 2004).

sewage facilities.²³⁸ However, Castro refused to hand over any of the services to the federal government; this continued to be a point of honour. In fact, this spirit of independence not only persisted and was strengthened by subsequent administrations, but it also shaped the public health infrastructure in the 1940s. When Jandyr Maya Faillace, Professor of Hygiene at the Faculty of Medicine, took over the State Department of Health in 1946, he could authoritatively articulate what his organisation could offer Rio Grande do Sul. He was aware that his department provided a broader range of services when compared with other Brazilian states. For instance, there was a Service of Biostatistics in Rio Grande do Sul headed by the physician Leonidas Soares Machado. This service was set up to monitor several indicators of endemic and epidemic diseases. Tuberculosis was one of the priorities of this service, and it was monitored by individual towns and regions of the state. Among the eight geographical areas making up Rio Grande do Sul, the *Campanha* region at the southwest border with Uruguay and Argentina registered the highest mortality rate due to tuberculosis, 173 deaths per 100,000 persons.

A further consequence of this broad range of services was the creation of more opportunities for physicians in the area of public health. Successive administrations invested in public health services that required a substantial workforce. Although in 1949 Rio Grande do Sul had only one sanatorium dedicated to tuberculosis and six dispensaries for the entire population of 3.8 million, 270 public health posts and ambulatories existed there, offering a host of services to the population.²³⁹ The number of public health employees working for the State Department of Health reached 1,565 in the early 1940s.²⁴⁰ Among this contingent were

²³⁸ Jandir Maya Faillace, 'Evoluções e novos rumos', *Arquivos do Departamento Estadual de Saúde*, 9 (1951), 7-14.

²³⁹ Edmundo Nascimento, 'A contribuição do SESC', *R.M.R.S.*, 5 (1949), 139-40. For demographics, see 'Meses de outubro e novembro de 1949', *Boletim Mensal de Bioestatística*, 11 (1949), 2-32. Three of these dispensaries were located in Porto Alegre, see Bonifácio Costa, 'Administração sanitária', *Arquivos de Higiene*, 13 (1943), 173-223: p. 206.

²⁴⁰ Of the three states in the southern region, the percentage invested in public health and medical assistance was respectively 2.9% and 1.4% in Rio Grande do Sul, 5.0% and 3.3% in Santa Catarina, and 3.5% and 3.9% in Paraná.

part-time physicians who held academic positions, and Jandir Maya Faillace was one of them. He was among 1,203 physicians with a license to practise medicine in Rio Grande do Sul, who could aspire to positions in any of the sections of the State Department of Health.²⁴¹

Apart from diseases like tuberculosis and malária, a substantial contingent of public employees dealt with several conditions related to poor hygiene, such as typhoid fever and a high prevalence of intestinal parasites. Of the seventy-five towns in Rio Grande do Sul, twenty-five had a water system, while only fifteen had a public sewage network.²⁴² The main challenge facing public health officials was to plan and coordinate tailored services for different parts of the state. As José Fernando Carneiro, Professor of Phthisiology at the Faculty of Medicine of Porto Alegre, had suggested, the north and south of Rio Grande do Sul were so different that it was hard to believe they were part of the same country.²⁴³ The most difficult problems and the worst statistics in the state were concentrated in the southern region. The poorer towns in the southwest were struck by the highest rates of illiteracy, child mortality and tuberculosis. The central and southeast regions were the most densely populated areas and included the three largest towns in the state, Porto Alegre, Pelotas and Rio Grande, respectively. Urban concentration was followed by a higher number of diseases, such as tuberculosis, and evidence demonstrates that patients were dying after receiving no form of medical care whatsoever.²⁴⁴ In the southeast, where warmer temperatures were registered throughout the year, diseases such as yellow fever and malária were more common.²⁴⁵ Around forty per cent of the children who died before reaching one year of age in the southern region had no medical assistance of any kind.²⁴⁶ There was also evidence that patients were dismissed from hospitals and public posts

²⁴¹ This number was within the official target: an average of 4,000 patients per physician, see João de Barros Barreto, 'A saúde pública no Brasil', *B.O.S.P.*, 21 (1942), 849-59: p. 851.

²⁴² *ibid.*: p. 856.

²⁴³ José Fernando Carneiro, 'A luta antituberculosa no Brasil', *Anais do 2º Congresso Sul-Riograndense de Higiene*, (1959), 36-65.

²⁴⁴ *ibid.*: pp. 36-38.

²⁴⁵ R. Di Primio, 'Sobre a presença do *Aedis Aegypti* em Porto Alegre', *Arquivos Rio Grandenses de Medicina*, 16 (1937), 389-90.

²⁴⁶ Espirito, 'Aspectos da mortalidade': pp. 81-93.

in some towns before having been completely cured because queues of critical cases requiring urgent treatment were simply too long.²⁴⁷

2.2 – Porto Alegre in the Rio Grande do Sul context

The command centre at the State Department of Health of Rio Grande do Sul was in Porto Alegre. Here, employees planned, coordinated and monitored all of the services provided for the population throughout the state. As it had the largest population of the state – a total of 326,000 people in 1949 – the capital was the place where ideas were tested before becoming official policies.²⁴⁸ Urban concentration provided physicians with optimal conditions for testing procedures, both individually and collectively. At the infrastructural level, the main hospitals in the state were located in Porto Alegre. The City Council also sponsored the so-called Central Post, which provided health services for the general population. Although the post was in fact a large ambulatory, designed to provide emergency assistance, its ambulances answered more than two thousand calls each month. Professors from the Faculty of Medicine were among the physicians answering these calls, which included a broad variety of cases, from victims of gun fire, burns and heart attacks, to deliveries of new babies and bites from animals. Moreover, Fernando Louzada, Professor of Clinical Practice at the Faculty of Medicine of Porto Alegre, was the Editor in Chief of the journal published by the City Council's Secretariat of Health. The field ambulatories, known as Hygiene Posts, were organised by the State Department of Health throughout Rio Grande do Sul. They provided services similar to those of the Central Post in Porto Alegre but on a smaller scale.²⁴⁹

²⁴⁷ The increase of morbidity rates, particularly after the introduction of antibiotics in the late 1940s, caused problems in Porto Alegre and Curitiba. For a discussion of these problems, see João Ermani Bettega, 'Novos rumos da profilaxia da tuberculose no Brasil', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 3 (1958), 93-102; Faillace, 'Evoluções e novos rumos'.

²⁴⁸ For studies on public health in Pelotas, the second largest city after Porto Alegre, see Lorena Almeida Gill, *O mal do século*, (Pelotas, 2007); 'Dados bio-estatísticos', *Boletim Mensal de Bioestatística*, 11 (1949), 12-49.

²⁴⁹ Costa, 'Administração sanitária', pp. 211-212.

At the level of the population, Porto Alegre provided several opportunities to test ideas in the area of Public Health. For instance, the mortality caused by tuberculosis in the capital was one of the highest in the entire country, reaching 361 deaths per 100,000 persons in 1940, almost three times the rate of Curitiba. It was estimated that more than fifty per cent of all children between seven and fourteen years of age reacted positively to tuberculin.²⁵⁰ In the ranking of towns most affected by the tuberculosis epidemics, which took into consideration figures from twenty Brazilian capitals, Porto Alegre ranked fifth; this was substantially high considering that the four towns most affected were the capitals of the poorest states of the country. Since urban concentration was considered partly to blame for these high rates of contagion, physicians had to manage problems within a fairly close proximity. Thus they preferred to test treatments locally before recommending them to other towns. For instance, after the physician Edmundo do Nascimento had undertaken an x-ray survey of 331 employees from a factory in Porto Alegre, he recommended similar trials in the rest of the state.²⁵¹ Most of the individuals testing ideas were, like Nascimento, in some way linked to the State Department of Health. The diversity of professional figures supporting public health initiatives required the establishment of a programme to train these professionals. This took place in the early 1940s at the Faculty of Medicine of Porto Alegre. The topics on the agenda ranged from microbiology and parasitology to household sanitation and urban sewage. Lack of proper household sanitation was a crucial problem since even in Porto Alegre only forty-eight per cent of households were linked to the public sewage system. Public health officials argued that any sanitary campaign, particularly against human parasites, had to begin at home. Porto Alegre

²⁵⁰ Bonifácio Costa, 'A luta contra a tuberculose', *Arquivos do Departamento Estadual de Saúde*, 1 (1940), 7-13.

²⁵¹ Nascimento, 'A contribuição do SESC'.

was the ideal testing ground for this kind of rationale since part of its population lived in conditions as hazardous as those prevailing in the poorest parts of the state.²⁵²

2.3 – The Faculty of Medicine of Porto Alegre

At the same time that positivist principles were being used to justify the decentralisation of essential public health services, they were also invoked in arguments for professional freedom in Rio Grande do Sul. Therefore, whereas the local interpretation of Comte's doctrine generated opportunities for physicians in the State Department of Health, it conflicted with the interests of one of the main medical institutions of Rio Grande do Sul, the Faculty of Medicine of Porto Alegre. According to the first Brazilian Republican Constitution, issued in 1889, professional freedom (*liberdade profissional*) should be allowed for all trades and activities. In the medical field, this meant not only that practitioners without an academic degree could work legally but also that degrees from foreign universities had the same value as those from Brazil. When Julio de Castilhos, the president of the province of Rio Grande do Sul, issued the state's first constitution in 1892, it incorporated these ideas, including the right to professional freedom.²⁵³

Pharmacists in Porto Alegre radically opposed Castilho's idea of granting professional freedom because they feared that this would allow all types of folk medicine to flourish and eventually harm the population. They argued that only pharmacists with academic degrees should be allowed to practice their trade. A Faculty of Pharmacy was founded in 1896 as a way of exerting pressure on the state government to reconsider the professional standard regulating

²⁵² Although this course took place at the Faculty of Medicine, only three professors took part. R. Di Primio taught insect borne diseases, Jandyr Faillace lectured on tuberculosis and Décio Martins was in charge of the topic focusing on infant health, see Ernesto Dornelles, 'Decreto 993', *Arquivos do Departamento Estadual de Saúde*, 5 (1944), 193-214: p. 198. Although there are indications that similar courses were organised in Paraná, there is little evidence that local professors participated. Moreover, the course's scope does not appear to be as broad as it was in Porto Alegre, see João de Barros Barreto, 'A saúde pública no Brasil', *B.O.S.P.*, 21 (1942), 849-59: p. 851.

²⁵³ Beatriz Teixeira Weber, 'Positivismo e ciência médica no Rio Grande do Sul', *História, Ciências, Saúde-Manguinhos*, 5 (1999), 583-601; Beatriz Teixeira Weber, *As Artes de Curar*, (Bauru, 1999).

the profession.²⁵⁴ After this initiative, local physicians followed suit. In 1897, they created a Childbirth Course in the *Santa Casa* Hospital in an attempt to contest the hegemony of “unregulated” midwives, who thus far had been the unofficial experts in that area.²⁵⁵ The Childbirth Course was then transformed into a Faculty of Medicine when local physicians, whose chairs were named after their specialties, decided to work in line with the local pharmacists. In 1899, both faculties were merged to form the Faculty of Pharmacy and Medicine of Porto Alegre (referred to here as the Faculty of Medicine only).²⁵⁶ Thus, from its inception the Faculty of Medicine had been linked to efforts of professional legitimatisation as well as to initiatives designed to fend off the practice of medicine and pharmacy by “unregulated” practitioners.²⁵⁷ According to the historian Lizete Oliveira Kummer, professors were still campaigning in the 1920s for the prohibition of professional practice by individuals who did not hold academic qualifications, called at the time ‘official titles’.²⁵⁸ In 1926, this idea was formalised by the physician Francisco Simões, who, in a medical congress held in 1926 in Porto Alegre, proposed a bill demanding that the Faculty of Medicine administer an examination to individuals who wanted to practise medicine. When this idea was approved, physicians with respected names but without official titles naturally opposed the motion. However, members of the Medical Association of Rio Grande do Sul used the resolution to legitimise a state wide campaign against “unofficial” practitioners, using the old argument that the greatest threats to public health would only be removed when professional freedom was

²⁵⁴ João Rechden, ‘História da faculdade de medicina’, *Arquivos Rio Grandenses de Medicina*, 20 (1942), 377-80.

²⁵⁵ Until the late 1940s, half of the deliveries in Porto Alegre were still carried out at home, see Leonidas Soares Machado, ‘Índices sanitários de Porto Alegre’, *Boletim Mensal de Bioestatística*, 9 (1947), 11-5: p. 14.

²⁵⁶ Antônio Bottini, ‘No cinquentenário’, *Anais da Faculdade de Medicina de Porto Alegre*, 8 (1948), 61-72.

²⁵⁷ Lizete Oliveira Kummer, ‘A medicina social’, (unpublished UFRGS Masters dissertation, 2002); Felipe Almeida Vieira, ‘Fazer a classe’, (unpublished UFRGS Masters dissertation, 2009); Bottini, ‘No cinquentenário’, p. 61. For different interpretations of the motivations behind the creation of the Faculty of Medicine, see Weber, ‘Positivismo’, pp. 583-601; Tatiana Pereira Gomes, ‘Entre a prática e a ciência’, (unpublished UFRGS Undergraduate dissertation, 2009).

²⁵⁸ Kummer, ‘A medicina social’, p. 78.

abolished.²⁵⁹ Not surprisingly, several members of the Medical Association of Rio Grande do Sul were also professors of the Faculty of Medicine, where “official” titles were issued, as discussed in the next section.

2.4 – Articulating sites: Local ramifications of the Faculty of Medicine of Porto Alegre

By studying the career pathways of almost a hundred members of the Medical Association of Porto Alegre, the historian Felipe Almeida Vieira demonstrated the close links between former students and professors of the Faculty of Medicine and the Association.²⁶⁰ For example, more than eighty per cent of the founding members of the Association were Faculty of Medicine alumni. His conclusion was that the Association was a vehicle through which the political and social interests of the Faculty of Medicine Chairs were articulated. Vieira concedes, for instance, that not all members of the Medical Association insisted that it was necessary to define who should be allowed to practice medicine. However, though internal dissent might have existed, the control and monopoly of the medical field was an everlasting aspiration of its members.²⁶¹

A further bill passed in 1932 is evidence of the recurrent pressure and political lobbying done by the Faculty of Medicine through the Medical Association, whereby they regulated the medical profession in Rio Grande do Sul. The bill demanded academic training as a prerequisite and determined that the State Department of Health would enforce the respect of the law. From 1938 onwards, the Department of Health of Rio Grande do Sul relied on the help of the police to search for and physically evict medical practitioners who were not following the new directive.²⁶² Unregulated practitioners, nevertheless, continued to exist into the 1940s, forcing

²⁵⁹ *ibid.*: p. 80.

²⁶⁰ Vieira, ‘Fazer a classe’, pp. 56-177.

²⁶¹ *ibid.*

²⁶² Kummer, ‘A medicina social’, p. 100.

the Medical Association to continue to patrol the boundaries of the medical profession. A new development during the years leading to nationalisation was that some of these unregulated physicians managed to secure mandates from the judicial system to practice medicine.²⁶³ In 1945, a two-page editorial of the Medical Association journal revealed the on-going conflict between non-academic practitioners and degree holding physicians. The current fees paid to unlicensed practitioners, considered to contradict ‘the most elementary principle of justice and collective dignity’, were frequently the same and sometimes even higher.²⁶⁴ It was argued that licensed ‘physicians [...] could no longer ask for a fair and reasonable payment for their services. That is so because they must compete with a vast and restless army of decadent and unscrupulous quacks, naive and ignorant health workers, technicians and attendants’.²⁶⁵

In the constant struggle by members of the Medical Association and the Faculty of Medicine to establish what was proper medical knowledge and what was not, the use of the word *Science* acquired an important meaning. In the early 1940s, it was common to use the word *science* to oppose what was called *empiricism*. Whereas *science* meant established knowledge that was taught at the Faculty of Medicine, empiricism indicated an erratic trial and error method that had no criteria and was thus potentially harmful.²⁶⁶ The work of unregulated midwives, for instance, was empirical because it relied only on their informal and unsupervised experience. On the other hand, when a physician with a degree presented the results of his works at a conference, he was making a scientific contribution to his specialty.²⁶⁷ Yet this *science* did not necessarily resemble what is today called biomedicine. A literature survey presented by a professor was already considered a scientific work. A joint session of different

²⁶³ Vieira, ‘Fazer a Classe’, p.106.

²⁶⁴ ‘O desprestígio da classe’, *R.M.R.S.*, 2 (1945), 1.

²⁶⁵ *ibid.*

²⁶⁶ Kummer, ‘A medicina social’, pp. 12-100.

²⁶⁷ As described in Costa, ‘A luta contra a tuberculose’, p. 7.

specialists working in a hospital on the same case was called a scientific investigation.²⁶⁸ Professors in the Faculty of Medicine were expected to teach science –though this would today be called general knowledge – to their students.²⁶⁹ At the time, the word used to describe what today is associated with scientific laboratory work was *technical*. When a laboratory was built in Porto Alegre, *technical requirements*, which we would call scientific requirements today, were said to have been met.²⁷⁰

Academic activities that could be considered similar to experimental practices in the Faculty of Medicine of Porto Alegre were carried out in the wards of the *Santa Casa de Misericórdia* Hospital. Chair holders also doubled as heads of wards in the *Santa Casa*, which was run by a Catholic congregation. The *Santa Casa* remained the only teaching hospital of the University of Porto Alegre until the late 1950s, when additional funds that were made available as a result of nationalisation enabled the inauguration of a new university hospital. The historian Felipe Vieira has argued that the *Santa Casa* Hospital was part of the strategy for hegemony carried out by physicians linked to the Medical Association and Faculty of Medicine. Headships of the *Santa Casa* wards were hereditary: when a head surgeon or a ward chief retired, his son was given priority, enabling him to take up the position. If there were no next of kin available, another physician already at the *Santa Casa* was given priority over outsiders. Therefore, members of the Medical Association controlled both the Faculty and the *Santa Casa*, which was the larger hospital of Porto Alegre and also the main teaching centre for medical students.²⁷¹

²⁶⁸ Ernesto de Souza Campos, 'Centro médico', *Anais da Faculdade de Medicina de Porto Alegre*, 1 (1938), 24-37.

²⁶⁹ Armando Câmara, 'Discurso do Professor Armando Câmara', *Anais da Faculdade de Medicina de Porto Alegre*, 7 (1946), 5-8: p. 7.

²⁷⁰ W. P. Oliveira, 'Defesa e Controle da Peste Suína no Rio Grande do Sul', *B.D.P.A.*, 8 (1952), 21-31.

²⁷¹ This combination of factors proved successful. In the 1930s, when two other Faculties of Medicine were created, the Medical Association managed to force them to close down and transfer the students to the Faculty where its members taught, see Vieira, 'Fazer a classe', pp. 56-95.

Public Health, one of the areas usually associated with laboratory work in Porto Alegre, as Faillace and Primio's work will demonstrate, had low priority in the *Santa Casa*. In the case of tuberculosis, for example, there were only two nurses in the *Santa Casa* trained to treat patients with that disease.²⁷² The hospital did not keep track of the geographical origins of patients admitted with communicable diseases. This was basic information for epidemiological studies and, as documented below, it was collected by the State Department of Health.²⁷³

²⁷² Daiane B. Bittencourt, 'Os tratamentos da tuberculose', in Luiz Gustavo Guilhermano et al. (eds.), *Páginas da história da medicina*, (Porto Alegre, 2010), pp. 213-26: p. 215.

²⁷³ Moysés Hodara, 'Estudo da epidemia tuberculosa no Rio Grande do Sul', *R. M. R. S.*, 9 (1953), 439-47.

Case Study Three – Medical Entomology at the Faculty of Medicine of Porto Alegre – Raul di Primio and the Chair of Parasitology

The use of DDT and BHC against Malária and Chagas disease Vectors in Rio Grande do Sul.

In 1943, a group known as the Mosquito Foci Police, specialised in combatting malária and yellow fever vectors, was created in Porto Alegre. The Mosquito Foci Police was responsible for labour intensive activities such as the spreading of larvicides (usually a mineral oil) in mosquito-breeding water deposits; the inspection of potential breeding sites, including buildings, manholes, household drains and wells; the listing of terrains covered with stagnant water to be filled with sand; and the introduction of predatory fish in places where mosquito larvae could be found but where chemical substances could not be used to destroy them, like streams feeding potable water pipes. There were sixty-eight full-time workers in the field in charge of these tasks for five days a week.²⁷⁴ In Porto Alegre, these individuals visited almost eight thousand buildings per year and registered more than 150,000 interventions.²⁷⁵ The Mosquito Foci Police provided the same services as those administered by the National Service of Malária Eradication in Rio de Janeiro. The existence of an independent service, established to fight malária in Porto Alegre, reflected the local culture of retaining essential services instead of handing them over to the central government.

The initiatives in the fight against malária and Chagas disease in the countryside were a different matter. As with other activities of the State Department of Health, it had been expected that the establishment of the Mosquito Foci Police would be imitated by city councils throughout the state. However, the Federal Government in Rio de Janeiro continued to man field posts in charge of tasks similar to those being carried out by the Mosquito Foci Police. In

²⁷⁴ Halley Marques, 'Serviços especiais', *Arquivos do Departamento Estadual de Saúde*, 5 (1944), 156-9.

²⁷⁵ *ibid.*

the early 1940s, for instance, more than nineteen kilometres of flooded areas were drained.²⁷⁶ Therefore, city councils in the state could rely on the central government rather than investing directly in prophylactic initiatives against malária and Chagas disease. Officials from the State Department of Health were aware that not all towns would expect Porto Alegre to provide services to fight malária.

After the inception of organochlorine pesticides in 1945, the state of Rio Grande do Sul was among the areas in which the Malária National Service directly administered DDT on a large scale. Just like neighbour states, Rio Grande do Sul acquired the pesticide directly from manufacturers, and the Federal Government sent spray teams to administer it.²⁷⁷ Although it is difficult to assess the exact quantity used in the countryside of Rio Grande do Sul, it is calculated that during the 1940s the Malária National Service oversaw the administration of thirty-one million litres of DDT solution.²⁷⁸ Rio Grande do Sul bought some of this, which was distributed to the seventy-six field stations of the Federal Government in the state.²⁷⁹

It is noteworthy that the State Department of Health of Rio Grande do Sul did not become directly involved in the administration of pesticides outside Porto Alegre. However, as will be demonstrated below, through the work of Raul di Primio, the State Department of Health could still oversee the action taken by federal employees. To do this they used their own research on the way in which pesticide administration affected the geographical distribution of malária and Chagas disease vectors; these issues were not directly related to the prophylactic measures being handled by the Federal Government in the countryside.

²⁷⁶ Barreto, 'A saúde pública no Brasil', *B.O.S.P.*, 21 (1942), 849-59, p. 851.

²⁷⁷ There is evidence that the state had authorised the purchase of the pesticide between 1945 and 1946 see Getúlio Vargas and Gustavo Capanema, 'Decreto-Lei Nº 8.007 de 27 de Setembro de 1945', *Diário Oficial da União*, (29 Sept. 1945), 15508; 'Seção 1', *Diário Oficial da União*, (7 Jan. 1946), 1414.

²⁷⁸ 'Seção 1', *Diário Oficial da União*, (17 Nov. 1950), 16568.

²⁷⁹ Barreto, 'A saúde pública no Brasil', *B.O.S.P.*, 21 (1942), 849-59, p. 852.

Research Practices of the Parasitology Chair

Studies on vectors of malária and Chagas disease took place in the State Department of Health Parasitology Laboratory located in Porto Alegre. This research site is an important point of reference as the professional trajectory of Raul di Primio, holder of the Parasitology Chair at the Faculty of Medicine of Porto Alegre, was closely associated with its activities. Primio completed his medical studies at the National Faculty of Medicine in Rio de Janeiro in 1919. Unlike most medical students at the time, he wrote a final year thesis that enabled him to pursue an academic career. The topic he selected was the microscopic study of food fibres in faecal material.²⁸⁰ Although for most of his career Primio focused on entomological studies, his first contact with basic research had a lasting influence on his future interests. During the 1950s, he continued to publish in the area of microscopic analysis, producing a series of works centred on the identification of specific food fibres.²⁸¹

Upon completing his undergraduate degree, Primio enrolled in a Master's programme offered by the Oswaldo Cruz Institute. Among his tutors was the parasitologist César Pinto, one of the main figures in the contemporary Brazilian School of Tropical Medicine. It was César Pinto who influenced the early phase of Primio's research work. For instance, Primio wrote his Master's dissertation on a protozoa group, the *Apicomplexa*, which had been studied by Pinto.²⁸² Pinto had also written several papers on Chagas diseases and malária, two areas to which Primio would dedicate himself in the future.²⁸³ But Primio's first job following the completion of his Master's was not in medical entomology. He first worked as an assistant to

²⁸⁰ R. Di Primio, 'Do reconhecimento microscópico dos resíduos fecais de origem alimentar', (unpublished Faculty of Medicine Ph.D. thesis, 1919).

²⁸¹ For examples, see R. Di Primio, 'Quinta contribuição para o reconhecimento microscópico dos resíduos fecais de origem alimentar', *Anais da Faculdade de Medicina de Porto Alegre*, 14 (1954), 17-24; R. Di Primio, 'Sexta contribuição para o reconhecimento microscópico', *Anais da Faculdade de Medicina de Porto Alegre*, 15 (1955), 60-95; R. Di Primio, 'Sétima contribuição para o reconhecimento microscópico', *Anais da Faculdade de Medicina de Porto Alegre*, 16 (1956), 78-85.

²⁸² R. Di Primio, 'Contribuição para o estudo das hemogregarinas brasileiras', (unpublished Fiocruz Masters dissertation, 1925); César Ferreira Pinto, 'Contribuição ao estudo das Gregarinas', *M.I.O.C.*, 15 (1922), 84-108.

²⁸³ Carlos S. Lacaz, 'César Pinto (1896-1964)', *Journal of the Institute of Tropical Medicine*, 6, (1964) 300-1.

the physician and researcher Werneck Machado in a leprosy hospital in Rio de Janeiro. Machado was a specialist in that area and worked on several research projects focusing on the aetiology and treatment of the disease.²⁸⁴ Following his work with Machado in Rio de Janeiro, Primio arrived in Porto Alegre in the mid-1920s to work as a technician in the Secretariat of Hygiene at the State Department of Health until he was recruited as Assistant Professor at the Faculty of Medicine.²⁸⁵ Between 1931 and 1933, Primio carried out his first field work in Rio Grande do Sul with his former tutor César Pinto from the Oswaldo Cruz Institute.²⁸⁶ Pinto had been invited to Rio Grande do Sul by the Secretary of Public Health for a friendly visit. Pinto and Primio visited several towns in search of the vector of yellow fever, the identity of which was still unknown in the state.

The influence that Pinto had on the early phase of Primio's career is fundamental. Pinto introduced him to the practices of a school of research that flourished before the introduction of organochlorine pesticides. Instead of considering the wholesale administration of pesticides, Cesar Pinto belonged to a generation of scientists whose approach to the malária problem included a broad range of elements. For example, Pinto usually identified the different vectors, their geographical distribution and, in some cases, even the morphology of the captured insects.²⁸⁷ He also paid attention to the human side of insect outbreaks. Who were the individuals most infected? What were their living conditions? In what age, sex and ethnical group were most cases found? These were the sort of questions that guided his entomological work.²⁸⁸ Pinto's approach demanded large-scale collaborative work. Entomological expeditions, for example, included activities ranging from the medical examination of people

²⁸⁴ Jaime Benchimol and M. Sá, 'Adolpho Lutz and the controversies over the transmission of leprosy by mosquitoes', *História, Ciências, Saúde-Manguinhos*, 10 (2003), 49-93; Dilma Fátima, 'Entre ideias e ações', (unpublished UFF Ph.D. thesis, 2007).

²⁸⁵ Rosemary Fritsch Brum, *Caderno de Pesquisa*, (São Luiz, 2009), p. 141.

²⁸⁶ César Ferreira Pinto, 'Alguns mosquitos', *Revista Medico-Cirurgica do Brasil*, 51 (1932), 3-27.

²⁸⁷ César Ferreira Pinto, 'Epidemiologia da doença de Carlos Chagas', *M.I.O.C.*, 44 (1946), 363-400.

²⁸⁸ *ibid.*

to the testing of blood samples from humans and animals.²⁸⁹ This required a team of researchers with different kinds of expertise, helping entomologists to focus their enquiry. Medical entomology required team work that not only called for organisational skills from expedition leaders, but also for expert knowledge to investigate social and sanitary conditions. The picture that resulted from these expeditions, described in the literature available in Porto Alegre, was multidimensional and revealed the epidemic stage that malária and Chagas disease had reached in many parts of Brazil's countryside.²⁹⁰

Although Primio did not co-author Pinto's article about their expedition, working with the former Director of the Oswaldo Cruz Institute gave Primio the confidence to incorporate features of his tutor's methodology into his own work. For example, in one of his papers on the American phlebotomine sand flies, he emphasised fieldwork, an important feature of Pinto's methodology, as opposed to conducting a purely taxonomical analysis.²⁹¹ Sand flies transmitted the protozoa *leishmaniasis* and were still little known in Rio Grande do Sul. To capture and study them, Primio spent days in remote areas of the countryside, most of the time alone, and until the 1990s he would be the only researcher to have identified sand flies in Brazil.²⁹² In a further paper published in 1937, attention to geographical distribution, another aspect of Pinto's methodology, was also present.²⁹³ Primio devoted detailed attention to the conditions, time of year, temperature, latitude and longitude where the insects described were captured. In this early work, he also drew a map of the state to assist his readers in visualising

²⁸⁹ For example Lauro Travassos and J. F. Teixeira Freitas, 'Relatórios da sexta excursão do Instituto Oswaldo Cruz', *M.I.O.C.*, 37 (1942), 259-286.

²⁹⁰ *ibid.*

²⁹¹ His first work on the topic was R. Di Primio, 'Sobre a presença do *Phlebotomus fischeri* Pinto', *Revista Cursos Fac. Medicina de Porto Alegre*, 18 (1932), 141-9.

²⁹² Edelberto Santos Dias, Ada L. Falcão and João E. Silva, 'Notes on the sand fly fauna (Diptera: Psychodidae)', *M.I.O.C.*, 92 (1997), 329-32.

²⁹³ Di Primio, 'Sobre a presença do *Aedis Aegypti* em Porto Alegre'.

the places of capture; entomological cartography would, in fact, characterise his approach over the following decades.²⁹⁴

From sand flies Primio moved to mosquitoes; first the species *Aedes aegypti*, vector of dengue and yellow fever. Primio reiterated that his motivation for studying that particular species was that it was found in other countries at the same latitude as Rio Grande do Sul. Geography was again important in his work, not only when he spatially identified the places in which he made his captures but also for understanding the influence of altitude, humidity, wind strength and other variables; these factors were carefully described as a means of understanding insect behaviour and distribution. In this work, Primio achieved another milestone by being the first to identify the *Aedes aegypti* in Porto Alegre.²⁹⁵

In 1937, Primio began studying the family *Culicidae* – which included mosquitoes from the genus *Anopheles*, vectors of malária – and wrote a report about the identification of several specimens in the countryside.²⁹⁶ Again, geographical distribution was an important aspect of his work. One of his main conclusions was that current means of transportation introduced the insects to areas where vectors were previously unknown. He pointed out that because the locations he studied had low average temperatures and there were no data pointing to neighbouring areas affected with malária vectors, it was possible to conclude that they had been introduced through transportation from regions in which the same species had been identified. Geographical location in this case was the key to understanding the aetiology of the disease.²⁹⁷ Over the years, as Primio focused more on geographical distribution, he was increasingly

²⁹⁴ R. Di Primio, ‘Os flebotomos do litoral do Rio Grande do Sul’, *Arquivos Rio Grandenses de Medicina*, 16 (1937), 475-82.

²⁹⁵ Di Primio, ‘Sobre a presença do *Aedis Aegypti* em Porto Alegre’.

²⁹⁶ R. Di Primio, ‘Alguns culicídeos do Rio Grande do Sul’, *Arquivos Rio Grandenses de Medicina*, 4 (1935), 305-14.

²⁹⁷ R. Di Primio, ‘Em torno de alguns transmissores de doenças’, *Arquivos Rio Grandenses de Medicina*, 7 (1937), 305-14.

critical of authors who disregarded the precise identification of the location in which insects had been captured.²⁹⁸

It is noteworthy that data about geographical distribution of vectors was extremely useful for city councils wishing to coordinate and plan prophylactic campaigns together with the central government. Until 1945, the services provided by the National Service of Malária Eradication, for example, were part of a standard procedure applied to the entire country. Any specific adaptation to local particularities depended on research carried out by locals. Primio's focus on geographical distribution coincided with the on-going rationale of the State Department of Health, which was to coordinate public health actions throughout the state. In the late 1940s, when the federal government was allowed to spread DDT in the countryside, the study of the geographical distribution of vectors became very useful. The information provided public health officers of city councils with an overview of what was being accomplished. In this sense, Primio's studies represented a way of independently controlling the actions of federal personnel in Rio Grande do Sul.

²⁹⁸ R. Di Primio, 'Distribuição geográfica do *Pastrongylus Megistus*', *Anais da Faculdade de Medicina de Porto Alegre*, 15 (1955), 39-58.

The troubled decade: Primio in the 1940s

Although several aspects of César Pinto's methodology may be found in the early phase of Primio's career as a researcher, on his second visit to Porto Alegre Pinto would exert a somewhat negative effect on Primio's early enthusiasm for research on medical entomology. Unlike Pinto's previous trip, which had so positively influenced Primio's works, Primio's career took a new direction following Pinto's second visit. After the first informal invitation, the government of Rio Grande do Sul decided to hire Cesar Pinto for twelve months to organise the Laboratory of Parasitology in the State Department of Health. At that point, Primio was still working in the Secretariat of Hygiene. Beyond directing the laboratory, the government of Rio Grande do Sul sponsored Pinto's own research in the state. As soon as César Pinto arrived, there were signs of open rivalry between the two researchers. The first evidence that suggests a conflict between Primio and Pinto can be found in the thesis written by Alfredo Silveira Netto in 1940. Silveira Netto aspired to the chair of Parasitology at the Faculty of Pharmacy, and he dedicated his thesis to César Pinto, whom he identified as having been extremely supportive while at the Laboratory of Parasitology. Silveira Netto set out to update and expand all the existing knowledge about the geographical distribution of the malária mosquito family in the state.²⁹⁹ He paid little attention to insect control; for example, he briefly explained that they were attempting to grow predators of mosquito larvae in César Pinto's laboratory. Netto's main concern was actually the taxonomical classification and the precise definition of the geographical distribution of malária vectors in Rio Grande do Sul. It was in this area that Silveira Netto directly questioned Primio's basic skills as a medical entomologist.³⁰⁰ The first criticism went against what he considered to be a basic classification mistake. Silveira Netto argued that Primio had 'placed the mosquito *Anopheles Cruzei* under the subfamily

²⁹⁹ Alfredo Silveira Netto, 'Mosquitos do Rio Grande do Sul', (unpublished Faculdade de Medicina de Porto Alegre Parasitology Chair admission's thesis, 1940), p. 10; César Ferreira Pinto, Alfredo Silveira Netto and Hally Marques, 'Mosquitos do Rio Grande do Sul', *Arquivos do Dept. Estadual de Saúde*, 1 (1940), 15-52.

³⁰⁰ Silveira Netto, 'Mosquitos do Rio Grande do Sul', p. 60.

Culicidae!'.³⁰¹ To Silveira Netto, this was an inexcusably basic mistake, because that mosquito was the best-known vector of malária. Of all the species, this one in particular should be known by the holder of a parasitology chair. The problem, Silveira Netto pointed out, was that the *Anopheles Cruzi* belonged to the subfamily *Anophelinae*, and not *Culicidae*. Silveira Netto then added that: '...regarding the [species] *Aedes (O) fulvus*, it is likely that Dr. R. di Primio misclassified it, believing that it belonged to Porto Alegre dipteral fauna'.³⁰²

The second accusation against Primio was even more serious. Silveira Netto argued that there was evidence of plagiarism in Primio's work. This time Primio's judgment was juxtaposed to Pinto's work. Silveira Netto argued, 'two species [...] identified by Dr. R. di Primio were not found by Cesar Pinto among the 2,700 specimens he identified during an entire year's work [...] therefore I believe that one of these species has been identified by another specialist whose name Dr. R. di Primio omitted.'³⁰³ Silveira Netto then indicated the exact pages where evidence of plagiarism could be found in Primio's work; this suggests that Netto had meticulously scrutinised it.

This was not the only direct accusation against Primio because Netto also focused on the thesis that had secured Primio's position at the Chair of Parasitology.³⁰⁴ More importantly, as Pinto had closely helped Silveira Netto, his comments suggest that Pinto agreed with Netto's assessment; a public disagreement of such magnitude was rare among the small and close knit medical community, and, for this reason, it was potentially damaging to both the reputation of the Faculty of Medicine and Primio.³⁰⁵ Silveira Netto's open criticism also suggests that whereas Primio might have been alone as the local specialist in medical entomology until the 1930s, with the arrival of Pinto the local scene changed. Pinto's role in Porto Alegre cannot be

³⁰¹ Exclamation mark according to original, see *ibid.*

³⁰² *ibid.*, p. 10.

³⁰³ *ibid.*, p. 10.

³⁰⁴ R. Di Primio, 'Reservatórios de protozoários', (unpublished Faculdade de Medicina de Porto Alegre Parasitology Chair admission's thesis, 1938).

³⁰⁵ Silveira Netto, 'Mosquitos do Rio Grande do Sul'.

underestimated. He brought with him the reputation of the Oswaldo Cruz Institute and was later credited with the creation of ‘a School of Parasitology in Rio Grande do Sul’.³⁰⁶

Though incursions into the field of malária and Chagas disease in Rio Grande do Sul was subjected to the close scrutiny of renowned specialists, at least through their pupils, Primio’s academic career was going well. Students, for instance, held him in high regard. In 1937, one of his classes bought a plaque to pay homage to him. The plaque was placed in the Faculty of Medicine and was unveiled at a ceremony in which speeches were read in the presence of high-ranking academics, including the vice-chancellor.³⁰⁷ In addition, other professional and social activities took Primio away from his research. He was a member of the Medical Association and of the editorial board of its journal, *Arquivos Rio-Grandense de Medicina*.³⁰⁸ In addition, Primio became involved in a project to build a hospital for leprosy patients.³⁰⁹ He had worked with leprosy cases immediately following his graduation and, in Porto Alegre, he helped to gather funds to build the first hospital for leprosy patients in the state.

In addition to his teaching duties and personal projects, Primio gradually became more involved in projects close to the Secretariat of Hygiene in the State Department of Health. Some of these projects did not directly involve research. For example, he helped to organise and teach training seminars for hygienists of the State Department of Health. The content of his lectures reveals the broad range of topics he had to master to be able to teach a well-informed audience. He began exploring the morphology and action of pathogenic agents that caused various

³⁰⁶ Ibid.: p. 3. In fact, other physicians tried to replicate his methodology, see D. T. Clausell, ‘Doença de Carlos Chagas’, *Arquivos Rio Grandenses de Medicina*, 20 (1942), 105-10.

³⁰⁷ Brum, *Caderno de Pesquisa*, p. 536.

³⁰⁸ Vieira, ‘Fazer a classe’, p. 68; Lisboa de Azevedo, ‘Relatório da Sociedade de Medicina de Porto Alegre’, *Arquivos Rio Grandenses de Medicina*, 16 (1937), 227-31. Most of Primio’s early works were published in the Medical Association journals, see Di Primio, ‘Alguns culicídeos do Rio Grande do Sul’; Di Primio, ‘Sobre a presença do *Aedes Aegypti* em Porto Alegre’; Di Primio, ‘Os flebotomos do litoral do Rio Grande do Sul’; Di Primio, ‘Em torno de alguns transmissores de doenças’.

³⁰⁹ Juliane C. P. Serres, ‘Memórias do isolamento’, (unpublished Unisinos University D.Phil. thesis, 2009), pp. 67-78; Costa, ‘Administração sanitária’, p. 208; Ana Z. S. Cunha, ‘Hanseníase’, (unpublished UNISC Undergraduate dissertation, 1997), pp. 59-60.

diseases, such as malária and Chagas disease, and conducted research on amoebae and Schistosoma. Primio used his own experience to add details, particularly those concerning the aetiology and prophylaxis of malária and Chagas disease. In his lectures, Primio also discussed the ways in which epidemiological studies could be carried out on those parasites and prophylactic alternatives.³¹⁰ Holding seminars for hygienists was an activity that secured Primio a highly visible and well-regarded position in the State Department of Health without having to risk an open confrontation with any of Pinto's pupils. Primio only resumed his work on Chagas disease after Pinto returned to Rio de Janeiro in 1946.³¹¹

After nationalisation, Primio became one of the most prolific professors of the Faculty of Medicine of Porto Alegre. To understand this new phase of his career, however, it is necessary to consider his formative years described above. For example, he continued to work alone, as he had in his fieldwork to collect data for his first papers. He also avoided discussions on pesticide efficacy, even as several of his peers tried to understand its impact on malária. Finally, geographical distribution continued to be one of his main interests and an aspect on which he became an expert. All of these elements were present in his methodology before the 1940s and will help to understand the direction of his works after nationalisation.

³¹⁰ Dornelles, 'Decreto 993'.

³¹¹ While director of the Public Health Department, Faillace, declared that the person in charge of the Parasitology Department returned to Rio de Janeiro in 1946. Jandir Maya Faillace and Eleyson Cardoso, 'Laboratórios de Saúde Pública', *Arquivos do Departamento Estadual de Saúde*, 5 (1944), 179-89; Faillace did not mention Pinto by name, but it is likely that he was referring to him; there is also evidence that Pinto was teaching full-time in São Paulo after that date, see Lacaz, 'César Pinto (1896-1964)'. In addition, there is evidence that Pinto carried out other research projects in different parts of Brazil, see César Ferreira Pinto, 'Um ano de combate', *M.I.O.C.*, 40 (1944), 209-340; César Ferreira Pinto, 'Disseminação da Malária pela aviação', *M.I.O.C.*, 34 (1939), 293-430.

Case Study Four – Jandyr Maya Faillace and the Chair of Hygiene of the Faculty of Medicine of Porto Alegre

The context of tuberculin use in Porto Alegre

From around the late 1930s, the medical community of Porto Alegre gradually came to agree that the priority in tuberculosis studies should be the investigation of *how* to treat the disease and no longer *where* to treat it.³¹² The ‘how’ question could be answered with new technologies such as abreugraphy and tuberculin testing. The abreugraphy – or mass miniature radiography – for instance, was recognised as a breakthrough because it would identify the disease in its early stages when clinical signs were still elusive. Abreugraphy thus partially answered the ‘how’ question by helping specialists to treat the disease in its early stages.³¹³ Tuberculin testing also answered the ‘how’ question when it was administered in combination with the BCG vaccine, which immunised infants against tuberculosis meningitis.³¹⁴ BCG was considered an effective tool to tackle tuberculosis in the long term, as it would secure the future for generations who would grow up without the disease. Tuberculin, in this context, would provide evidence that infants had been effectively immunised by the vaccine, to be confirmed by a positive reaction after its administration.

³¹² Helmuth Weinmann, ‘Atas’, *Arquivos Rio Grandenses de Medicina*, 15 (1936), 700-7.

³¹³ J. Carvalho Ferreira, ‘O controle do pneumotórax pela Roentgeonfotografia’, *Arquivos Rio Grandenses de Medicina*, 21 (1943), 343-6.

³¹⁴ In Porto Alegre, the use of surgical procedures in tuberculosis cases was also increasingly debated among local surgeons. Nevertheless, important differences exist when the debates in Porto Alegre are compared with what took place in Curitiba. In Porto Alegre, the interest in surgical procedures started much earlier than it did in Curitiba. By 1937, local physicians already presented papers based on personal experience and well-informed literature discussions at the Medical Association. The second important difference was that surgeons interested in tuberculosis occupied Chairs of Surgery at the Faculty of Medicine. These individuals were ward chiefs at the Santa Casa Hospital where tuberculosis patients usually arrived with such advanced stages of the disease that surgeons chose to remove the infected lung. This procedure was called pneumothorax and was practised in the Santa Casa. It is important to notice, however, that the methodology originated with surgeons and not physicians involved with public health policies. The high prevalence of severe cases created more opportunities for surgeons to practice the complex procedure for pneumothorax. For this reason, these procedures were not exclusively aimed at contributing to prophylactic strategies, see Jacy Carneiro Monteiro, ‘Discurso de posse’, *Anais da Faculdade de Medicina de Porto Alegre*, 5 (1944), 5-15. In Curitiba, surgical procedures for tuberculosis cases were studied by the Phthisiology Chair, as will be explained in detail in Chapter Five.

In Rio Grande do Sul, the administration of tuberculin and the surveys based on abreugraphy tests were a prerogative of the State Department of Health. The Department attempted to maintain a well-organised epidemiological monitoring of infectious diseases in Porto Alegre, as described in the introduction to this chapter. Similarly to how the work of the Bureau of Animal Industry was conducted, human diseases were monitored with the assistance of hygiene outposts scattered throughout the countryside. A group of well trained nurses, the *visitadoras*, was at the forefront of the data collection in these outposts. *Visitadoras* meant ‘those who pay visits’ as they were expected to reach out to the population and in particular to children. During these visits, they discussed ways of avoiding diseases and treating common illnesses. When they diagnosed an infectious disease, they invited parents to take their children to a private doctor. If the family did not have enough money, the nurses would suggest that they visit one of the State Department of Health outposts.³¹⁵ Every visit was followed up by a report in which the suspicion or confirmation of a disease, as well as its treatment, were described, and this data eventually ended up in the statistics being compiled in Porto Alegre. In the case of tuberculosis, it was on the basis of the work carried out by the *visitadoras* that public health officials devised immunisation strategies that included distribution of the BCG vaccine and the administration of tuberculin to check the deployment of its resources on the ground.³¹⁶

³¹⁵ Leônidas Soares Machado, ‘Serviço de doenças contagiosas’, *Arquivos do Dept. Estadual de Saúde*, 2 (1941), 155-64.

³¹⁶ Jandir Maya Faillace, ‘A vacina B. C. G.’, *Arquivos do Departamento Estadual de Saúde*, 1 (1940), 171-8.

Faillace and The Institute of Biological Research

The research practices of Jandyr Maya Faillace were closely linked to the laboratories of the State Department of Health, which in 1948 were unified to become the Institute of Biological Research. The configuration of this institute benefitted from the experience of a researcher from Rio de Janeiro named Abdon Lins. In 1926, Lins accepted an invitation to come to Porto Alegre to organise the laboratory, but he could only stay for one year. Before leaving, he introduced a colleague to the laboratory who was also a physician, Joaquim Travassos da Rosa, and Travassos moved to Porto Alegre one year later.³¹⁷ Both directors opened a communication channel with the laboratories in Rio de Janeiro, including the Oswaldo Cruz Institute,. In fact, in 1929 Travassos would go back to Rio to become director of the Oswaldo Cruz Institute (1961-1964). Although Travassos's time in Porto Alegre was short, he managed to gain ground on what came to be called the Laboratory of Microbiology in the State Department of Health; this was where vaccines against major endemic diseases in Rio Grande do Sul, such as bubonic fever, typhus, diphtheria and tuberculosis were manufactured. One of his pupils, Jandyr Maya Faillace, took over the laboratory when Travassos returned to Rio de Janeiro, and Faillace continued Travassos's research over the following decades.³¹⁸ Faillace had been put in charge of a project that aimed to replicate the BCG strain. It was through personal contacts that Travassos managed to acquire the initial sample from the laboratory of the epidemiologist Arlindo de Assis in Rio de Janeiro; in 1927, Faillace and Travassos began the replication process.

As explained above, ideas were tested in Porto Alegre, and it was there that after carrying out tests on guinea pigs, Faillace devised a human trial that initially used a single individual. The newborn baby of a mother with tuberculosis was vaccinated with the strain

³¹⁷ Newton Neves Silva, 'Divulgação', *Revista da Associação Médica do Rio Grande do Sul*, 5 (1961), 162-73.

³¹⁸ Márcia Aiub Mello, 'Instituto de pesquisas biológicas', *Boletim da Saúde*, 15 (2001), 121-8.

produced in Porto Alegre and then monitored. When there was no sign of the disease developing despite the fact that the infant lived in a household with patients who had active tuberculosis, Faillace expanded the trial. The second experiment included 321 children, of whom Faillace was able to follow up on 104. Twelve of these children died before reaching one year of age, which, according to Faillace, was significant given that in statistical terms child mortality in Porto Alegre in the same period was 22.6 per cent; almost twice that number. The obvious flaws in this inference – for example, the fact that mortality from tuberculosis usually increased after the first year, and that the cause of death in both groups was not specified – were not noted at the time; in fact, quite the opposite was true. Faillace used these figures to justify a programme of vaccination on a scale unknown in Brazil. Initially, his goal was to administer BCG to at least twenty per cent of all newborn babies.³¹⁹ Until the 1950s, Porto Alegre remained the only town outside São Paulo and Rio de Janeiro where the BCG vaccine was produced.

Over the following years, Faillace continued to work on vaccines and considerably expanded the range of diseases for which they were produced. In the 1940s, he became head of the Laboratory of Microbiology where he personally oversaw the production of vaccines and serums to treat and diagnose diseases like typhoid fever, rabies, diphtheria, smallpox and syphilis.³²⁰ In that period, Faillace also carried out studies to produce penicillin at his laboratories. Using a methodology similar to that used previously to test the BCG, he carried out trials with 342 individuals and reported results that he described as promising.³²¹

Faillace's trajectory at the State Department of Health from a research assistant to the head of the Microbiology Laboratory occurred alongside a steady academic career and a busy

³¹⁹ This remained a goal until the late 1940s, see , J. Maya Faillace, 'A vacinação B.C.G. e seu valor na profilaxia de Tuberculose', *R.M.R.S.*, 4 (1948), 3-7.

³²⁰ Costa, 'Administração sanitária', p. 202; Faillace and Cardoso, 'Laboratórios de Saúde Pública'.

³²¹ J. Maya Faillace et al., 'Penicillin', *Arquivos do Departamento Estadual de Saúde*, 5 (1944), 215; J. Maya Faillace, 'Divisão de Laboratórios', *Arquivos do Departamento Estadual de Saúde*, 5 (1944), 132-5: pp. 134-135.

social agenda. The son of a surgeon, Faillace was a former undergraduate at the Faculty of Medicine of Porto Alegre. He became the Chair of Hygiene at the same faculty in the late 1930s, when he was already administering tuberculin tests at the laboratories of the State Department of Health. After taking over the Chair of Hygiene, Faillace became an outspoken advocate of a very strict stance within the hygienist movement. He campaigned against alcoholism and became a staunch advocate of complete abstinence. He argued that one of the problems with alcohol consumption was that parents who drank excessively gave birth to children who were ‘imbeciles and idiots’. Complete abstinence was the advice he ‘gave, praised and practised’ since it was a prerequisite of the aim of ‘infinite perfection’ that, although unreachable, was nevertheless a legitimate ‘eugenic ideal’.³²² Eugenics was one of the five main areas of the Brazilian hygienist movement, alongside the correction of malformations; the control, protection and improvement of human beings; the combat of communicable diseases and, finally, the education of children.³²³

Faillace lectured on hygienist ideas to select audiences and was, in fact, considered a specialist in his field. Besides being a member of the editorial board of the journal published by the Medical Association of Porto Alegre, Faillace was responsible for translating, reviewing and discussing foreign articles written in journals received by the Medical Association. He also represented the association by answering letters in its name. However, it is noteworthy that he never presented the results of his own works at the Association or in the Faculty of Medicine journal.³²⁴ A survey of all the issues of this journal between 1935 and 1943 reveals that discussions about tuberculosis were relatively rare and not a single article mentioned

³²² J. Maya Faillace, ‘Notas de medicina social’, *Arquivos Rio Grandenses de Medicina*, 16 (1937), 257-60.

³²³ J. P. Fontenelle, ‘A higiene no Brasil’, *1º Congresso Cultural Brasileiro*, (1940). In the 1940s, the term eugenic was commonly used by physicians without reference to racist theories, see Carlos Carone, ‘A missão do médico’, *Arquivos Rio Grandenses de Medicina*, 20 (1942), 159-64.

³²⁴ The Medical Association changed its main goal to solving problems of social medicine in the late 1930s, and it was implicit that it would act as a centre of expertise on tuberculosis, see Weinmann, ‘Atas’.

tuberculin.³²⁵ Faillace's main publication outlet was the journal of the State Department of Health.

Confirmation of Faillace's excellent reputation among his peers came in 1946 when he was made Director General of the State Department of Health. In that position, he oversaw a complete reorganisation and expansion of the State Department laboratories, transforming them into the Institute of Biological Research in 1948. By the late 1950s, the Institute would produce 250,000 doses of the BCG vaccine each year.³²⁶

Tuberculin in the field: Faillace's research practices

Until Faillace became the head of the State Department of Health in 1946, he actively studied the pros and cons of tuberculin in public health campaigns. His initiation into research on tuberculin occurred when he had to test the efficacy of the BCG vaccine replicated in Porto Alegre in the late 1920s. Faillace, his tutor Travassos, and the community of epidemiologists in Brazil were well aware of the host of problems that tuberculin presented since its inception as the main tool for testing BCG efficacy. The first trials of tuberculin in both humans and animals were not entirely successful. In human trials, there were reports that the injection had activated dormant tubercle bacilli in some patients. False negatives were also reported in the early stages of tuberculin trials. Patients with clinical and radiological signs of the disease failed to react to tuberculin. False positives also offered a challenge to early epidemiologists. Some patients reacted to tuberculin despite the fact that no other diagnostic method revealed any sign that the patient was infected.³²⁷

³²⁵ For example, J. Maya Faillace, 'Review of Sobre a alopecia marginal traumática', *Arquivos Rio Grandenses de Medicina*, 16 (1937), 141; Ulysses Nonohay, 'Travesseiros e tuberculose', *Arquivos Rio Grandenses de Medicina*, 16 (1937), 283-304.

³²⁶ Felicíssimo Difini, 'Divisão técnica', *Arquivos do Departamento Estadual de Saúde*, 5 (1944), 103-6.

³²⁷ C. F. Martin and G. D. Robins, 'On the diagnostic value of tuberculin', *The British Medical Journal*, 1 (1898), 357-9.

Across the world, as with bovine tuberculosis, these erratic results led to the inclusion of tuberculin testing in intricate and specific national prophylactic policies. Countries which extensively adopted the test, including the United States, argued that the disease could be diagnosed more quickly, more precisely and less expensively than with any other method. For example, tuberculin tests identified microscopic lesions that would escape the traditional clinical examination. Even if individuals did not have lesions but had had been in contact with infected patients, they were expected to react positively to the test.³²⁸ In Brazil, however, as in other countries, abreugraphy was preferred for being equally inexpensive but undoubtedly faster and, thus, more suitable for mass epidemiological control.

The difference between these two approaches is significant because in medical circles, as demonstrated earlier in relation to veterinary circles, American practitioners were taken to be the main authority. However, this admiration created a paradoxical situation. The United States did not adopt mass BCG vaccination for prophylaxis; instead, they used tuberculin as their main diagnostic tool. In fact, American specialists had become highly critical of BCG. Initially Brazilian researchers such as the epidemiologist Arlindo de Assis dismissed this criticism, saying that in Brazil things had to be adapted: a different social reality demanded flexibility in prophylactic campaigns. Born in Salvador in the state of Bahia, Assis moved to Rio where he eventually became director of the Viscondessa de Morais Laboratory. Assis' laboratory was the official supplier of BCG to the Brazilian government. This implied exclusive rights to distribute the vaccine to the entire country with the exceptions of São Paulo and Porto Alegre, where the vaccine was also produced. Assis was considered to be the father of the Brazilian School of BCG, and he argued that South American countries could not solve the problem of a shortage of hospital beds in the foreseeable future. BCG was the best short-

³²⁸ J. Arthur Myers, 'Eradication of tuberculosis by epidemiological methods', *American Journal of Public Health and the Nations Health*, 38 (1948), 516-24.

term solution.³²⁹ Brazilian researchers enthusiastically embraced Assis' doctrine because he had introduced BCG in Brazil as soon as test trials had ended in France around 1925. After the arrival of BCG in Brazil, Assis and his colleagues tested its safety some years before Faillace replicated the vaccine strain in Porto Alegre.³³⁰ Following successful testing on animals to prove the vaccine's safety, trials were carried out on humans. At that early stage, a reaction to tuberculin had been considered evidence of immunity. During the following two decades, physicians monitored the efficacy of the vaccine through absolute death rates. Tuberculin was mostly used to test older children who could only be vaccinated if they were non-reactors.³³¹

However, by the mid-1940s, some hygienists in Rio de Janeiro and São Paulo began to question the efficacy of the BCG.³³² After hundreds of thousands of children had been vaccinated over more than a decade, authorities expected to see some concrete results. In Rio de Janeiro, for example, the death rates as recorded during the 1940s showed no signs of decreasing even after widespread administration of BCG. The death rate of children between birth and two years of age remained steadily above 100 deaths per 100,000 infants throughout the decade.³³³ The question of how to test the efficacy of the vaccine lay at the centre of the discussion. When physicians felt pushed for results, they went back to studies on the relation between tuberculin and immunity. Again on the table was the problem that a positive reaction to tuberculin seemed to disappear in sample groups after some time. Some interpreted this as evidence that a problem with the tuberculin test occurred rather than an indication that there was a problem with the vaccine itself. Several researchers concentrated their efforts on understanding the reasons for the disappearance of the allergic reaction.³³⁴

³²⁹ Arlindo de Assis, 'Contestação final do Dr. Arlindo de Assis', *O Hospital*, 18 (1940), 230-3.

³³⁰ For a detailed description of the early stages of the introduction of the vaccine in Brazil, see Arlindo de Assis, 'Ensinamentos', *O Hospital*, 27 (1945), 529-43.

³³¹ The attention to safety was a recurrent aspect of early papers, for example, see Arlindo de Assis, 'Notas sobre a profilaxia da tuberculose', *Revista Brasileira de Tuberculose*, 7 (1938), 635-52.

³³² Arlindo de Assis and Alvimar Carvalho, 'Vacinação B. C. G. por via bucal', *O Hospital*, 18 (1940), 11-23.

³³³ Arlindo de Assis, 'A propósito do editorial', *O Hospital*, (1951), 743-5.

³³⁴ For an extensive review of the debate, see José Rosemberg, 'Contribuição ao estudo da alergia infratuberculínica', (unpublished UFF Physiology Chair admission's thesis, 1949).

This early introduction of BCG as a major prophylactic tool, combined with particular interest in the irregular reactions to tuberculin, formed the main features of what, until the late 1940s, was called the Brazilian School of BCG. In Porto Alegre, Arlindo de Assis, the leader of the Brazilian School, was constantly referenced, and decisions taken in the State Department of Health were often justified through the use of his name. This happened because Assis played an important role as the gatekeeper of the Brazilian School of BCG. He used his reputation to publicly rebuke, at times with marked ferocity, any criticism of the Brazilian strategy of mass vaccination. In 1940, for instance, he refuted the criticism of Pedro Cantonnet Blanch (1900-1988), a physician from Uruguay, who argued that any national policy in the area of tuberculosis should concentrate on expanding the number of hospital beds. Blanch criticised what he considered the overconfidence of Brazilians in their use of BCG, mainly because tuberculin tests showed that in many cases the reaction was negligible. Faillace was aware of the guidelines produced by the Brazilian School of BCG as well as the active role of Assis. What Faillace eventually accomplished in his research practices was the result of the adoption, exchange and even neglect of the ideas proposed by the school as well as his interpretation of Assis' work in particular.

The reluctance of other countries to adopt BCG and the lack of evidence from Assis that would withstand foreign scrutiny allowed Faillace to declare that people should not expect miracles from the vaccine.³³⁵ After almost twenty years of coordinating vaccination in Rio Grande do Sul, Faillace did not share the opinion held by mainstream circles that the problem of non-reaction in vaccinated groups was indicative of a problem with tuberculin. In 1948, Estela Budansky, for example, who worked under Faillace in the section of paediatrics of the State Department of Health, referred to tuberculin when declaring that there was 'no

³³⁵ Jandir Maya Faillace, 'O Serviço BCG', in Jandir Maya Faillace (ed.), *Notas sobre 18 anos de aplicação da vacina*, (Porto Alegre, 1946), pp. 5-11.

completely effective method' to verify the BCG immunisation.³³⁶ Faillace, however, seemed increasingly less enthusiastic about BCG and more confident in the efficacy of tuberculin as a diagnostic tool that could be used as the basis of prophylactic campaigns.³³⁷ In the late 1940s, tuberculin testing became a standard test in his laboratory, and he stopped working on BCG research at the same time.³³⁸ It is noteworthy that Faillace's position stemmed from his work on the frontline of the fight against tuberculosis. It was his reputation that was at stake with each dose of BCG dropped into the mouths of toddlers and newborn babies; it was also his reputation that was at stake when his laboratory produced vaccines that did not help to end the tuberculosis outbreaks that continued at alarming rates. Faillace's position in relation to BCG made him one of the earliest physicians in Brazil to make public his scepticism about the efficacy of that vaccine. This might explain the reason for his failure to engage in debates on the false negatives of tuberculin; he did not expect that BCG would, in fact, immunise one hundred per cent of those vaccinated. Faillace was aware of the on-going discussions by American researchers and knew that they considered BCG a prophylactic tool only in extreme cases; for instance, in regions where life expectancy was extremely low and tuberculosis was one of the main causes of death.³³⁹

³³⁶ Estela Budianski, 'Posição atual do B. C. G.', *Arquivos do Dept. Estadual de Saúde*, 8 (1948), 55-61.

³³⁷ Later, others would follow the same path, see José Rosemberg, 'Raphael de Paula Souza', *Boletim de pneumologia sanitária*, 7 (1999), 91-3.

³³⁸ Faillace, 'A vacinação B. C. G.', pp. 3-7.

³³⁹ The trials conducted by the American researcher Joseph D. Aronson were the most well known in Brazil. In the early 1940s, Aronson finished a six-year trial of BCG vaccination on an Indian reservation that demonstrated high rates of deaths by tuberculosis. The results of this study showed that BCG was indeed protective, and they were constantly discussed by Brazilians, including Faillace in Porto Alegre. Joseph D. Aronson and Carrol E. Palmer, 'Experience with BCG vaccine', *Public Health Reports*, 61 (1946), 802-20; Joseph D. Aronson, 'BCG vaccination among American Indians', *ART*, 57 (1948), 96-9; Faillace, 'A vacinação B.C.G.'. However, physicians outside Porto Alegre deliberately ignored the fact that Aronson's work was an exception to the general consensus that BCG should not be used on a large scale in the United States. His work was seen by other researchers in the United States to be relevant only to exceptional cases, such as the case of Indian reservations, which were extremely poor and had high death rates caused by tuberculosis. Despite these exceptions, the American policy remained, completely against BCG and in favour of tuberculin testing. In fact, an editorial in the issue in which Aronson published his research declared that the results presented thus far showed 'no valid statistical proof of long-time benefits' of BCG. 'BCG vaccination against Tuberculosis', *Public Health Reports (1896-1970)*, 61 (1946), 801-2. What is more, if Aronson's testing standards had been applied to trials being carried out in Brazil to support BCG, their weaknesses would have become clear. An observant specialist, like Faillace, would have clearly known that, for instance, Aronson used external peers to check evidence such as x-ray plates. These peers had no relation whatsoever to Aronson's main team and had no idea whether a patient had

In the 1950s, when he was no longer at the head of the State Department of Health but was still at the Institute of Biological Research, Faillace decided to divert his focus to other areas, such as sanitary education and the expansion of the production of other vaccines in his laboratory. There is little evidence that Assis and Faillace had any close collaboration in the previous decade. In 1941, Assis used the results presented by Faillace in favour of BCG because Porto Alegre was one of the few places in Brazil that reproduced the strains sent by his laboratory.³⁴⁰ But there was no reciprocity in this relationship. Faillace's argument that miracles could not be expected from the vaccine was obviously never referred to by Assis.

Whereas Faillace grew increasingly sceptical about BCG, he continued to believe in what tuberculin could offer. In 1946, for instance, he compared the tuberculin produced in Germany with the one produced by Arlindo de Assis in Rio de Janeiro in an attempt to verify which delivered more reliable results.³⁴¹ Faillace also coordinated the distribution of tuberculin kits to the outposts of the State Department of Health where they were used in epidemiological studies, reaching seventy-six per cent of the towns.³⁴² Among his priorities were the towns in the *Campanha* region, which was the most severely affected by tuberculosis in Rio Grande do Sul. For example, A.J. Andrade de Oliveira, who was in charge of the tuberculosis section of the State Department of Health based in the city of Santana do Livramento, close to the Uruguayan border, reported that tuberculin received from Porto Alegre began to be used in 1941. Initially, Oliveira used the test to study which sex was more infected among the children

taken BCG or not. In addition, the sample used by Aronson was much larger than the usual samples used in Brazil. His main study used 3,007 individuals whereas there were sometimes case studies with samples of fewer than ten people in Brazil. Aronson also used intradermal vaccines, whereas in Brazil the oral method was used. Many other differences could be pointed out, all indicating that the methodology used overseas was completely unlike what was done in Brazil. Even so, Arlindo de Assis was one of the physicians who repeated Aronson's conclusions *ad nauseum*. In one case, Arlindo de Assis used four children to draw conclusions about the efficacy of BCG, see Arlindo de Assis, 'Tuberculose domiciliar', *Separata de "O Hospital"*, 31(6):815 (Junho 1947), 36 (1949), 801-13.

³⁴⁰ Arlindo de Assis, 'Review of Faillace, J. Maya, A vacina BCG', *O Hospital*, (1941), 205.

³⁴¹ Faillace, 'O serviço BCG'.

³⁴² Faillace, 'Vacina BCG'.

he tested.³⁴³ He also used tuberculin to check the lasting effect of the BCG vaccine. Oliveira understood that while an individual reacted to tuberculin he was protected against the disease, but once the reaction disappeared, he had to be re-vaccinated.³⁴⁴

Coupled with his lack of confidence in BCG as a vaccine, Faillace's professional life also took him away from laboratory work. While he was the General Director of the State Department of Health, he turned his attention to administrative issues. He went to great lengths to raise funds for the laboratory he had helped to organise with Travassos. Production data in the 1950s would justify this effort. While the production of BCG vaccines was around 250,000 doses per year, his laboratory distributed 1.1 million doses of smallpox vaccine.³⁴⁵ He also helped to bring laboratory practices to the heart of the discussion on tuberculosis. For example, Newton Neves Silva, one of Faillace's subordinates, declared that laboratory tests could significantly contribute to the diagnosis of tuberculosis.³⁴⁶ This was exactly the opposite, for instance, of what was being said in Curitiba around the same year. Working backstage, Faillace helped research to prosper in the Institute of Biological Research. The price for this was neglect of his own research projects. He did not publish any works on tuberculin – or on BCG for that matter – during the 1950s. In view of the context discussed in this case study, Faillace certainly considered that to be a fruitless effort following nationalisation.

³⁴³ A. J. Andrade Oliveira, 'Índice de infecção tuberculosa em Livramento', *Arquivos do Dept. Estadual de Saúde*, 7 (1946), 125-32.

³⁴⁴ A. J. Andrade Oliveira, 'Considerações sobre a vacinação', *Arquivos do Dept. Estadual de Saúde*, 7 (1946), 133-6.

³⁴⁵ Silva, 'Divulgação', pp. 166-167.

³⁴⁶ Newton Neves Silva, 'Diagnóstico da tuberculose', *Arquivos do Dept. Estadual de Saúde*, 1-2 (1940/41), 125-8.

Conclusion

Tuberculin may have been only a small part of the research career of Faillace, but its analysis has opened a window to reveal the institutional settings and research cultures that characterised medical research in the capital of Rio Grande do Sul prior to 1950. Jandir Maya Faillace's interest in tuberculin arose from a major project involving the production of the BCG vaccine. Replication of the strain received from Arlindo de Assis in Rio de Janeiro was the major accomplishment of Faillace's early research career. The influence of two veteran scientists, Abdon Lins and Joaquim Travassos, was crucial at this point. They brought their laboratory experience to Porto Alegre, and Faillace continued their work by expanding the range of vaccines produced in Porto Alegre. Tuberculin was used for epidemiological studies both in Porto Alegre and, under Faillace's supervision, in the countryside. The medical use of tuberculin in Porto Alegre was, therefore, linked to two institutional environments: the Faculty of Medicine and the Institute of Biological Research. While occupying the Chair of Hygiene, Faillace also became director of the State Department of Health and expanded the facilities of the Institute of Biological Research. However, more responsibilities came with the position. Faillace expanded the production of his laboratory to tackle other diseases, and he eventually moved away from the epidemiological studies he had carried out in the early 1940s.

Raul di Primio wrote little about organochlorine pesticides when they were being introduced into the arsenal used by public health authorities in the fight against disease vectors. However, Primio's case study has not shown outright neglect of the issue, but rather it indicates a context in which, for a variety of reasons, he turned toward his academic duties and became involved with other professional projects. A focus on context has revealed that he could only have observed the major developments in pesticide use against malária from a distance.³⁴⁷

³⁴⁷ Helmuth Weinmann, Alfredo Hofmeister and Carlos Hofmeister, 'Atas - Sociedade de Medicina', *Arquivos Rio Grandenses de Medicina*, (1936), 522-36; Juliane C. P. Serres, 'É preciso cuidar da lepra', *Boletim da Saúde*, 17 (2003), 84-97: p. 93. He was also seen at the Leprosy hospital Itapua in 1942, see Fernanda Barrionuevo Proença, 'Os escolhidos de São Francisco', (unpublished PUC-RS Masters dissertation, 2005), p.120. There are

Moreover, he did not get involved in the studies on DDT efficacy that were being carried out in other faculties of medicine.³⁴⁸ After nationalisation, he resumed the research he had abandoned in the 1930s, turning his attention once more to geographical distribution, as will be seen in Chapter Five. Geographical distribution had been his main focus in the period before organochlorine pesticides, when eradication – through massive pesticide administration – was the order of the day. Geographical distribution was also the main approach to disease vectors when Primio was the main local specialist before César Pinto came to Porto Alegre.

Before 1950, an important feature of the research culture at the Faculty of Medicine of Porto Alegre was the fact that professors carried out research projects outside of the academic environment. The previous chapter has shown that this was the case with both Outubriño Correa and Ramiro Gomes da Costa, who kept their research interests separate from their academic careers. The case studies analysed in this chapter suggest a similar situation. Researchers, such as Raul di Primio, who carried out studies on disease vectors, did so in laboratories outside their respective academic departments. There is also little indication that Faillace worked to improve the interaction between his position as Chair and the environment of research at his Institute of Biological Research. This interaction could have taken place through the Medical Association, where research papers were sometimes read. However, historiography indicates that Chair holders and the alumni of the Faculty of Medicine used the association mostly as an instrument through which they could push for greater regulation of their profession. In the Faculty, the priority was not creating new knowledge but establishing a knowledge base that could be used as a mark of distinction by outsiders. In this respect, research and science acquired different meanings. They were a source of distinction as opposed

also indications that Primio might have been working as parasitology technician at a public laboratory called Oswaldo Cruz, see Vieira, 'Fazer a classe', p. 90.

³⁴⁸ For example Durval T. Lucena, 'Profilaxia da malária', *Anais do Sétimo Congresso Brasileiro de Higiene*, 1 (1949), 501-23. For a summary of research programmes carried out in Faculties of Medicine regarding pesticides, see Simone Kropf, 'Ciência, saúde e desenvolvimento', pp. 107-24.

to what was referred to as empiricism. Empiricists were equated with amateurs and practitioners who failed to attend formal courses and obtain academic status. In Porto Alegre, all Chairs in the Faculty of Medicine were scientists in the sense that they all opposed empiricism. This idea became crucial after 1950, when a scientific agenda had to be established in the new nationalised university. Research, on the other hand, was a practice that provided public health officials with the necessary tools to control, predict and administer public health campaigns. This small etymological point would make an enormous difference after 1950 because one of the changes brought about by nationalisation was the opportunity to implement scientific research programmes. However, scientific work meant different things to different groups, and it is crucial to bear in mind that for physicians this was a point of honour. They had been fighting for half a century to consolidate their public image as scientists, and any concession on this point would have to be carefully negotiated.

The second part of this thesis will demonstrate that some aspects outlined in the first two chapters were not as self-evident as they might first appear. For example, the remark that researchers in public research centres in Porto Alegre were concerned with public opinion does not apply to Curitiba, where individuals in analogous positions seemed able to remain indifferent to social pressure. Therefore, by contrasting both capitals, it will be possible to identify distinct local research cultures that would give rise to a diverse configuration of research programmes in both universities after 1950.

Chapter Three

The impact of nationalisation on the faculties of Medicine, Agronomy and Veterinary Medicine of Porto Alegre 1950-1955

Dutra's nationalisation campaign was set in motion in December 1950 and was officialised as Bill Number 1,254. One of the academic institutions mentioned in that document was the University of Rio Grande do Sul; faculties, institutes and schools incorporated over previous years from the Borges de Medeiros Institute were to be included in the nationalisation process.³⁴⁹ From that date onwards, the custody of buildings, libraries, equipment and all other assets of the University of Rio Grande do Sul was automatically transferred to the federal government. Over the following months, all employee contracts were transferred to the federal services. The name of the university was also changed; the former University of Rio Grande do Sul was now to be known as the Federal University of Rio Grande do Sul (FURGS). It consisted of seven faculties, four teaching institutes, and three higher education schools. Besides Porto Alegre, the new university had campuses in the cities of Santa Maria in the central region and Pelotas in the southern region of the state. In Porto Alegre, the Faculty of Medicine as well as the Faculty of Agronomy and Veterinary Medicine were now part of the nationalised university. Previous chapters have explored the early development of these faculties through an examination of the research practices implemented by some of their most influential representatives. The ways in which nationalisation affected these individuals from 1950 to the mid-1950s will now be analysed.

³⁴⁹ Diário Oficial [Federal Government], *Law 1254*, (8 Dec. 1950).

3.1 – Research practices of professors from the Faculty of Agronomy and Veterinary Medicine after 1950: Outubrino Correa, Emir Kober, and Ramiro Gomes da Costa.

3.1.1 – Signs of continuity: Outubrino Correa

After nationalisation, Outubrino Correa became the Chair of Veterinary Hygiene. This, in fact, only confirmed the academic role he held since the 1940s, as described in Chapter One. At the same time, Correa continued to expand the scope of his research and scientific output in the IVRDF. Between 1950 and 1955, he published twenty-two articles on four main topics: six on pesticides, six on swine parasitology, four on brucellosis, four on avian cholera and typhus, and two on other topics.³⁵⁰ Bovine tuberculosis and, as a result, tuberculin became secondary topics among his broad list of interests. He continued to warn the population about the risk of consuming raw milk, a practice that was still common in the countryside.³⁵¹ He also continued to monitor the results of the tuberculin tests that were administered throughout rural areas, which indicated a contamination level of seven per cent.³⁵² However, to a great extent, Correa also continued to ignore veterinary debates on several aspects of bTB.³⁵³ One of the reasons for his declining interest in bovine tuberculosis was that a substantial number of infected animals began to disappear from the official veterinary statistics when IVRDF's official methodology for the presentation of bTB assessment changed in the mid-1950s. During the previous decade, Correa had only used the infection percentages recorded by meatpackers to compile official statistics, and he usually presented them separately from his tuberculin testing results. His main source of information had always been the network of outposts of the Bureau

³⁵⁰ 'Nominata dos trabalhos publicados pelos técnicos do IPVDF', *Arquivos do Instituto de Pesquisas Veterinárias Desidério Finamor*, 1 (1954-55), 7-10.

³⁵¹ Outubrino Correa, 'Incidência da tuberculose', *A Granja*, 8 (1952), 91-2; 'Atividades das inspetorias veterinárias em 1950', *B.D.P.A.*, 7 (1951), 48-9.

³⁵² 'Atividades das inspetorias veterinárias', *B.D.P.A. Rio Grande do Sul*, 5 (1950), 76-7.

³⁵³ For examples of journals circulating in Porto Alegre where bTB was still discussed, see 'The bovine tubercle', *South African Medical Journal*, 28 (1954), 941-3; H. L. Ratcliffe and V. S. Palladino, 'Tuberculosis', *The Journal of Experimental Medicine*, 97 (1952), 61-8; M. B. Lurie et al., 'On the response of genetically resistant and susceptible rabbits', *The Journal of Experimental Medicine*, 95 (1952), 119-34.

of Animal Industry. The main difference between these two methods was that the number of tuberculin tests administered was usually a small fraction of the visual inspections carried out by meatpacking companies, as demonstrated in Chapter One.³⁵⁴ However, in 1956, when Waldemar Peixoto de Oliveria, a colleague of Correa in the IVRDF, published the statistics regarding bTB epidemics in the state, he presented both meatpackers' observations and tuberculin figures tests together. Significantly, he not only applied that methodology for current numbers but also rewrote previous statistics published by Correa. The end result was that a much smaller number of cases was tabulated than had been indicated by tuberculin tests only. For example, whereas Correa's studies in 1943 suggested contamination of almost ten per cent, the new methodology produced a reassuring total of 0.60 per cent.³⁵⁵ This abrupt change in figures occurred because the new methodology considered infection levels in relation to the total number of animals analysed. As tuberculin tests were administered in smaller samples, the higher percentages of contamination previously identified in tuberculin tests dwindled when compared with the results that came from the visual inspection of hundreds of thousands of animals that were slaughtered each year. In order to check the results of tuberculin tests, it was necessary to read the internal reports of the Bureau of Animal Industry known as Activities Reports. They showed that tuberculin tests continued to reveal contamination of almost five per cent, which, if extended to the entire state's herd, would represent around 500,000 animals.³⁵⁶ The altered methodology of reporting bTB caused confusion about the reach of the disease to say the least and, quite possibly, it dissuaded new researchers from studying the topic.

³⁵⁴ In some cases, the difference between the infection rate found by meatpackers and the results from the tuberculin testing of animals in the same region was significant. In a study carried out in Venezuela in 1943, the difference between tuberculin testing and inspection at meatpackers of cattle from the same region was respectively 0,19 per cent to 38 per cent, see R. Soulés-Baldó, 'El problema de la tuberculosis y la lucha antituberculosa en Venezuela', *B.O.S.P.*, 22 (1943), 992-9.

³⁵⁵ W. P. Oliveira, 'A tuberculose bovina no Rio Grande do Sul', *A Diretoria da Produção Animal e suas Realizações*, (1956), 161-3: p. 163.

³⁵⁶ *ibid.*

For Correa, there were novel frontiers to explore. His pioneering attitude is exemplified by one of his papers presented in 1954, when the Chair of Veterinary Hygiene became available. Correa applied for the position, submitting a thesis on the use of insecticides against animal parasites.³⁵⁷ He was particularly interested in myiasis, the parasitism of animals' living tissue by larvae of the blowfly *Cochliomyia hominivorax*.³⁵⁸ He admitted that no precise statistic on losses caused by blowflies in the cattle herds of Rio Grande do Sul existed, but he quoted American statistics to estimate that the insects were responsible for almost eighty-five per cent of losses caused by parasites.³⁵⁹ Correa first reviewed the work of several Brazilian veterinarians who, over previous years, tested recently launched pesticides against the larvae. BHC and DDT were among the main options, but Correa highlighted their well-known inconveniences. For instance, he argued that animals treated with DDT subsequently showed traces of the pesticide in their meat or milk. Furthermore, the high toxicity of BHC remained effective only up to three days.³⁶⁰ Correa needed a more durable product to protect wounds from new larval depositions. He also wished to kill the larvae already present in tissues without harming the animals. His original idea was to use the pesticide Toxaphene (*Chlorinated Camphene*) to achieve these results. Toxaphene arrived on the Brazilian market in 1947 and was rapidly deployed to combat cotton pests.³⁶¹ However, Correa was the first Brazilian researcher to test this pesticide for the treatment of myiasis. He undertook laboratory and field trials in the IVRDF facilities, using the institute's private herd.³⁶² In the laboratory, he successively tested different percentages of a composition he called Miíatox, created by

³⁵⁷ Outubriño Correa, 'Contribuição ao estudo da profilaxia das miíases cutâneas', (unpublished UFRGS Veterinary Hygiene Chair admission's thesis, 1954).

³⁵⁸ 'The screw-worm brought to book', *The British Medical Journal*, 1 (1934), 390.

³⁵⁹ Correa, 'Contribuição ao estudo da profilaxia das miíases cutâneas', p. 3; Among the studies quoted was Cushing and Parman, 'The screw-worm and blowfly problem', *Keeping Livestock Health*, Yearbook of Agriculture, (1952), 313-22.

³⁶⁰ Correa, 'Contribuição ao estudo da profilaxia das miíases cutâneas', pp. 5-7.

³⁶¹ M. C. Van Horn, 'New pesticides', *The Florida Entomologist*, 33 (1950), 55-61.

³⁶² In the early 1950s, the IVRDF had around seven hundred animals, see Correa, 'Contribuição ao estudo da profilaxia das miíases cutâneas', p. 53.

combining four elements: Toxaphene, water, linseed oil and a fat-soluble dye (*Sudan III*). He began by diluting Toxaphene with water and then added linseed oil (*Linum usitatissimum*) to create a protective membrane. Although the pesticide mixture was not soluble in linseed, dispersion of Toxaphene within the oil was enough to achieve the desired results if both were shaken together before administration. Finally, fat-soluble dye was added to facilitate the process.³⁶³ Different percentages of these products were then tested on hundreds of larvae from the IVRDF herd until Correa found a solution that combined the various components according to the correct measures. He began his field trials on larvae found among the cattle, swine and lambs of the IVRDF herd. After monitoring the animals for eight weeks, he reported his results: adding linseed oil to the mixture increased the adherence of the whole composition, providing up to twenty-five days' protection, and the Toxaphene not only killed the larvae but allowed the wounds to heal normally. Correa considered Toxaphene to be an effective alternative against myiasis and outlined preventive measures for successfully treating that condition.³⁶⁴ His methods demonstrated independence, originality and determination to provide a long-term solution to a major problem. These characteristics establish not only Correa's maturity as a researcher but also indicate the lasting influence of the culture of diversity that characterised the SDAIC in the previous decade.

Despite the diligence with which Correa explored specific areas, it is noteworthy that, as was his habit in the 1940s, he continued to work on different fronts simultaneously. While working on myiasis, he also attempted to come up with an original idea against the serious threat of brucellosis. This disease caused recurrent miscarriages in cows, resulting in economic and productivity losses. Correa pointed out that he had been responsible for monitoring brucellosis among the Rio Grande do Sul stock herd since 1937.³⁶⁵ In the 1950s, researchers

³⁶³ *ibid.*: pp. 11-12.

³⁶⁴ *ibid.*

³⁶⁵ Outubrino Correa, 'Incidência da brucelose bovina', *B.D.P.A.*, 13 (1956), 43-5.

were having difficulties with immunisation alternatives; the problem was that the highly effective strain used in the available vaccines, Brucella 19, was extremely unstable. There were frequent reports of virulent bacilli being found in the milk of vaccinated cattle.³⁶⁶ Correa studied an unusual yet simple alternative: the inoculation of dead strains of brucellosis bacilli into cattle. These tests implied a sequence of procedures and manipulations of highly contagious live bacilli, which were heat-killed and used to inoculate cattle.³⁶⁷ His results were published in a sequence of five articles that detailed months of research and field trials.³⁶⁸ He concluded that the 'blood serum of animals inoculated with heat-killed bacilli produced agglutinins upon contact with virulent strains'.³⁶⁹ This meant that when he injected virulent heat-killed bacilli into the animals' digestive tracts, their bodies created specific antibodies. Correa subsequently identified these antibodies in forty-five per cent of the animals tested during a seventeen to seventy-eight day period.³⁷⁰ These results suggested that heat-killed bacilli induced immunity, at least temporarily. Unsurprisingly, these results caught the attention of the veterinary community. The journal *Chácaras e Quintais*, published by the Oswaldo Cruz Institute, reprinted Correa's results and triumphantly announced that his work might resolve the problems arising from the use of Brucella 19.³⁷¹ Correa's next natural step was to try to develop a vaccine with dead bacilli which would be safer and possibly cheaper than the live one. Although he eventually abandoned this project, it is clear that Correa had the freedom to test different ideas in his position at the IVRDF in the early 1950s and to test innovative methods against a broad range of zoonosis.

³⁶⁶ M. D'Apice, 'Combate a brucelose bovina no estado de São Paulo', *Anais do 2o Congresso Panamericano de Medicina Veterinária*, 2 (1954), 113-36; M. D'Apice, 'Bases de combate à brucelose bovina', *Anais do 6º Congresso de Veterinária*, (1953).

³⁶⁷ The use of heat-killed bacillus was a standard procedure for the production of vaccines, see Arlindo de Assis, 'Standardization of the test for latent tuberculin allergy in man', *J.A.M.A.*, 124 (1944), 252.

³⁶⁸ Starting in Outubrina Correa, 'Pesquisa de aglutininas em bovinos', *A Granja*, 45 (1949), 5-6, and ending in Outubrina Correa, 'Pesquisas de aglutininas', *A Granja*, 8 (1952), 46-7.

³⁶⁹ 'Pesquisa de aglutininas', *C.E.Q.*, 80 (1949), 704.

³⁷⁰ *ibid.*

³⁷¹ *ibid.*

Regarding Correa's attitude towards his academic role, there is little evidence that he used his research work after nationalisation to unite the IVRDF and the Faculty of Veterinary Medicine. From 1953 to 1956, the IVRDF allowed university students to attend laboratory classes in the area of immunology in its facilities.³⁷² These classes were scheduled in advance and listed as 'cultural activities' at the Institute, occurring alongside visits by researchers and authorities from other states.³⁷³ When the interaction was initiated from the IVRDF to the Faculty of Veterinary Medicine the same degree of formality could be noted. Correa published a paper in the journal of the Faculty of Agronomy and Veterinary Medicine in the late 1950s, and the result was a descriptive article that might have been used as a class text.³⁷⁴ No references to experiments were made despite the fact that an extensive list of works produced by Correa in the same period reveals intense activity in both laboratory and fieldwork. When Correa was allowed to bring his research experience to the academic environment, as described below, he maintained the distinction between academic research and practices undertaken in the IVRDF.

Correa's trajectory exemplifies several features of veterinary research that existed before 1950 and after nationalisation. His interest in a variety of areas, a pattern already observed in the SDAIC in the 1940s, was still present in the first part of the subsequent decade.³⁷⁵ In the research conducive environment of the IVRDF, Correa was able to explore new areas, and he drifted away from his previous interest in tuberculin and bTB. From being the central topic of his early career, bTB became marginal to his other interests. Correa broke new ground, explored novel ideas and surpassed his peers in areas of high visibility. In the

³⁷² 'Atividades do IPVDF', 59-61.

³⁷³ Guerreiro, 'Estado atual dos trabalhos do I.P.V.D.F.', pp. 135-9.

³⁷⁴ Outubrino Correa, 'Complexo leucócito aviário', *R.E.A.V.R.S.*, 2 (1959), 29-44.

³⁷⁵ Milton Guerreiro is another example of an IVRDF employee with a diverse range of interests, see Guerreiro, 'Estado atual dos trabalhos'; Milton G. Guerreiro, 'Relatório anual 1956', *Arquivos do Instituto de Pesquisas Veterinárias Desidério Finamor*, 2 (1957), 93-101; Milton G. Guerreiro, 'Relatório anual 1957', *Arquivos do Instituto de Pesquisas Veterinárias Desidério Finamor*, 2 (1957), 103-10; Milton G. Guerreiro, 'O combate à tuberculose bovina pelo emprego do BCG', *B.D.P.A.*, 10 (1954), 43-5; Milton G. Guerreiro, 'Determinação de tipos de vírus aftoso', *B.D.P.A.*, 2 (1946), 21-32.

meantime, he maintained a conservative perspective on what could be accomplished by bringing the university closer to his laboratory practices. In addition, although nationalisation introduced changes to academia, Correa's work suggests that independent research institutes in Rio Grande do Sul, like the IVRDF, had a consolidated research ethos and institutional autonomy; these characteristics enabled them to resist the pressure to align with academia without making fundamental changes in their methods.

3.1.2 – Ramiro Gomes da Costa and the Faculty of Agronomy

If Correa's work typifies the early years of nationalisation in the Faculty of Veterinary Medicine, the same may be said about Ramiro Gomes da Costa's work in the Faculty of Agronomy. Costa was also active before 1950, and he continued to work outside the university throughout the following decade. While he held the Chair of Entomology in the Faculty of Agronomy, his work on leaf-cutter ants continued to attract extensive attention. Entomologists throughout Brazil soon realised that his method of combat, methyl bromide, was highly effective against the scourge of leaf-cutter ants. Following the publication of his first article, no less than two hundred tons of the highly toxic methyl bromide were used on Sao Paulo farms alone.³⁷⁶ Mario Autuori, considered by many to be the main specialist in leaf-cutter ants in Brazil, visited Costa in Porto Alegre to learn more about methyl bromide.³⁷⁷ Shortly after, Autuori published several articles indicating the positive results achieved through the use of Costa's technique.³⁷⁸

For the purpose of this thesis, Costa's work is also representative because of his influence on a new generation of researchers outside academic circles. In the Bureau of Plant Industry, Costa's subordinate, the agronomic engineer Emir Kober, enthusiastically joined the discussions on pesticides that occurred after 1950. Using some of the procedures deployed by Costa in his work on leaf-cutter ants in the late 1940s, Kober specialised in insect control and tested a large number of pesticides. It is worth looking briefly at Kober's studies as they typify a research programme that branched off from the academic environment in the early 1950s because of the support and guidance of an academic. In Kober's case, guidance came from Professor Costa, his supervisor at the Bureau of Plant Industry.

³⁷⁶ H. S. Lepage and Gonçalves Silva, 'Previsão de consumo de inseticidas', *O Biológico*, 17 (1951), 61-71.

³⁷⁷ 'Estudos da saúva no Rio Grande do Sul', *O Biológico*, 16 (1950), 220.

³⁷⁸ For example, Mário Autuori, '"M.M.33"', *O Biológico*, 16 (1950), 175-80.

3.1.3 – Emir Kober and the Department of Agriculture

In the 1940s, SDAIC sections were directly involved in campaigns characterised by their intensive use of pesticides. The case of locusts illustrate that researchers realised rather early that the deployment of chemicals on the ground had to be followed by skilled coordination in Porto Alegre. However, the nature of outbreaks changed in the 1950s. Rather than large outbreaks, several smaller threats occurred simultaneously. This change was related to the diversification of agricultural crops throughout the state. Emir Kober's work in the Bureau of Plant Industry began when a farmer contacted him about a particular pest permeating his property. Whereas Costa's main focus had been leaf-cutter ants, Kober tested pesticides against a variety of harmful insects. Kober's articles commonly depicted crops that were completely ravaged by insects. His experimental trials benefitted from an abundance of insects and, more importantly, of unusually receptive landowners.

Upon recognising the problem pests posed to agriculture, Kober initiated a thorough literature review on the pesticides that were being tested in several laboratories, both in Brazil and overseas. He quoted, for example, articles published by the Biological Institute in Sao Paulo – the same reference point that was central for the IBTR in Curitiba – and international journals like the *Journal of Economic Entomology*, published in the United States.³⁷⁹ The diversity of sources used by Kober differed from the tradition of Costa; Costa himself usually complained about his difficulties in finding relevant literature.³⁸⁰ Through a broader list of sources, Kober found that commercial brands, such as Toxaphene, were being used by Outubrino Correa against myiasis, and Parathion, today banned for its extremely high toxicity to humans, was being tested alongside several other products; at the time, these pesticides were

³⁷⁹ Emir Kober, 'Observações preliminares da ação de diversos inseticidas orgânicos', *Agronomia Sulriograndense*, 2 (1955), 30-40.

³⁸⁰ Ramiro Gomes Costa, 'Formigas cortadeiras do Rio Grande do Sul'.

unrestricted and therefore within the reach of farmers.³⁸¹ Invariably, however, DDT and BHC were present in almost all Kober's laboratory and field trials.

After reviewing the literature, Kober replicated experiments to test the efficacy of specific pesticides in the laboratory of the Entomology Division of the Department of Agriculture. At this stage, he used a 'vacuum dusting chamber', which served to evenly distribute precise quantities of pesticides onto plants to ensure that insects would come into contact with the product during laboratory tests. After monitoring the effect of different pesticides on insects in his laboratory, Kober selected the brands that yielded the best results for further testing on the affected crops. The main challenge at this stage was to identify the appropriate dusting method. Depending on the crop, different techniques were used. Depending on the terrain inclination, airplanes or helicopters could be used for tall trees. Kober once tested dusting by airplanes over eucalyptus farms.³⁸² For smaller trees, large pumping machines on the ground managed to dust entire orchards, from smaller branches to canopies. For ordinary plants, farm workers were instructed how to use manual dusting machines. At that point, these were used without any sort of personal protection.

The problem associated with finding the right equipment was that each pesticide had a specific composition, density and solubility; and sometimes what worked in the laboratory proved impractical in the field. For instance, on one occasion a pesticide was selected after laboratory trials mainly because it could be mixed with any dry solvent without much preparation. However, in subsequent field trials strong winds blew the mixture from the leaves, thus revealing that a substance was required to improve adherence.³⁸³ The challenge in finding

³⁸¹ Emir Kober, Observações preliminares da ação de alguns inseticidas orgânicos 1776 de síntese sobre as lagartas de Noctuidae *Agrotis Ypsilon* Rottemburg, atacando sementeiras de citrus SPP', *Agronomia Sulriograndense*, 2 (1955), 41-9. For a trial in which he tested Toxaphene see, Emir Kober, 'Experiências de campo com inseticidas orgânicos', *Agronomia Sulriograndense*, 1 (1954), 10-9: p.13.

³⁸² Emir Kober, 'Experimentação de laboratório e observações preliminares de campo', *Agronomia Sulriograndense*, 3 (1958), 45-52.

³⁸³ Kober, 'Experiências de campo com inseticidas orgânicos', p. 15.

such an adhering agent was that some pesticides were soluble only in specific mediums. For example, DDT was insoluble in water, and the usual solvent, kerosene, was prohibitively expensive to most small farmers. Also, each medium evaporated at a different temperature. Different mediums were also thought to affect the taste of certain crops, making them unsuitable. Kober could avoid dusting equipment altogether by administering pesticides using poisoned baits, like his colleagues had done in previous decade against locusts. However, the decision to use baits required a detailed study of insects' life cycles and behaviour, a practice which necessitated time: of course, time was a rare commodity when farmers faced sudden outbreaks. In one case, Kober tested poisoned baits on caterpillars attacking cassavas, but the insects emerged at dawn from subterranean shelters very close to the plant stems and missed the baits altogether.³⁸⁴

Taking into account these complex sets of variables, Kober's articles presented a distinctive feature that contrasted with Costa's assertiveness in his work on leaf-cutter ants.³⁸⁵ Kober's recommendations were usually open-ended, and he recurrently emphasised both the necessity of further work and the specific conditions within which his tests had been carried out. Another innovative aspect of his work, the use of control areas, was possibly influenced by his familiarity with external literature. In several works published in the early 1950s, Kober considered a plot or area over which pesticides were not used. Although this was a rather basic precaution, mainly adopted overseas to test efficacy, it was rare in the southern region of Brazil. In addition, Kober also inaugurated a practice he called 'blind assessment.' Kober asked his colleagues from the Department of Agriculture to count the number of dead insects collected after the administration of specific pesticides. It was considered 'blind' since the person counting the dead insects was not informed which pesticide was used.³⁸⁶

³⁸⁴ Emir Kober, 'Lagarta da mandioca', *A Granja*, 12 (1956), 52-4.

³⁸⁵ For example, see recommendations in Kober, 'Experiências de campo com inseticidas orgânicos', 20-7; Costa, 'O brometo de metila no combate a saúva'.

³⁸⁶ As for example in Kober, 'Experiências de campo com inseticidas orgânicos', p. 14.

Although Kober was clearly addressing problems much more diverse than those faced by Costa, he benefitted from the experience of the older entomologist, his immediate superior, and built a thriving research practice outside the Faculty of Agronomy. It is noteworthy that until the late 1960s at least, pesticide studies were excluded from the early academic research programmes in the faculty. Unlike his mentor, who taught until the age of seventy, Kober retired in the late 1970s, never having worked at FURGS. In the final years of his academic career, Costa began a new research project on pests that targeted stored grains.³⁸⁷ Fungi were the main problem in this field, and they occupied an entirely novel universe for Costa to explore. Assisting him was the head of the Department of Agriculture João Costa Neto, who had worked with fungi since the late 1930s and had amassed scores of literature, samples and field experience on the most damaging species in Rio Grande do Sul.³⁸⁸ In this light, both Costa and Kober were studying new areas and trying to incorporate the possibilities generated by the different pesticides into innovative research programmes. It is noteworthy that these programmes and their practices remained outside the academic environment, as they had in the 1940s, and there is little evidence of systematic studies on economical entomology in the Faculty of Agronomy of Porto Alegre before the late 1960s.

³⁸⁷ For example, Ramiro Gomes Costa, 'Malathion na defesa de grãos armazenados', *R.E.A.V.R.S.*, 2 (1957), 38-42.

³⁸⁸ For example, 'Noticiário', *Correio do Povo*, (5 Sept. 1947), 12; J. P. Costa Neto, 'Reconhecimento e controle dos fungos', *Revista Agrônômica*, 2 (1938), 118-122.

3.1.4 – The Nationalised Faculty of Agronomy and Veterinary Medicine

While researchers who were also chair holders, like Correa and Costa, continued their work outside the Faculty of Agronomy and Veterinary Medicine, some of their academic peers began to change their opinions regarding the role of research within the university. It is crucial to understand this shift because, in some cases, it led to the introduction of research practices that clearly avoided areas already studied by professors like Correa and Costa. For example, parasitology, Correa's area, and economic entomology, Costa's area, were not initially included in the discussions concerning which disciplines should be considered for academic research programmes.

The debate surrounding academic research began in the Faculty of Agronomy and Veterinary Medicine immediately after nationalisation. Opinion was clearly divided between two groups. Some believed that professors like Correa and Costa should continue to keep their research distinct from their academic duties. This group simply did not want research inside the faculty and insisted that the focus be on teaching.³⁸⁹ The traditional argument that 'a good researcher was a bad teacher and vice-versa' was strong among this group, which included the prominent figure Gastão Dias de Castro, the Dean of the Faculty of Agronomy and Veterinary Medicine.³⁹⁰ Castro argued that the role of the university was to 'attain' and 'transmit culture'. Moreover, he emphasised that courses in agronomy and veterinary medicine, in general, faced a serious decline in enrolment numbers when compared to other courses, and he feared that increasing the research output would definitely not improve this scenario.³⁹¹ To justify his position, he cited a report from a national convention of the faculties of agronomy and veterinary medicine. There, the general opinion had been that more urgent priorities must be met before faculties could invest in research; improving the conditions of students who arrived

³⁸⁹ Gaspar Dilermando Ochoa, 'Em redor do ensino das ciências naturais', *R.E.A.V.R.S.*, 1 (1955), 81- 94.

³⁹⁰ José Grossman, 'Normas gerais para apresentação de trabalhos científicos', *R.E.A.V.R.S.*, 1 (1954), 7-12.

³⁹¹ Gastão Dias Castro, 'Problemas do ensino universitário', *R.E.A.V.R.S.*, 2 (1959), 83-96; Gastão Dias Castro, 'Doze anos de administração na escola de agronomia e veterinária da URGs', *R.E.A.V.R.S.*, 2 (1959), 67-85.

ill-prepared for undergraduate work, increasing the appallingly low salaries of professors, and changing the legislation to allow full-time positions were among these priorities.³⁹²

Opposing this trend, another group emphasised the importance of research. Although Costa and Correa did not voice their opinions on the matter, some of their faculty colleagues argued that the entire system should change: their faculty could take the first step by following the examples of institutions where research already played a key role. Rodolpho Gliesh, Professor of Clinical Zoology, for instance, suggested German universities as a model; he believed that the academic research in veterinary medicine carried out in Germany should be used as an archetype for future changes in the FURGS.³⁹³ Mozart Soares, Chair of Comparative Anatomy, used an example found closer to home. He argued that different faculties in Argentina could use the same facilities to teach students from a variety of courses. Referring to the lack of communication between faculties, he emphasised that Argentineans did not demonstrate the ‘absolutist spirit’ prevalent among lecturers in Porto Alegre.³⁹⁴ He argued that if both engineers and geneticists required training in mathematics, there was no reason for students in these programs to sit in separate classes. He stated that contrary to the situation in Porto Alegre, practical classes in Argentina were mandatory whereas theoretical classes were optional; and admissions tests were generally less rigorous than their respective courses. He criticised Brazilian universities for giving a low priority to research and, more importantly, for their evident insularity. In his final remark, he identified one problem in Argentina: some of the institutions originally created to concentrate on research ended up ‘having neither the time nor the environment for organized research’. This, he concluded, was much ‘like our case here in the Faculty of Agronomy and Veterinary Medicine of Porto Alegre’.³⁹⁵

³⁹² ‘Encontro de diretores de escolas de agronomia e veterinária do Brasil’, *R.E.A.V.R.S.*, 2 (1958), 111-25.

³⁹³ Rodolpho Gliesh, ‘Considerações sobre o ensino e a profissão veterinária’, *R.E.A.V.R.S.*, 1 (1956), 65-74.

³⁹⁴ Mozart Pereira Soares, ‘Considerações sobre o ensino veterinário’, *R.E.A.V.R.S.*, 1 (1954), 33-44.

³⁹⁵ *ibid.*

The idea that the recently nationalised faculties of the FURGS were like isolated islands was seconded by Gaspar Ochoa, Chair of Agricultural Geology in the Faculty of Agronomy. He claimed that professors who believed research should be undertaken outside FURGS were still the majority.³⁹⁶ Similarly, Ady Raul Silva, Professor of Agronomy, argued that ‘the problem in Porto Alegre is that, with few exceptions, professors and their assistants do not undertake research’. He argued that the viva for admission as a new chair holder, for example, was ‘much more about the way content was delivered than the content itself’.³⁹⁷ At the same time, foreign teachers, though Raul Silva described them as being more prepared to undertake research, neither understood the local problems nor the language.³⁹⁸

The explicit support for a revaluation of the role of research from a group inside the Faculty of Agronomy and Veterinary Medicine coincided with the availability of new sources of funding for research in the early 1950s. For members of the congregation of faculties, individual budget allotments were distributed according to student numbers. The Faculty of Agronomy and Veterinary Medicine had considerably fewer students than did its sister faculties.³⁹⁹ With nationalisation, the room for manoeuvre became considerably more narrow because the faculty no longer belonged to the Instituto Borges de Medeiros and therefore could not receive funds from the state of Rio Grande do Sul. The likelihood that professors could use political influence to argue for the same rights and privileges as physicians, for example, a tactic they tried in the 1940s, disappeared with developments brought about by nationalisation. In this context, the increasing availability of funds for research presented an opportunity for a

³⁹⁶ Ochoa, ‘Em redor do ensino das ciências naturais’, p. 89.

³⁹⁷ Ady Raul Silva, ‘Escola para estudos post-graduados’, *Revista Agrônômica*, 16 (1953), 46-8.

³⁹⁸ *ibid.*

³⁹⁹ In 1959, the total number of students that matriculated in the courses of agronomy and veterinary Medicine were two hundred and ninety, respectively, see Castro, ‘Doze anos de administração na escola de agronomia e veterinária da URGs’, p. 68. In that year only seven students finished the course in veterinary medicine, and forty four finished the course in agronomy, see *Memória comemorativa*, pp. 97-100. In stark contrast, one hundred students finished their courses in the Faculty of Medicine in the same year. This was more than the two other combined and almost half of the total number of students matriculated in the Faculties of Agronomy and Veterinary Medicine see <http://www.famed.ufrgs.br/formados-medicina.php>, Access 28 June 2012.

short-term budget increase. This would preserve the prevalent tradition of the 1940s that sent professors overseas to complete their studies. In the early 1950s, this tradition was kept in place with the assistance of foreign agencies. For instance, Ruben Markus, Professor of Genetics at the Faculty of Agronomy, used a Rockefeller Foundation studentship to achieve his MSc in Genetics at Iowa State College in the United States.⁴⁰⁰ Edgardo Jose Trein, Professor of Pathological Anatomy, went to Hannover, Germany, with a studentship from the Alexander von Humboldt Institute. There he joined the team of the German researcher Paul Cohrs to study animal pathologies.⁴⁰¹

None of the individuals who publicly supported research were from the SDAIC. It is nevertheless noteworthy that the research areas of Outubrino Correa and Ramiro Gomes da Costa did not receive grants for postgraduate studies overseas, indicating that priority lay in investing in areas in which there was no local expertise. This condition highlights the importance of research undertaken outside the academic environment in the 1940s, which clearly helped to shape the beginning of research programmes in the Faculty of Agronomy and Veterinary Medicine in Porto Alegre. Correa's presence in the Faculty of Veterinary Medicine would have another direct effect on the introduction of research into Porto Alegre academia. While the first initiatives towards international exchange and studentships were for agronomy, this began to change when Correa was elected Dean of the Faculty of Agronomy and Veterinary Medicine in 1960.⁴⁰² Correa's mandate was characterised by the creation of opportunities for professors from the Veterinary Medicine course to benefit from the new availability of funds. While head of the faculty (1958-1963), Correa initiated negotiations with the United States Development Agency to sponsor research programmes in the Faculty of Agronomy and

⁴⁰⁰ For further initiatives of the Rockefeller foundation in Rio Grande do Sul, see 'Fundação Rockfeller', *R.E.A.V.R.S.*, 1 (1954), 58-9; Kummer, 'A medicina social' p. 55; R. Di Primio, 'Alguns aspectos da ancilostomose no Rio Grande do Sul', *Anais da Faculdade de Medicina de Porto Alegre*, 17 (1957), 39-49: p. 39.

⁴⁰¹ Castro, 'Doze anos de administração na escola de agronomia e veterinária da URGs', 78-79.

⁴⁰² *Memória comemorativa*, p. 60.

Veterinary Medicine.⁴⁰³ The Faculty eventually received a grant that allowed professors to continue their Masters courses in the United States while American professors travelled to teach at the Faculty of Veterinary.⁴⁰⁴ In addition, Correa managed to increase support from the Rockefeller Foundation; in this way, he was able not only to keep the studentships previously used for courses overseas but also to buy laboratory equipment.⁴⁰⁵ Correa's initiative of strengthening his contacts with international agencies led to the creation of a Master's course in Agronomy with an emphasis on soil chemistry. This postgraduate programme was the first of the FURGS and the fourth in the entire country to be created in the area of agronomy.⁴⁰⁶ When the first class graduated in 1965, there were twelve professors for the course; seven Brazilians and five Americans.⁴⁰⁷ Four years later, Correa's work enabled the creation of the first Master's course in Veterinary Medicine in Brazil, also in the FURGS.⁴⁰⁸ This programme focused on Parasitology, the area in which Correa had been the Chair since the approval of his work on myiasis.⁴⁰⁹ Amongst the first group of professors on this programme was Sylvio Torres, who created the IVRDF, as described in Chapter One.⁴¹⁰

However, as in the 1940s, these initiatives had nothing to do with the IVDRF.⁴¹¹ Correa helped to channel foreign agencies' resources into the Faculty of Veterinary Medicine, but he kept it separate from his research environment at the IVRDF. While the Faculty of Veterinary was creating opportunities for its researchers, the IVRDF was independently opening up its own exchange channels. In the early 1960s, the IVRDF signed an exchange agreement with

⁴⁰³ Camila Campos Jacobs, 'A participação da United States Agency for International Development (USAID) na reforma da universidade brasileira', (unpublished UFRGS Masters dissertation, 2004), p. 116.

⁴⁰⁴ *ibid.*, pp. 119-120.

⁴⁰⁵ *ibid.*

⁴⁰⁶ Azevedo, 'A pesquisa agropecuária', pp. 49-53.

⁴⁰⁷ Jacobs, 'A participação da United States Agency for International Development (USAID) na reforma da universidade brasileira', p. 117.

⁴⁰⁸ Azevedo, 'A pesquisa agropecuária', p. 61.

⁴⁰⁹ 'Curso de pós-graduação em medicina veterinária', *Arquivos - Faculdade de Veterinária - UFRGS*, 9 (1981), 1-88.

⁴¹⁰ *ibid.*

⁴¹¹ Milton G. Guerreiro, 'IPVDF', *Boletim do Instituto de Pesquisas Veterinárias Desidério Finamor*, 11 (1988), 7-20.

the University of Munich; this allowed its staff to spend time researching in Germany and vice versa. Later, in 1963, the IVRDF signed a similar agreement with the British Council; this allowed British researchers to visit the IVRDF for periods of one to two years. By the late 1980s, twelve IVRDF researchers had completed their Masters and PhDs in England through this agreement.⁴¹² Milton Guerreiro, who led the IVRDF while Outubrino Correa was working there, was proud of the independence of the IVRDF when remembering its institutional trajectory. He argued that if the IVRDF had ever agreed to a closer working relationship with the University of Rio Grande do Sul, it would almost certainly have received ‘unfair treatment’.⁴¹³ Besides, Guerreiro argued that the IVRDF would never have achieved what it had if it pursued a less independent path.

Therefore, the separation that existed between the IVRDF, the Faculty of Veterinary and the SDAIC before nationalisation continued after 1950. In spite of Correa’s efforts to create the first post-graduate courses at the FURGS, the independent exchange programmes of the IVRDF attested to a completely different institutional pathway when compared with the faculty. The same might be said for the Faculty of Agronomy. The study of agricultural pesticides was not among the early research priorities of the first professors who benefited from foreign aid. The trajectories of Costa, Kober and Correa provide concrete evidence that what happened in the 1940s defined the separation between independent research centres and the Faculty of Agronomy and Veterinary Medicine during the first years after nationalisation; it even impacted developments leading to the creation of postgraduate courses afterwards.

⁴¹² *ibid.*: pp. 15-16.

⁴¹³ *ibid.*

3.2 – Research practices of professors from the Faculty of Medicine after 1950: Jandir Maya Faillace, Jose Fernando Carneiro, and Raul di Primio

3.2.1 – Jandir Maya Faillace

Early in the 1950s, while still holding the Chair of Hygiene, Jandir Maya Faillace stepped down from the post of General Director of the Department of Health of Rio Grande do Sul. He took over the direction of the Institute of Biological Research, where he had been working with BCG since the early 1940s. Before leaving the position, Faillace managed to change state legislation, expanding the responsibilities of the laboratory and transforming it into a research centre. Although Faillace led a well-organized research centre during the final period of his career, he wrote little. The new Institute of Biological Research, officially created in 1948, kept him well occupied with its broad range of responsibilities. The research centre was responsible for analysing all foodstuffs circulating in the state, including milk; it was also in charge of the laboratory analyses of samples collected in public health posts, and manufactured all vaccines distributed in Rio Grande do Sul. Faillace also managed to secure an extra budget line to build a new facility for the Institute of Biological Research to his specifications. Faillace remained head of the new Institute until 1959, when he retired.⁴¹⁴ While the assessment of tuberculin undertaken by Faillace during the 1940s remained outside the University of Porto Alegre, José Fernando Carneiro brought the issue to the heart of the Faculty of Medicine in the 1950s. Carneiro had been appointed to the Chair of Phthiisology in 1948, and in that position he attempted to rewrite the history of tuberculosis research in Rio Grande do Sul. Some of the

⁴¹⁴ Silva, 'Divulgação', 162-73; Among the few articles found are Jandir Maya Faillace, 'Dois mestres do sanitário brasileiro', *R.M.R.S.*, 8 (1952), 86; Jandir Maya Faillace and Pedro de Medeiros Mitchell, 'Bases e sugestões para a "Campanha nacional de educação sanitária"', *R.M.R.S.*, 9 (1953); J. Maya Faillace, 'Recomendações e conclusões aprovadas', *R.M.R.S.*, 7 (1952), 331-8; Faillace, 'Evoluções e novos rumos', 7-14, J. Maya Faillace, 'Hidatidose', *R.M.R.S.*, 7 (1951), 339-44.

revisionist ideas he issued directly confronted the public position taken by Faillace over the previous decade.

3.2.2 – Rewriting the history of tuberculosis: José Fernando Carneiro

Unlike most of his colleagues in the Faculty of Medicine, José Fernando Carneiro was an outsider. After completing his studies in medicine in Rio de Janeiro in 1931, he worked privately for a few years, tending to tuberculosis patients. In 1943, he travelled to London where he volunteered at the Brompton Hospital. Returning to Brazil after the war, he resumed his activities as a private physician and took over the chair of Phthisiology in the Faculty of Medicine of Porto Alegre in 1954. His route to the position differed somewhat from that taken by members of the group closely related to the Medical Association, including Faillace. Instead of aspiring to a position as ward chief in the Santa Casa de Misericórdia, the common career path for almost all the chairs from the Faculty of Medicine of Porto Alegre, Carneiro secured a senior position in the Parque Belém Hospital. This hospital belonged to the family of Professor José Pereira Filho, Chair of Microbiology in the Faculty of Medicine. Parque Belém Hospital was the largest private centre for tuberculosis treatment in the state. There, Carneiro found freedom to carry out his research on tuberculosis, and he published extensively on a variety of aspects of that disease throughout the 1950s.

The outlet for Carneiro's views was the Faculty of Medicine. There he publicised his understanding of the latest developments within his field; he adopted an entirely new approach to tuberculosis and, more specifically, to the role of tuberculin. To support his bold arguments, he demonstrated a vast knowledge of specialist literature, especially foreign journals; he rarely quoted Brazilian journals. His fluency in foreign languages was demonstrated through his frequent use of quotations from journals written in English and French as well as his surveys

of new books published in German.⁴¹⁵ His knowledge of foreign research allowed him to authoritatively announce new directions taken in the area of tuberculosis; the resulting knowledge was markedly different from that displayed by Faillace as well as that which was being discussed in Curitiba. The first new direction he discussed was the introduction of antibiotics. Carneiro critically assessed their effect on the public health system.⁴¹⁶ He predicted that new drugs would increase patients' time in hospital and therefore add more pressure to an already overburdened system. Carneiro blamed Brazilian hospitals for being completely out of touch with the reality of tuberculosis epidemics. According to him, the hospitals had failed in the past, and if nothing radically different was attempted soon, they would almost certainly fail in the future. He suggested a complete revision of the national strategy of how hospitals contribute to the fight against tuberculosis. Before that revision, not a single new hospital ward should be built in the country.⁴¹⁷ This radical position differed entirely from recent pledges for expansion of the national hospital system as advocated by specialists like Milton Munhoz da Rocha in Curitiba.

Carneiro also brought discussions concerning bTB to the heart of the Faculty of Medicine. Contrary to what Faillace had done before, Carneiro included bTB in his recurrent discussions during the 1950s concerning the history of tuberculosis epidemics. As a professor, he was expected to write about the origins of the disease. The relevance of bTB to his work therefore lay in the fact that it was pinpointed as a major source of infection in human populations. According to Carneiro, the massive slaughtering campaigns in countries such as the United States had contributed to the sharp decrease in the number of deaths caused by

⁴¹⁵ For example, José Fernando Carneiro, 'A estreptomicina na tuberculose pulmonar', *Revista da Associação Médica do Rio Grande do Sul*, 1 (1957), 39-50; José Fernando Carneiro, 'Review of Letiner, J: Die primaere tuberkulose bei erwachsenen and kindern und ihre entwicklung', *R.M.R.S.*, 45 (1952), 173.

⁴¹⁶ Carneiro, 'A estreptomicina na tuberculose pulmonar', 39-50.

⁴¹⁷ Carneiro, 'A luta antituberculosa no Brasil', 36-65.

tuberculosis.⁴¹⁸ Regarding the effect of bTB in Rio Grande do Sul, Carneiro warned that ‘we are certain that a reasonable number of cases of tuberculosis in our state is caused by the bovine strain’.⁴¹⁹ A likely source of his conviction was the work of José Feldman, Professor of Phthisiology at the Faculty of Medicine of Minas Gerais. Feldman wrote the most complete work on bTB in Brazil prior to 1955.⁴²⁰ He was repeatedly mentioned in Carneiro’s work because he also suggested radical revisions in many areas of tuberculosis studies. Echoing Feldman’s views, Carneiro argued that there was already enough evidence to dismiss the illusion that bTB could be ignored. He also emphasised that it would be unacceptable to refrain from implementing an immediate screening test for tuberculosis patients in order to identify the origin of the bacilli. He highlighted that recent technologies enabled a fast, precise and cheap alternative for distinguishing the human bacilli from other strains.⁴²¹ Although Carneiro challenged the earlier apathy demonstrated by Faillace towards bTB, his enthusiasm emerged too late to gather support from local veterinarians. As demonstrated above, Correa, the main specialist in bTB in Porto Alegre, had changed his priorities: bTB had become a marginal topic for him.

Another new direction voiced by Carneiro was a change in perception of how specialists understood tuberculin tests. Carneiro argued that the results of tuberculin reactions used over the previous two decades had been misleading and could no longer be taken seriously. He argued that as a universal system of standardisation had not been adopted, previous tests were simply invalid.⁴²² It is hard to exaggerate the importance of this position. Tuberculin reactions

⁴¹⁸ José Fernando Carneiro, ‘Evolução e ensino da tisiologia’, *Revista de Tuberculose e Doenças do Tórax*, (1960), 5-16; José Fernando Carneiro, ‘Aula inaugural do curso de tisiologia de 1955’, *Revista Brasileira de Medicina*, 12 (1955), 503-8.

⁴¹⁹ Carneiro, ‘A luta antituberculosa no Brasil’, p. 58.

⁴²⁰ José Feldman, ‘Tuberculose humana de origem bovina’.

⁴²¹ Researchers had found that the human bacilli produced niacin in larger quantities than other strains. This vitamin, also known as nicotinic acid, could be cheaply identified with a reagent in laboratories, see S. Gilani and J. B. Selkon, ‘The niacin test for differentiating human tubercle bacilli from other mycobacteria’, *Tubercle*, 39 (1958), 396-8.

⁴²² José Fernando Carneiro, ‘Atualizações’, *Revista da Associação Médica do Rio Grande do Sul*, 5 (1961), 179-94.

had been the standard criteria for the evaluation of BCG immunisation over the previous thirty years. Faillace and many of his subordinates were among public health researchers who had used tuberculin in this way.⁴²³ Now Carneiro suggested that their data could be unrelated to tuberculosis infection. Carneiro studied this issue throughout the 1950s and published a detailed report of his findings in 1961.⁴²⁴ He presented solid evidence that specialists now believed that a greater diversity of germs than previously thought caused tuberculin reactions. What some had called false positives were now attributed to essential flaws in the method of preparation or to the type of tuberculosis strain previously used in tuberculin tests. As a universal standard, Carneiro suggested that future tests should be undertaken using the tuberculin manufactured in Denmark. He argued that tests using tuberculin with other origins should be considered invalid. All of Faillace's work discussed in Chapter Three fell into this category, as did the results used to justify the BCG vaccination of almost 600,000 children over the previous thirty years.⁴²⁵ Finally, Carneiro argued that all tests using high doses of tuberculin would necessarily yield positive results; therefore every test made with such quantities should also be considered null. This included the thousands of tests that had been done in Brazil using the standard practice of increasing doses of tuberculin to confirm negative results. Carneiro argued that the new problem for specialists lay in determining the most appropriate dose of Danish tuberculin that would react to tuberculosis bacilli only.⁴²⁶ In short, Carneiro's opinion was that virtually everything from that point onwards would have to be rewritten.

Another change announced by Carneiro concerned the understanding of differences between the concepts of 'immunity' and 'disease resistance' and the relationship of both to tuberculin. According to Carneiro, recent studies suggested that immunity was either innate or

⁴²³ For example J. Maya Faillace, 'O Serviço BCG', pp. 5-11.

⁴²⁴ José Fernando Carneiro, 'Aspectos atuais da alergia na tuberculose', *Off-Print Anais do XI Congresso Nacional de Tuberculose*, (1961), 119-66.

⁴²⁵ The use of tuberculin results to justify the Brazilian mass vaccination campaign was constantly mentioned, see Arlindo de Assis, 'Ensinamentos', 529-43.

⁴²⁶ Carneiro, 'Aspectos atuais da alergia na tuberculose', pp. 120-121.

induced. For example, exposure to attenuated tuberculosis bacilli – either from the environment or through vaccination – was a form of induced immunity. More importantly, immunity was a definite state; a person was either immune or she was not. Disease resistance, on the other hand, depended on four factors: race, species, tissues and individual differences. All these characteristics were essentially innate and determined the individuals' susceptibility to virulent bacilli. This distinction was particularly important in the area of tuberculin allergy. Carneiro argued that physicians had been mistakenly working with the hypothesis that three types of accepted reactions to tuberculin – absence of allergy, regular allergy, and “hypersensitivity” to tuberculin – might reveal the individual's resistance to virulent bacilli. According to Carneiro, disease resistance had nothing to do with tuberculin; rather, it was an innate condition. Immunity might be revealed by tuberculin tests.

Carneiro argued that physicians mistakenly believed that allergy and immunity were the same thing. Carneiro considered allergy to be entirely separate from the immune state of an individual. In the past, specialists like Arlindo de Assis, with whom Faillace had disagreed on the matter of BCG efficacy, had already noticed that vaccinated individuals failed to react to tuberculin, something they called infratuberculin allergy. Thus although individuals were believed to have been immunised, they did not react to tuberculin. The difference between the views of Assis and those articulated by Carneiro was that Carneiro claimed that it was not possible to produce a precise diagnosis in the absence of reaction to tuberculin. Therefore, while the absence of a reaction might be evidence of a nonallergic state, it says nothing with regard to the absence of immunity.⁴²⁷ Based on this new perspective, Carneiro declared that a complete revision of previous practice related to tuberculin was urgently required. The first

⁴²⁷ José Fernando Carneiro, ‘Imunidade e alergia na tuberculose’, *Revista de Tuberculose e Doenças do Tórax*, 1 (1959), 5-7, José Fernando Carneiro, ‘Resistência e imunidade na tuberculose’, *Off-Print Revista Brasileira de Tuberculose*, 20 (1952), 547-76.

steps were to understand in more detail how allergies worked and how to differentiate them from reactions caused by evidence of immunisation.

Despite the changes announced by Carneiro and the fierce determination with which he defended his position against accepted wisdom, he did not inaugurate new research practices within the area of tuberculosis studies in the Faculty of Medicine of Porto Alegre. His work usually consisted of a detailed bibliographical review that required him to keep up-to-date with several medical journals from Brazil and overseas. Although Carneiro disagreed with Faillace on almost everything, it was Faillace who defined the institutional environment in which tuberculin would be administered and studied during the 1940s. Faillace had chosen the Institute of Biological Research rather than the Faculty of Medicine, where Carneiro came to hold the Phthisiology chair, as the centre of expertise on BCG and tuberculin. Carneiro did little to change this situation; he argued that tuberculosis as an academic topic was changing, if not disappearing.⁴²⁸ He believed that as the disease became less lethal, specialists would migrate to new areas of research, such as pneumonia and lung cancer. Carneiro argued that physicians, fresh from undergraduate courses, rarely chose tuberculosis as their specialty. Although he suggested that new generations made use of the knowledge acquired from decades of work on tuberculosis to tackle new diseases, he accepted that changes were inevitable. Signs of change could be seen in the titles of foreign journals that were already broadening their scope. He pointed out that the influential *American Review of Tuberculosis*, had recently included the term ‘pulmonary diseases’ in its title. Observing this shift in his field of study, Carneiro once more took the opportunity to criticise his predecessors. He argued that for years specialists had misdiagnosed pulmonary diseases based on x-ray plates. He believed that physicians had been so concerned with tuberculosis that they ignored diseases such as

⁴²⁸ Carneiro, ‘Aula inaugural do curso de fisiologia de 1955’, p. 506; José Fernando Carneiro, ‘Micoses pulmonares no Brasil’, *Revista de Tuberculose e Doenças do Tórax*, 2 (1959), 5-20.

emphysema, pneumonia and even lung cancer.⁴²⁹ More importantly, Carneiro revealed that although there were new challenges and questions in relation to tuberculosis, there would gradually be fewer people addressing issues related to the disease.

Of all the physicians analysed in this thesis, Carneiro appeared the most focussed on not only understanding the new challenges emerging in his area but also predicting the new directions research would take. But he believed he did not need to undertake laboratory or fieldwork to accomplish this. Protecting himself with a vast bibliography, he based his arguments on the results of hundreds of trial studies and complex laboratory practices. He tried to make his readers believe that he knew, in detail, the sequences and procedures required to perform these experiments, although he rarely showed evidence of having replicated them himself. Perhaps he believed it was too late to do so; his priority lay in adapting to the changing epidemiological environment. Moreover, he wished to move on.

⁴²⁹ Carneiro, 'Evolução e ensino da fisiologia', p. 15.

3.2.3 – Raul di Primio and Medical Entomology in the Faculty of Medicine

Whereas Carneiro's revisionist approach suggests a marked break with previous traditions, Raul di Primio's work after nationalisation offers many indications of continuity. Chapter Two discussed Primio's works on malária vectors that were undertaken while he maintained his duties as Chair of Parasitology in the Faculty of Medicine. Although the topic of malária continued to attract considerable attention in other medical faculties, only one of the eighteen articles Primio published between 1950 and 1955 concerned malária.⁴³⁰ He predicted that the disease would remain restricted to small areas of the state's Atlantic coast, making major concern unnecessary.⁴³¹

Regarding the infestation of Triatominae, the vector of Chagas disease, the situation was different. Primio considered the insect's geographical distribution to be a serious challenge for medical entomologists, and he warned that the real extent of its outbreak was still unknown. This interpretation explains why half of the works he published during the decade attempted to determine the geographical distribution of Chagas disease in Rio Grande do Sul. Primio was certainly aware of the work of Emmanuel Dias of the Oswaldo Cruz Institute; Dias headed a national campaign to draw attention to the requirement for local studies on Chagas disease.⁴³² By 1948, Dias was convinced that BHC could eradicate Chagas disease by effectively destroying its vector. With his support, BHC became the standard pesticide against Triatominae in Brazil despite the fact that research demonstrated that the spraying procedures against this particular insect were complex and often failed to reach them.⁴³³ The Brazilian National Department of Health supported the strategy of Dias and intensified efforts to tackle the pest

⁴³⁰ For research programmes focused on Malária in the state of São Paulo, see Nelly M. F. Candeias, 'Memória histórica da Faculdade de Saúde Pública da Universidade de São Paulo', *Revista de Saúde Pública*, 18 (1984), 2-60.

⁴³¹ R. Di Primio, 'Situação da malária', *R.M.R.S.*, 8 (1952), 278-86.

⁴³² Thomas Kropf, 'Chagas disease', *Ciência & Saúde Coletiva*, 5, (2000), 347-65.

⁴³³ Antonio Louzada, 'Endemias rurais no Rio Grande do Sul', *Anais do 1º Congresso Sul-Riograndense de Higiene*, (1957), 57-73; Abdias Leite Mello, 'Alguns dados sobre a campanha contra a doença de Chagas no Rio Grande do Sul', *Anais do 1º Congresso Sul-Riograndense de Higiene*, (1957), 73-4; Leonidas Soares Machado, 'A doença de Chagas', *Anais do X Congresso Brasileiro de Higiene*, (1952), 450-61.

through intensive use of BHC.⁴³⁴ Brazilian historians argue that these developments in the study of insecticides, alongside other epidemiological studies, led to the creation of research programmes on Chagas disease, particularly in faculties of medicine located in regions where the disease was endemic. Simone Kropf, for example, mentions studies published by medical professors from faculties in the city of Ribeirão Preto in the state of Sao Paulo; in the region known as Triangulo Mineiro in the state of Minas Gerais; and in the city of Goiania in the state of Goias.⁴³⁵

These research centres focused on general concerns surrounding Chagas disease, such as ways of improving diagnosis techniques of the so-called myocardiopathy caused by the *Trypanosoma cruzi*, the pathogen transmitted by *Triatominae*.⁴³⁶ More specifically, the residual effects of BHC were still unknown and were therefore the focus of many research projects.⁴³⁷ In Rio Grande do Sul, Primio argued that the recent use of pesticides was changing the geographical distribution of insect species. However, he never demonstrated interest in studying pesticides against the *Triatominae*. Although BHC was accepted as effective, Primio offered an alternative. He suggested that affordable houses constructed with stronger materials would be as beneficial as the intensive use of pesticides would be. Primio argued that by building properties with a mixture of cement, sand and clay – materials both easily available and affordable – it would be possible to effectively eliminate *Triatominae*.⁴³⁸

His main interest in *Triatominae* lay in understanding its geographical distribution. The Oswaldo Cruz Institute, where Primio had studied, published two extensive works during the

⁴³⁴ Gilberto Hochman, 'Brazil isn't only disease', *Ciências, Saúde, Manguinhos, Rio de Janeiro*, 16 (2009), 313-31.

⁴³⁵ Kropf, 'Ciência, saúde e desenvolvimento', pp. 107-24.

⁴³⁶ Tests of residual effects of insecticides were still underway in mid-1950s, see Jacques H. M. Lacerda, 'Inquérito epidemiológico da moléstia de Chagas', *Anais do X Congresso Brasileiro de Higiene*, (1953), 466-7.

⁴³⁷ For example, Ivan Ricciardi and Ernest Paulini, 'Estudos sobre a ação dos vapores de BHC', *Anais do X Congresso Brasileiro de Higiene*, (1953), 627-30.

⁴³⁸ R. Di Primio, 'Habitação rural', *R.M.R.S.*, 8 (1952), 120-6.

1950s that mapped out the geographical distribution of that species.⁴³⁹ Similarly, researchers also drew attention to geographical distribution in hygiene congresses, and there was evidence that surveys were being undertaken in the states of Minas Gerais, Sao Paulo and Rio de Janeiro.⁴⁴⁰

Primio's former links with the Oswaldo Cruz Institute and his position as Professor of Hygiene made him aware of the attention that other Brazilian researchers were giving to geographical distribution. His justification for carrying out similar works in Rio Grande do Sul was that the analysis of distribution was affected by the month in which samples were taken and their location. For example, samples from urban and rural areas were, according to Primio, necessarily different, as were the samples collected during winter and summer months.⁴⁴¹ Primio repeatedly mentioned the necessity for revising previous works because they lacked clarity about the places where the insects had been captured. Throughout the 1950s, he would produce several detailed maps on which he indicated the distribution of each of the four varieties of Triatominae. In total, he captured more than 6,000 specimens and examined half of them.⁴⁴² However, before capturing the insects, Primio had to locate them. The search for samples took him all over Rio Grande do Sul. He usually travelled by train, after making arrangements with locals to assist him at each stop. His membership at the Rotary Club was considerably helpful to him in this part of his research. Often, the city mayor, also a Rotarian, would wait for Primio at the train station, and city halls provided special transportation while he stayed in their jurisdiction. Local physicians, mostly Rotarians as well, invited Primio to

⁴³⁹ Emanueu Dias, 'Aspectos climáticos da distribuição dos transmissores da doença de chagas no Vale do Rio São Francisco', *M.I.O.C.*, 56 (1958), 407-13; J. Pellegrino, 'Novos dados sobre a distribuição de Triatomídeos', *M.I.O.C.*, 48 (1950), 639-67.

⁴⁴⁰ Firmino O. Lima and Tito L. Silva, 'Distribuição de triatomíneos', *Anais do IX Congresso Brasileiro de Higiene*, (1952), 253-66; Fernando M. Bustamante and João Barreto Gusmão, 'Sobre um foco de Triatoma Infestans', *Anais do X Congresso Brasileiro de Higiene*, (1953), 461-463.

⁴⁴¹ Plínio do Prado Coutinho et al., 'Contribuição ao conhecimento da distribuição dos triatomídeos domiciliares', *Anais do IX Congresso Brasileiro de Higiene*, (1952), 239-52.

⁴⁴² R. Di Primio, 'Atual distribuição geográfica dos triatomíneos', *Anais da Faculdade de Medicina de Porto Alegre*, 17 (1957), 17-37.

dinners and lunches, and he used these opportunities to talk about his research and query where he might find insects. After making notes of auspicious places, he set out to do his field work. Besides poor households whose walls were made with porous materials and, therefore, prone to house insects, Primio inspected schools, police stations, prison cells, historical ruins and a variety of rural barns, ranches and sheds.⁴⁴³

Primio's work on Triatominae reveals continuities with research practices that he had previously implemented. The first element of continuity was the major role of fieldwork in his research. He did not count on the support of the Rotary network in the early part of his career, but at these two stages fieldwork was central to his work. In addition, both at the beginning of his career and later, he travelled without research assistants, and there was no indication that he studied his insects in the Faculty of Medicine. His recurrent visits to Rotary Club meetings also suggest that all arrangements for his expeditions might have been organised entirely without the support of the Faculty of Medicine. Like Carneiro, Primio was fully aware of the latest developments in his field, but he conducted his actual research outside the academic environment. The vigorous development of medical entomology in other Faculties of Medicine in Brazil did not take place within the academic environment in Porto Alegre; this was simply not the way Primio did research in the 1930s, and his methods would not change during the first years after nationalisation. As was the case with Faillace, practices developed by Primio during the 1940s and before helped to shape developments in the following decade.

⁴⁴³ R. Di Primio, 'Pesquisa de triatomíneos', *R.M.R.S.*, 10 (1954), 222-8.

3.2.4 – The nationalised Faculty of Medicine

The works of Carneiro, Faillace, and Primio typify the impact of nationalisation on research practices taking place in the first half of the 1950s in the Faculty of Medicine of Porto Alegre. In short, evidence presented above suggests that for different reasons nationalisation did not bring about sudden changes to the research culture of the Faculty of Medicine. However, there are signs that some medical professors also began changing their views concerning the role of scientific research within the faculty. As in the Faculty of Agronomy and Veterinary Medicine, medical professors began to discuss the possibility of making research an integral part of their faculty's culture. One of the reasons for this change of perspective was the practice of other Brazilian faculties. In 1956, José Milano, Chair of Descriptive Anatomy, mentioned the recently issued report of the World Health Organisation that outlined the ideal structure and general principles under which faculties of medicine should operate. According to that report, scientific research was among the main new pillars of medical teaching, and Milano argued that the Faculty of Medicine of Porto Alegre could not lag behind; it must reorient its strategy to remain competitive and keep pace with other educational institutions.⁴⁴⁴ Also in 1956, a major medical congress was organised in Ribeirao Preto, Sao Paulo, with the objective of discussing several issues about the medical profession, including medical education. A delegation from Rio Grande do Sul attended the congress and joined a panel discussing education. This panel's conclusions were then detailed in the Journal of the Medical Association of Rio Grande do Sul. Among the main points was the assertion that 'medical faculties should not only be responsible for training physicians but should also be in charge of the indispensable task of undertaking research, an indisputable tool for the improvement of its professors and students'.⁴⁴⁵ Ivo Meyer, Chair of Ophthalmology, argued that the Faculty of

⁴⁴⁴ José C. F. Milano, 'Aula inaugural 1956', *Anais da Faculdade de Medicina de Porto Alegre*, 16 (1956), 5-16.

⁴⁴⁵ Jose Martins Job, 'Educação médica', *R.A.M.R.S.*, 1 (1957), 108-12.

Porto Alegre would soon have to consider the possibility of having three distinct programmes, each devised to individually train students, researchers and other professors.⁴⁴⁶ Training researchers here was a completely new concept in terms of medical education; it was never before considered in Porto Alegre, except in independent institutions such as Faillace's laboratory. In addition, full-time positions were being discussed. Initially these did not enable academic research but were intended to help professors cope with increasing numbers of students.

While external signs indicated that the role of medical research should be reconsidered to keep up with other faculties, the active work to control professional boundaries could still be seen in the early 1950s as it existed in the 1940s. The *Medical Journal of Rio Grande do Sul* published an editorial signed by local physician Tasso Vieira Faria, which demonstrated that the same tension between degree-holder physicians and “unregulated” practitioners continued:

‘It is truly alarming the discredit, disrespect and the inconsiderate behaviour – not only of the general population but also from public authorities – towards Hippocrates’ heirs [...] Physicians have become the source of all troubles: patients make all sorts of infamous accusations, and unjust claims; private and public organisations made everything to transform physicians into slaves and most of the time they succeeded; [...] finally, there are the politicians who promise everything and deliver little; they are like lying mermaids whose demagogic songs might please their numb ears, but are nothing more than hot air.’⁴⁴⁷

Although this sort of argument was prevalent before 1950, there is evidence that changes began to take place that favoured research. For example, the Physiology Institute of Research, created in the Faculty of Medicine in the 1950s, is a clear example of change in this direction. The substitute professor Pery Riet Corrêa, who replaced the Chair of Physiology, Raul Pila, went to Argentina to work in the laboratory of the Nobel Prize winner (1947) Bernardo A Houssay. Returning to Porto Alegre in 1954, Pila requested authorisation to create

⁴⁴⁶ Ivo C. Meyer, ‘Aula inaugural 1955’, *Anais da Faculdade de Medicina de Porto Alegre*, 15 (1956), 5-14.

⁴⁴⁷ Tasso Vieira Faria, ‘Médico, ergue-te e luta!’, *R.M.R.S.*, 14 (1958), 169-74.

the institute, which was granted. Because of the troubled situation of the military dictatorship in Argentina, Houssay was prohibited from teaching at the Faculty of Buenos Aires. Over a two-year period, he came to Porto Alegre several times to work and oversee several student research projects. The most remarkable aspect of this incipient programme was that it differed completely from anything that existed previously at the University of Porto Alegre. First of all, it was an institute wholly dedicated to research. Second, some of his researchers had full-time positions sponsored by the recently created National Research Council.⁴⁴⁸ Lastly, the institute had a multidisciplinary character: there were researchers from the Faculties of Medicine, Philosophy, Science and Letters, and Agronomy and Veterinary Medicine. What is even more revealing is the fact that the institute had no chair holders among its researchers; all its members were assistants, instructors or substitute professors.⁴⁴⁹ It is noteworthy that physiology was not among the fields that already had local expertise, such as medical entomology and tuberculosis. As with the Faculty of Agronomy and Veterinary Medicine, research areas already consolidated in the 1940s were not the first to receive fresh investment following nationalisation. Further studies are necessary to determine whether the Physiology Institute resulted from the perception that the medical education environment was changing or whether it was purely a coincidence that both events occurred simultaneously. In any event, the evidence presented so far makes it possible to place its creation within a diverse set of variables that could both hinder and foster an incipient culture of scientific research within the Faculty of Medicine.

⁴⁴⁸ Several articles written by the Institute's researchers acknowledged National Research Council grants, see Hélio L. Markus, 'Carcinoma de células sebáceas em cão', *R.E.A.V.R.S.*, 2 (1957), 43-52; Antônio João Sá Siqueira, 'Determinação de uma fórmula simplificada e geral para a dosagem da Uréia', *R.E.A.V.R.S.*, 1 (1955), 53-6; Cláudio S. Siqueira, 'Tumor de células de granulose em uma cadela', *R.E.A.V.R.S.*, 2 (1957), 53-8; Mozart Pereira Soares, 'Técnica para abordagem dos órgãos sexuais na tartaruga fêmea', *R.E.A.V.R.S.*, 1 (1955), 39-52.

⁴⁴⁹ <http://www.ufrgs.br/ppgfsio/historico.html>, Access 10/07/2012.

Conclusion

Although several academics in the Faculty of Medicine and the Faculty of Agronomy and Veterinary Medicine in Porto Alegre were still reluctant to incorporate research into their institutions, the terms of this discussion changed essentially in the early 1950s. At that time, professors such as Outubrino Correa, Ramiro Gomes Costa, Jose Fernando Carneiro, and Raul di Primio found themselves in the position of either opening or closing their doors to research. However, as has been demonstrated above, their actions during the 1940s defined in many ways what took place in the 1950s and beyond. In the case of Outubrino Correa, the independence and originality of his work in the IVRDF secured him a safe working environment; this was undoubtedly more attractive than the still uncertain situation at the Faculty of Veterinary Medicine. In the case of Ramiro Gomes da Costa, he already had a stable career in the Bureau of Plant Industry, and he showed no interest in bringing both environments closer together. The case of Jose Fernando Carneiro was not significantly different. The gap created by Jandyr Faillace between his Institute of Biological Research and his academic environment in the area of tuberculin studies in the 1940s only widened with the profound change in the profile of tuberculosis; this change dissuaded Carneiro from inaugurating a long-term research programme in the Faculty of Medicine.

Despite these continuities and conditions that worked against the introduction of research into academia, new developments suggested the beginning of a new phase. The Institute of Physiology was set up in the Faculty of Medicine in an unprecedented format that combined interdisciplinary exchanges and high quality supervision. A similar innovative scheme was put in place to open exchange channels with research institutions overseas, enabling professors in the Faculty of Agronomy and Veterinary Medicine to specialise in the areas they did. Further studies are necessary to investigate whether these initiatives in both faculties revealed genuine interest in research or whether they were just an attempt to improve

academic credentials for teaching. Either way, the research practices of the 1940s discussed in previous chapters are certainly important for understanding the early introduction of research practices in the southern region's higher education system.

Chapter Four

Research Practices in the Faculty of Agronomy and Veterinary Medicine in Curitiba 1935-1949

4.1 – Epidemiological context of Paraná

From the late 1930s until the early 1960s, Paraná was the destination of thousands of immigrants.⁴⁵⁰ Waves of foreign settlers arrived in search of opportunities in the logging industry or the coffee regions located in the north and west of the state. To attract these colonists, the government of Paraná donated land and agricultural tools and financed the exploration of pristine areas. Brazilians from the north and south of Brazil also heard about the opportunities, and hundreds of thousands flocked to Paraná where new cities began to crop up. Between 1940 and 1950, the population grew by seventy-one per cent, the highest among the twenty-five Brazilian states and twice the national average. Over the following decade growth was even steeper, reaching 102 per cent.⁴⁵¹ This massive migratory movement impacted the nature of rural activities in the state. Until the 1920s, almost ninety per cent of the surface of Paraná was covered with virgin forests. With an average temperature of 15°C in the countryside, these sub-tropical forests offered ideal conditions for the coniferous tree *Araucaria angustifolia*; its ubiquitous presence was evidence of this fact. The *Araucaria* trunk reached thirty centimetres in diameter, rendering it very attractive to the logging industry. With virtually no legal restraints, the logging industry had tens of millions of trees at its disposal for processing. From the late 1920s onwards, the first logging companies set up their wood mills

⁴⁵⁰ PAP, DPD, GRE, *Cadastro das Colônias*, Ulisses Medeiros, Summary of Colonization Report, (1941).

⁴⁵¹ Oliveira, *Estudos de desenvolvimento regional*, :p. 246.

in the countryside and explored the seemingly endless source of raw material. In the space of little more than a generation, the total green coverage was reduced to seventy-nine per cent. Land speculation followed in the wake of irreversible deforestation. Speculators purchased areas of thousands of square kilometres and organised armed groups to protect their new properties. These large areas could be either subdivided into smaller parts and sold or let to small rural families, and, less frequently, they were used for large monoculture crops, such as soy, coffee or wheat.

Beyond the effects of deforestation, coffee caused further damage to the green coverage of the state. In the 1940s, the international price of coffee began to rise; this created a major demand that Brazilians were willing to meet. After São Paulo, Paraná became the second largest producer in Brazil. The demand created a rush for fertile land that could be rapidly converted into coffee farms. The northern region of Paraná fit this profile and became the main destination for farmers wishing to take advantage of the high price of coffee. Hundreds of farms were established and dozens of towns were built. In some areas, towns were created in the middle of native forests, even before proper roads and infrastructure had been constructed.⁴⁵²

Both logging and coffee farming soon marginalised other rural activities in terms of net volume and income tax generated for the state. Politicians used the new configuration of the rural economy in Paraná to justify investments in infrastructure to support and improve growth, particularly in the logging and coffee industries. Roads, warehouses and heavy equipment also became priorities in successive state budgets. Seeds, fertilisers, pesticides and other agricultural staples began to be subsidised by the state. It is in this context that research activities discussed in this chapter must be understood. For the researchers studied below, science became a catchword used to justify investment in state research activities. Interestingly,

⁴⁵² Casagrande, 'O incansável explorador Reinhard Maack', pp. 267-325; Ana Luiza Martins, *História do café* (São Paulo, 2008), pp. 234-255.

however, as it will be demonstrated below, there was a great discrepancy between the rhetoric that was used and the actual commitment to local agricultural needs that was demonstrated.

Ranching also benefitted from the sudden availability of land. Until the late eighteenth century, raising cattle had never been a priority for Paraná's landowners. The tradition in the state had always been to sublet areas to stockmen from other states, particularly Rio Grande do Sul. This tradition had begun in the late seventeenth century when gold was found in the centre of the country. The discovery of gold created a demand for horses and mules raised in Rio Grande do Sul. The animals were herded to Sorocaba, a hundred kilometres west of São Paulo, where they were sold. To reach Sorocaba the huge droves, called *tropas*, covered close to two thousand kilometres, and Paraná, located between Rio Grande do Sul and Sorocaba, became a preferred resting site.⁴⁵³ Its open fields and abundant rivers rendered it an ideal place for cattle to recover weight lost during the journey. Landowners in Paraná, therefore, did not have to raise cattle or horses because they could rent their lands to the cattle drivers who came from the south. This activity lasted until the mid-nineteenth century when the first railways were opened. The presence of trains reduced the demand for animal power in the centre of the country. At that point, cattle ranching was a secondary activity in Paraná to the extent that animals were bought from São Paulo to supply meat for Curitiba.⁴⁵⁴ The situation changed when a new wave of immigrants from the Netherlands arrived in Paraná in the late 1890s.⁴⁵⁵ Many Dutch immigrants established dairy farms and inaugurated a new phase in the history of animal husbandry in Paraná.

Although their techniques were innovative, the Dutch immigrants failed to meet the milk demands of the state. In the first half of the twentieth century, public authorities intervened

⁴⁵³ Folador, 'Gaúchos em Santa Catarina e Paraná', pp. 59-61.

⁴⁵⁴ Nilson Antonio Morais, 'A pecuária e a pecuarização no Estado do Paraná', (unpublished UFPR Masters dissertation, 1988), pp. 27-42; Eighty per cent of the meat sold in Paraná came from São Paulo, Moysés Lupion, '*Mensagem Apresentada à Assembléia Legislativa do Estado*', (Curitiba, 1948), p. 128.

⁴⁵⁵ Nilson Antonio Morais, 'A pecuária e a pecuarização no Estado do Paraná', pp. 56-60

to secure a minimum volume of the product for the population. In the late 1930s, with the state remaining dependent on other states not only for its milk but also its meat supply, the government actively attempted to stimulate local ranching activity. The man behind this project was Manoel Ribas, Governor of Paraná (1932-1945) and personal friend of Getulio Vargas. Ribas' friendship with Vargas began when both occupied political positions in Rio Grande do Sul. Vargas was governor of the state, whereas Ribas, who was also born in Rio Grande do Sul, was mayor of Santa Maria, a city on the southern border. When Vargas became president of Brazil in 1930, he appointed Ribas as Governor of Paraná.

While backing incentives to encourage husbandry activities, Ribas tried to regulate the hygiene standards of the growing dairy industry. In 1936, he informed the legislative assembly of Paraná that the hygiene standards of milk would be a priority in his administration.⁴⁵⁶ Declaring concerns about public health, in particular that of children and convalescents, he planned to impose strict controls on dairy farms to curb the spread of zoonosis, especially bovine tuberculosis (bTB). Initially, he decided to segregate sick and weak animals from main herds as a prophylactic measure. Although he did not mention actual figures, Ribas commented that a test-and-slaughter programme was necessary to avoid more severe tuberculosis epidemics among the population. Before that programme could be organised, he passed a bill that demanded the pasteurisation of all milk delivered to the capital. He argued that because the potential risk of bTB contamination through milk was increasing and pasteurisation was thoroughly safe and tested against the bTB bacillus, all milk produced in the state had to be pastuerised. By imposing these measures, Ribas made a unilateral decision, as was common during Vargas' dictatorship. However, in Paraná he would immediately stumble against a major obstacle, namely, opposition from the capital, Curitiba. In the 1940s, measures like

⁴⁵⁶ Manoel Ribas, *Mensagem do Governador Manoel Ribas*, (Curitiba, 1936), pp. 20-7.

mandatory pasteurisation had to be proven effective in Curitiba or the public would not support their application throughout the rest of the state.

4.2 – A Promising Future: The Prospects of the Smiling City

Curitiba was the testing ground for ideas such as mandatory pasteurisation. Known as ‘the smiling city’ (*Cidade Sorriso*), the capital of Paraná was considered a modern and prosperous town with a bright future in the 1930s. Curitiba’s political and business leaders envisaged a future in which the city would be an important metropolis, and they believed this goal was achievable due to the wealth of natural resources present in its underexplored countryside.⁴⁵⁷ Fortunes were made by exploiting raw materials from Parana’s ground. Moysés Lupion, who would succeed Manoel Ribas as governor, owned several wood mills throughout the state. His was an example of the ways in which new economic ventures drove development in Curitiba, where ideas were tested before being imitated throughout the state. The testing ground, however, occasionally proved challenging, even for those accustomed to power.

When Ribas tried to impose mandatory pasteurisation, he faced serious opposition. Dairy farmers, who bore the cost of the initiative, refused the measures. Ribas had authorised the construction of a large pasteurisation unit on the outskirts of Curitiba, but a fee would be levied on every supplier. In response to this imposition, farmers organised a strike; milk was unavailable in Curitiba for over two weeks. Negotiations reached a stalemate that left the government in a delicate position. Ribas was aware that dairy activity was not the primary interest of many dairy suppliers. Milk extraction and the production of dairy products complemented the income of small properties, but these activities could be easily replaced with something else if expenses increased. The government had imported pedigree animals and subsidised artificial insemination in an attempt increase the size of cattle herds. Demand for

⁴⁵⁷ ‘Curitiba, cidade do futuro’, *A Divulgação*, 1 (1947), 7.

meat and milk was much higher than suppliers could satisfy, and Curitiba, the largest town of Paraná, exhausted its supplies. Restrictive measures, such as mandatory pasteurisation, put everything at risk. To complicate matters further, the Women's Association of Curitiba supported the dairy farmers.⁴⁵⁸ At the beginning of the third week of the strike, when milk prices had doubled, the government retreated; it allowed unpasteurised milk to be sold as long as consumers were made aware of health risks and warned that the customer would be responsible for boiling milk to avoid contamination. However, the relaxed control of the dairy supply did not help to increase the quality of the products that reached consumers. The following year, 1937, almost eight thousand bottles of milk were destroyed for either being contaminated with bTB or chemically altered.⁴⁵⁹

Throughout the 1940s, Curitiba would remain the site of control for the sanitary standards before they could be applied to the rural activities of the countryside. The Laboratory of Chemical Analysis, for example, had been created with the primary role of controlling the quality of dairy products. In 1941, Theodorico R. Silva, one of the leading technicians at the laboratory, presented a PhD thesis titled 'Aspects of Milk Sanitary Control in Curitiba' at the Faculty of Medicine.⁴⁶⁰ Silva had access to all samples sent from collection points in Curitiba, and his laboratory was capable of testing them. Several different procedures indicated the acidity as well as the quantity of pathogenic microorganisms present in the samples, among other things. His thesis described in detail several ways in which the defilement of milk occurred in Curitiba and demonstrated the extremely high rates of contamination by *Escherichia coli* (*E. coli*) and other bacteria. Silva's attention was drawn to tuberculosis because the low acidity level found in several samples suggested that the milk was probably contaminated with bTB. A high percentage of calcium was a safe indication that bTB was

⁴⁵⁸ Siqueira, *Lacen - Laboratório Central do Estado*.

⁴⁵⁹ Manoel Ribas, *Mensagem do Governador Manoel Ribas*, (Curitiba, 1937), p. 46.

⁴⁶⁰ Theodorico Raphael Silva, 'Aspectos da fiscalização sanitária do leite de Curitiba', (unpublished UPR Ph.D. thesis, 1941).

present, and Silva confirmed this in at least one of his trials. The main challenge in controlling bTB occurred when farmers in Curitiba sold animals that had reacted positively to tuberculin to ranchers in the countryside, who had limited access to markets.⁴⁶¹

Other specialists agreed with Silva's assessment of the risk posed by bTB to the human population. Medical literature arriving in Curitiba in the early 1940s suggested that the disease posed particular risks to children. In 1940, an article by Alexandre Mello, Director of the Bureau of Animal Industry of São Paulo, was circulated in Curitiba and indicated mounting evidence that bTB was the main source of tuberculosis in children. According to Mello, no less than fifty per cent of cases of infant tuberculosis in England and sixteen per cent of cases in Germany were believed to originate from bTB. In Brazil, the evidence suggested that the bovine strain of tuberculosis was also found in cases of children who died from tuberculosis meningitis. The solution that veterinarians in São Paulo devised to tackle the problem was the application of stricter rules concerning pasteurisation. However, in São Paulo, too, there were problems. Many consumers still preferred unpasteurised milk because they believed it was stronger and tastier; the resulting demand allowed an unregulated market to prosper.⁴⁶² Researchers were aware of these challenges and remained adamant that all milk, even pasteurised milk, be boiled before consumption.⁴⁶³ Virulent tubercle bacillus had been found in samples of pasteurised milk, and Alexandre Mello attributed this contamination to malfunctions in the pasteurisation equipment, a common problem at that time.⁴⁶⁴

⁴⁶¹ *ibid.*

⁴⁶² Alexandre Mello, 'O leite', *Boletim de Indústria Animal*, 6 (1943), 3-8.

⁴⁶³ Alexandre Mello, 'Leite e tuberculose infantil', *Revista de Agricultura*, 3 (1940) 3-7.

⁴⁶⁴ Alexandre Mello, 'Pesquisa de M. tuberculosis no leite pasteurizado da capital', *Boletim da Indústria Animal*, 5 (1943), 7-14.

4.3 – The Faculty of Agronomy and Veterinary Medicine of Curitiba

It is in the context of a booming rural industry and of the cascade of related problems it generated, that the development and extensive duties of the Faculties of Agronomy and Veterinary Medicine of Curitiba must be placed. Professors and former students of these faculties would be at the forefront of the major changes that transformed the landscape and the rural economy of the state. As in Porto Alegre, both faculties in Curitiba were founded in 1918 to work alongside each other. Initially, they were called the Veterinary Medicine and Agronomical School and identified the improvement of the agricultural capabilities of Paraná through technical training and applied research as their objective.⁴⁶⁵ Members of the political elite, involved in the agricultural sector and therefore aware of the relevance of their activity, were behind the idea of the school. More importantly, the first generation of veterinarians and agronomists – who would engage locally in research over the following decades – was mainly comprised of the school's former students. Among these students were Oscar Palmquist and Lycio de Castro Velloso; their research activities will be analysed in more detail below.

The main peculiarity of the faculties in Curitiba is the degree of political interference they were subjected to, something that rarely comes up, for example, in the available sources from Porto Alegre. Manoel Ribas, in particular, tried several times to dictate how the Faculty of Agronomy and Veterinary Medicine in Curitiba should be run. During the period between 1933 and 1940, his interference is described as having been the most damaging. Ribas often demanded that professors who were allied to his political adversaries be expelled from the school. When the Director of the Faculty refused to comply with Ribas' demands, the governor cut finances, and professors remained without salaries for months.

⁴⁶⁵ Maria Elizabeth Lunardi, 'Organização da ciência no Paraná', (unpublished Unicamp Masters dissertation, 1993), p. 65.

In 1941, the Federal Government accredited the Faculty after a request was issued from professors who hoped to escape Ribas' grip. But in 1944, changes in the national legislation favoured Ribas, who once again managed to change the name of the Faculty to the Superior School of Agriculture and Veterinary Medicine (*Escola Superior de Agricultura e Veterinária*). This change represented a step closer to maturing into a higher education institution and created a more visible division between the two areas. But the new arrangement cut funds from the federal government and the Superior School was again forced to rely solely on the state, becoming time and again the victim of political mismanagement.⁴⁶⁶ The situation at the Superior School only began to improve after Ribas' term of office expired in 1945. The following governor helped to change the status once more from a Superior School to a Faculty, and the request for nationalisation was made independently from the University of Paraná, as will be explained in Chapter Six.

During this phase of marked political tensions, research was not among the top priorities of the Faculty of Agronomy and Veterinary Medicine. There was a so-called experimental farm, the *Granja Canguiri*, where students were supposed to undertake fieldwork.⁴⁶⁷ In reality, however, Governor Ribas had donated this area to the faculties because it was a prerequisite for granting the official license to educational institutions. The barns, which were supposed to be used for practical classes, sheltered the stallions used by the state for breeding, as part of an initiative by Ribas' to stimulate animal husbandry.⁴⁶⁸ Lycio Velloso de Castro, who would become Director of the Faculty of Agronomy and Veterinary Medicine, recalled in 1959 that the objective of the Faculty had always been teaching rather than research. If both coexisted within the faculties, the place of research would only be to assist and complement teaching.⁴⁶⁹

⁴⁶⁶ Luiz Doni Filho, *História da Escola Agrônômica do Paraná* (Curitiba, 1995).

⁴⁶⁷ As suggested in Anchises Marques Faria, 'Uma escola que eleva o ensino superior do Paraná', *Página Rural* 1(1945), 26-9, p. 27; 'Escola Agrônômica do Paraná, C.E.Q.', 61 (1940), 593.

⁴⁶⁸ Castellano Netto, 'Um Estabelecimento de criação que orgulha a Terra das Araucárias', *Página Rural*, 1 (1945), 20-1: p. 21.

⁴⁶⁹ FAV-PR, DIM, ADM, *Bases para um "Plano Diretor"*, (1959), p. 23.

When the academic cultures of the faculties of agronomy and veterinary medicine in Porto Alegre and Curitiba are compared, they appear to stand a world apart. Sources from the faculty in Curitiba do not reveal, for instance, the same struggle for recognition that existed in Porto Alegre. In 1945, when a local magazine interviewed Anchises Marques de Faria, Director of the Faculty of Agronomy and Veterinary Medicine of Curitiba, he stated that the institution's aim was to 'train apt and efficient technicians'.⁴⁷⁰ The word *technician* here (*técnico* in Portuguese) differs from *engineer* (*engenheiro*), which was the title used by undergraduates in Porto Alegre. Technician inferred a low-skilled and often a manual labourer who would assist stockowners and farmers in practical tasks. In the available sources, there are few indications that veterinarians and agronomists in Porto Alegre made attempts to compete on equal terms with physicians. This was undoubtedly one of the main contrasts with Porto Alegre, where members of the Faculty of Veterinary Medicine demanded the same treatment as other prestigious professions, such as medicine; frequently, their demands were successful.

⁴⁷⁰ Faria, 'Uma escola que eleva o ensino superior do Paraná', p. 26.

4.4 – The Institute of Biology and Technological Research

One of the main reasons that research practices failed to develop in the faculties of agronomy and veterinary medicine in Curitiba was that the Institute of Biology and Technological Research (hereafter IBTR) was considered to be their extension. The almost symbiotic relationship between the faculties and the IBTR is one of the main peculiarities of the faculties of agronomy and veterinary medicine in Curitiba. The establishment of the IBTR was another of Ribas' initiatives during the early 1940s.⁴⁷¹ It started as the Laboratory for Research and Analysis (LRA), for the support of agriculture and animal husbandry. At the head of this research facility was Marcos Augusto Enrietti, who had studied with Oscar Palmquist in the Faculty of Veterinary Medicine of Curitiba. Enrietti was born in Brazil, but he moved to France in 1926 to study at the *École d'Agriculture Defumade D'Ahun* in the La Creuse department.⁴⁷² After his return, he completed his studies at the Faculty of Veterinary Medicine before taking over the IBTR. His widowed mother had married the Governor Manoel Ribas, the main patron of his stepson's research institute. Enrietti founded the IBTR in 1942 expanding the former Institute of Animal and Plant Biology.⁴⁷³

Enrietti's centre was officially established with the objective of 'supporting and improving agriculture, livestock and industry in every possible way'.⁴⁷⁴ Six laboratories were created for agricultural and technological analysis, bacteriology, mineralogy, phytopathology, cytology and parasitology.⁴⁷⁵ The IBTR and the Faculty of Agronomy and Veterinary Medicine were located at opposite sides of the same street, the *Rua dos Funcionários*. Clotilde Branco, a former student of the Faculty of Veterinary Medicine and later researcher at the IBTR, stated that in the 1950s, it was common for students to use the IBTR facilities for practical classes.

⁴⁷¹ PAP, DPD, GRE, 1942 MNF 1143, *Realizações do Governo 1937 – 1942*.

⁴⁷² Ibid.: p. 83.

⁴⁷³ Lunardi, 'O IBPT', pp. 27-100.

⁴⁷⁴ Alexandre Zainko, 'Objetivos', *Boletim do Instituto de Biologia Agrícola e Animal*, 1 (1941), 1-57: p. 4.

⁴⁷⁵ Ibid.: p. 18.

According to Branco, if students wanted to undertake practical work, they could simply ‘cross the street’.⁴⁷⁶ It was well known in the Faculty of Agronomy and Veterinary Medicine that Marcos Enrietti had an open door policy for students. Chairs, who also held research positions, also benefited from this policy. Oscar Palmquist and Lycio Vellozo, for example, had an academic position at the Faculty of Veterinary and a part-time job in the IBTR.⁴⁷⁷

Former students of the faculties of agronomy and veterinary medicine actually occupied various positions within the IBTR. Palmquist himself (1941-1966) studied in the same class as Enrietti. Similarly, Lycio de Castro Velloso, who headed the Division of Phytopathology in the Agriculture Division of the IBTR (1943-1962), studied in the Faculty of Agronomy. More importantly, Enrietti, Palmquist and Velloso became chair holders early in their careers and continued to hold these positions after nationalisation. A number of foreign researchers were also invited by Enrietti to run divisions of his institute.⁴⁷⁸ These individuals happened to be in Curitiba for several reasons, one of which was to hold teaching positions at the University of Paraná. This was the case for the German geologist, Reinhard Maack (1892-1969), head of the Geology Division (1945-1962), and the Austrian chemist, Hans Ludwig Weber (1899-1967), head of the Chemistry Division (1941-1966).

⁴⁷⁶ Clotilde Branco, Interview, 01/April/2012.

⁴⁷⁷ In a report to the UNESCO Agency in Montevideo written in 1949, Marcos Augusto Enrietti stated that he was the single full-time employee of the IBTR. All of the staff, including division directors, were recorded to have part-time positions, see PAP, DSA, MRE, *Relatório da Contabilidade*, ‘Síntese da Organização Técnico-Científica do Instituto de Biologia e Pesquisas Tecnológicas, (1949), pp. 2-3.

⁴⁷⁸ Jaques Brand and Regina C. Z. Rocha, ‘Do IBPT de Marcos Augusto Enrietti ao Tecpar’, (Curitiba, 1991).

The focus on zoonosis

As zoonosis and entomology are the focus of the case studies below, the divisions in charge of these areas at the IBTR must be briefly introduced. Regarding animal diseases, the founding document of the IBTR made it clear that Enrietti intended to focus on the area of animal husbandry. The new research centre was to be ‘a specialised institution, to develop theoretical and practical studies [...] aimed at improving [...] animal husbandry’, under the leadership of Oscar Palmquist. Two divisions were created with the purpose of achieving this aim: the ‘Division of Bacteriology and Fermentation Industry’ and the ‘Division of Parasitology and Zoology’.⁴⁷⁹ The former was under Palmquist’s direct supervision and handled the production of vaccines and veterinary products, and the latter studied specific problems raised by ranchers and stockmen.⁴⁸⁰

The IBTR’s first publication re-emphasised that its primary objective was to focus on animal husbandry. Enrietti went so far as to add a subtitle under the IBTR name: ‘Science - To serve Agriculture and Animal Husbandry in the Government of Manoel Ribas’. Throughout the publication, stockmen were constantly quoted alongside industrialists and farmers, as the groups the IBTR would assist.⁴⁸¹ It was stated, for instance, that ‘the combat of epizootic diseases through study and training of stockmen’ would be a primary aim of the institution; in particular, it focused on promoting ‘study and research into industrialisation, transformation and use of animal origin products’. Palmquist would also be in charge of animal bacteriology studies, research on epizootic diseases and the means by which they could be combatted, and preparation of serum, vaccines and drugs for the treatment of animal diseases.⁴⁸² Therefore, at

⁴⁷⁹ Manoel Ribas, Angelo Lopes and João Oliveira Franco, *Decreto-Lei Nº.11.008*, (1941).

⁴⁸⁰ PAP, DSA, SRL, *Recebidos e Expedidos 1940*, From Marcos Enrietti to Sandoval Ribas, (8 Aug. 1940); PAP, DSA, SRL, *Recebidos e Expedidos 1940*, From Oscar K. Palmquist To Sandoval Ribas, (20 July 1940).

⁴⁸¹ Alexandre Zainko, A ciência no governo Manoel Ribas a serviço da agropecuária’ *Boletim do Instituto de Biologia e Pesquisas Tecnológicas*, 1 (1941), 1-25.

⁴⁸² *ibid.*, p. 21.

least on paper, not only was the IBTR conceived to assist animal husbandry, but Palmquist's division was also specifically organised to achieve this aim.

Although Marcos Enrietti had announced his intention to centralise research on bovine zoonosis, including bTB, in practice the reality was rather different.⁴⁸³ In 1945, no less than five years after foundation of the IBTR, little had been accomplished. In December of that year, the veterinarian Heitor Medina, head of the Division of Anatomical Pathology, disclosed this slow progress in a letter to Enrietti:

‘There are many diseases affecting our cattle about which we currently know little or almost nothing, both from a nosological or statistical point of view. So much so that in order to write this report we tried to gather information about the most common maladies and got nothing more than fragmented information about some cases verified by our technicians [...] Therefore I take the liberty to remind you once more about the need to organize a group that could, at any time, go to the countryside in cooperation with inspectors, already there, to carry out studies and to collect samples for research. These studies will not only be useful to the population, but will also increase the scientific research output of the IBTR, unquestionably leading to our recognition within our borders and beyond.’⁴⁸⁴

It is clear that while Medina revealed his inadequate knowledge about what was taking place in the state, his primary concern was that the IBTR receive recognition from its peers. As he stated further on,

‘I could notice during my training period at the Biological Institute, in São Paulo, that the IBTR begins to be seen as an institution that is up to their level considering the dedication of its technicians who went there to improve their skills. It is therefore logical that we might be able to show at any given time that we take care of our regional zoonosis and do not allow other technicians to come to discover things that we, by obligation, have the duty to teach them about.’⁴⁸⁵

Medina wanted to gain recognition from the Biological Institute in São Paulo because IBTR personnel respected it. Enrietti, for instance, referred to the Biological Institute when he

⁴⁸³ There is evidence that bTB was among the initial zoonoses to be studied at the IBTR, see PAP, DSA, SRL, *Recebidos e Expedidos 1940*, From Enrietti to Director, (30 Dec. 1940).

⁴⁸⁴ PAP, DSA, IAR, Heitor Medina, ‘Serviço de anatomia patológica’, *Relatório de 1945*, (1945), pp. 48-49.

⁴⁸⁵ *ibid.*

set up his own institute. The initial official logo of the IBTR was almost identical to that of the Biological Institute, which was the ‘Protection of Agriculture and Animal Husbandry’.⁴⁸⁶ In Paraná, Enrietti made just a small change to the title of the IBTR, replacing the term ‘protection of’ with ‘to serve [...] animal husbandry’.⁴⁸⁷ In addition, most of the training for positions at the IBTR took place at the Biological Institute. Among those who trained in São Paulo were individuals who, on different occasions, ran IBTR divisions. For example, Heitor Medina (Division of Anatomical Pathology 1941-1942), Milton Giovanonni (Division of Parasitology 1941-1942) and Milton Miró Vernalha (Division of Entomology 1950-1951) all trained at the IBTR. Gastão Kubiak, an active research assistant of the Division of Parasitology, also trained for three months at the Biological Institute.⁴⁸⁸

The status of the Biological Institute was the main factor that prompted considerable attention to cattle diseases in São Paulo. In the case of bTB, the Biological Institute had recommended tuberculin testing for any new cattle purchases and the systematic testing of closed and open range herds since 1937.⁴⁸⁹ In 1938, the year that Outubrino Correa published his series of articles on tuberculin testing, P.N. Faria, a researcher from the Biological Institute, also published research about tuberculin testing, detailing how it should be administered as well as the options available to do so.⁴⁹⁰ Whether Medina, the author of the report about the unfamiliarity of IBTR researchers with the situation in the countryside, read these studies is unclear, but he did not investigate this topic after he returned home. When he arrived in Curitiba, Medina declared his intent to focus on three specific diseases; unsurprisingly, these were the same ones being studied at the Biological Institute, namely, equine encephalomyelitis, paracoccidioidomycosis and equine trypanosomiasis. It is noteworthy that none of these were

⁴⁸⁶ Schwartzman, *A space for science*, p. 144.

⁴⁸⁷ Zainko, *A Ciência*, p. 2.

⁴⁸⁸ PAP, DSA, MRE, Gastão Victor Kubiak, *Relatório do Estágio*, (1945).

⁴⁸⁹ G.T. Carvalho, ‘Resultados obtidos na tuberculinização de bovinos’, *O Biológico*, 3 (1937), 33-5.

⁴⁹⁰ P. N. Faria, ‘Tuberculinização’, *O Biológico*, 4 (1938), 141-4.

cattle diseases. Paracoccidioidomycosis is a fungal infection that affected horses and mules. The fact that researchers knew little about its vector made it a topic of increasing interest in São Paulo, since it caused symptoms similar to pulmonary tuberculosis in man. Encephalomyelitis and trypanosomiasis primarily affected horses.

The focus on agricultural entomology

A second area of the IBTR necessitating consideration is pest control; this was the division with which Lycio Velloso, the main character of one of the following case studies, was directly involved. Marcos Enrietti argued that the top priorities of his research centre included not only confronting zoonosis in the state of Paraná but also combatting agricultural pests. This public commitment is significant in the context of the unprecedented scale in which pesticides would be introduced in Paraná in the late 1940s. Large quantities of pesticides, particularly BHC, were used to control agricultural pests and insect-borne disease vectors. However, the unbridled deployment of BHC took place independently of the IBTR despite the fact that Enrietti persistently presented it as the main centre for pest control in the state. When Enrietti's stepfather, Governor Manoel Ribas, signed the official decree creating the IBTR, one of the eleven objectives of the new institution was 'to be in charge of campaigns against pests that might threaten the state's crops and to carry out chemical analyses of pesticides'.⁴⁹¹ More explicitly, the study of pesticides was central to the mission of two entire divisions of Enrietti's research centre. The Division of Parasitology and Zoology was conceived to study and identify ways of tackling protozoa, arthropods, and worms, among other things that caused or transmitted diseases to animals. One of its main priorities, for instance, was the study of ticks

⁴⁹¹ Ribas, Lopes, and Franco, *Decreto-Lei N°. 11.008*, p. 17.

and methods for their eradication.⁴⁹² Another division in which the extermination of insects played a major role was the one led by Lycio Castro Velloso and dedicated to phytopathology and entomology. This division was conceived to study microorganisms and plants that were harmful to crops, the efficiency of fungicides and pesticides, and other alternatives for biological control. More importantly, it was expected to undertake research on pests that threatened the state's crops.

The intention of the IBTR to develop expertise on agricultural pests was further confirmed by its attempt to organise a technical library on agricultural pests. This was accomplished through an exchange of publications initiated when its first bulletin became available in 1941. The bulletin was increasingly used to request exchanges from research centres in Brazil and overseas. In 1946, when this bulletin was replaced by a journal, interactions with other institutions steadily grew.⁴⁹³ Eventually, the IBTR built the most up-to-date library concerning insecticides and agricultural pests. It could be expected, therefore, that the administration of large quantities of pesticide in Paraná was the result of the IBTR advising local authorities and interacting with local farmers and research communities outside Paraná. After all, this was the IBTR's statutory role, and the institution also concentrated information about ongoing research on pesticides. The IBTR should have communicated the potential benefits – or risks – of pesticide use to the population and aided authorities in devising strategies against agricultural pests. Yet, as detailed below, IBTR researchers did not actively

⁴⁹² And, in fact, it was mentioned in one of the first works of the IBTR, see Milton Giovannoni, 'Principais parasitoses dos equinos', *Instituto de Biologia e Pesquisas Tecnológicas*, 6 (1943), 1-57, p.47.

⁴⁹³ For examples of studies on pesticides being carried out in research centres that exchanged publications with the IBTR, see Raimundo Faria, 'Combate às moscas', *Revista Ceres*, 6 (1944), 95-107; Frederico Vanetti, 'Ligeira orientação sobre o combate químico às pragas das culturas', *Revista Ceres*, 7 (1947), 210-34. The Biological Institute also developed a systematic work on pesticides. There is evidence of field and laboratory trials being carried out with pesticides particularly after 1945. Products were tested against a broad variety of pests as several works attested, see N.G. Planet, 'O expurgo pelo brometo de metila', *O Biológico*, 13 (1947), 56-61; A.C. Andrade, 'Como obter êxito na pulverização das plantas', *O Biológico*, 13 (1947), 97-103; H.S. Lepage and O. Giannotti and A. Orlando, 'Observações relativas a atividade de diversos inseticidas', *O Biológico*, 13 (1946), 228-32; H.S. Lepage and O. Giannotti, 'Progresso nos campos dos inseticidas e fungicidas', *O Biológico*, 11 (1945), 101-6.

engage in studies on pesticides before nationalisation. This lack of initiative was paralleled by Palmquist's reluctance to engage with tuberculin studies in spite of overwhelming evidence of bTB among dairy herds supplying milk to Curitiba. Both attitudes are even more revealing when considered alongside the effort made by Enrietti to centralise his research in those areas in his institute, as explained below.

4.5 – The Centralisation Feature: The Service of Livestock Sanitary Control and the Service Against the Berry Borer

One of the main characteristics of these IBTR divisions was the centralisation of research activities directly and indirectly related to animal husbandry and pest control. Whereas in Porto Alegre the IVRDF was only one among several state research settings, the IBTR centralised virtually all the activities related to agriculture and animal husbandry in Paraná. This is relevant to both animal sanitary control and entomological activities because this centralisation, in many ways, defined the limits within which researchers outside the IBTR could work. Moreover, it undoubtedly enforced a standardised research culture for those inside Enrietti's institute.

In the case of animal husbandry, Governor Ribas created the Service of Livestock Sanitary Control in 1943 to assist 'the main livestock centres of the State, with the objective of dealing with endemic and epidemic diseases, whose consequences are so disastrous to the public economy'.⁴⁹⁴ The objective of this service was to put into practice the Federal Law of Sanitary Control (number 24.548) in Paraná. This legal instrument established the sanitary guidelines within which the entire Brazilian livestock industry should operate, and Marcos Enrietti initially wanted to gain control of the livestock industry, which would give inspectors and all IBTR employees the power to control and inspect the circulation of livestock as well as the commercialisation and rearing of animals for human consumption. IBTR officers could

⁴⁹⁴ PAP, DSA, IAR, '*Relatório de 1946*', Service of Livestock Sanitary Control, (1946), p. 50.

also fine stockmen and slaughterhouses for not complying with the regulations. Anchises Marques de Faria, who would be in charge of the service, asserted that the IBTR was not in a position to undertake that additional work.⁴⁹⁵ Yet, at the insistence of Enrietti, the IBTR eventually took on the responsibility.

Enrietti implemented the service by setting up ten regional divisions that would control all ranching activity and report back to him in Curitiba.⁴⁹⁶ The Service of Livestock Sanitary Control was responsible for controlling animals purchased overseas and checking whether they had a certificate indicating a negative reaction to tuberculin testing. The same would be done regarding interstate exchanges, which IBTR inspectors were entitled to check and stop, if necessary. IBTR inspectors were also permitted to destroy animals that were contaminated with bTB without having to compensate either the buyer or the seller. In addition, the sanitary code explicitly mentioned that inspectors were expected to consider tuberculosis a priority; the disease was to be monitored in cattle, poultry and swine. Besides devising prophylactic campaigns, inspectors had the legal authority to order the destruction of contaminated animals already in the state.⁴⁹⁷ Therefore, in the area of tuberculin administration and prophylactic measures against bTB, there is little doubt that the IBTR and the Service of Livestock Sanitary Control provided infrastructure, funds and legal guidelines for researchers working in Paraná like Oscar Palmquist, who was the equivalent of Outubrino Correa. By analogy, the activity in

⁴⁹⁵ PAP, DSA, MRE, *Documentos Diversos*, Parecer, (1943).

⁴⁹⁶ PAP, DSA, IAR, *Service of Livestock Sanitary Control*, 'Relatório de 1944', (1944). In 1948, the Service of Livestock Sanitary Control was still not independent of the IBTR, see Lupion, '*Mensagem Apresentada à Assembléia Legislativa do Estado*', (Curitiba, 1948), p. 20.

⁴⁹⁷ Juarez N. F. Távora, 'Decreto-Lei N°. 24.548', (Curitiba, 1934). It is noteworthy that IBTR's Service of Livestock Sanitary Control was not the same as the Animal Production Control under the Department of Agriculture of Paraná. These two services were separate in Paraná. IBTR technicians controlled the welfare of animals while the Animal Production Department inspected their products. The IBTR inspected a broad variety of animal and vegetable products, from apricots and canned sardines to water, tea and coffee; but milk was outside their jurisdiction. In any case, from government reports circulating in the IBTR they would have known that milk control was not being undertaken properly. An official report in 1948 stated that the Animal Control Division was severely understaffed and that most of its technicians were undertaking tasks other than those to which they had been assigned. Moysés Lupion, '*Mensagem Apresentada à Assembléia Legislativa do Estado*', (Curitiba, 1948), p. 21.

Curitiba could have included the mapping of bTB outbreaks, administration of systematic tuberculin testing and implementation of prophylactic campaigns.

A second area that Marcos Enrietti managed to centralise in his research centre included campaigns against agricultural pests. The best example of this initiative was the campaign against the insect known as coffee berry borer (*Hypothenemus Hampei*), which attacked farms in the northern region of Paraná. This campaign was well funded and implemented research methods used by the Biological Institute in São Paulo. Initially, Enrietti authorised and oversaw the establishment of a field station in the city of Jacarezinho, at the centre of the region where most of the coffee farms were located.⁴⁹⁸ One supervisor, four agronomical engineers, five field inspectors, and fourteen technicians initially staffed this field station; all reported to Enrietti in Curitiba via the station supervisor.⁴⁹⁹ The field station personnel was responsible for the campaign against the berry borer, which was initially undertaken exclusively through biological means. Enrietti named his field station ‘Service to fight the Coffee Berry Borer’ and defined the inspection of farms, the creation of quarantine zones, and the issuing of permits for vehicles to circulate between those zones among its major responsibilities. In fact, most of the reports submitted to Enrietti in Curitiba concentrated on the circulation of vehicles in rural areas. Technicians in the field argued that as insects continued to linger in the stalks after harvests, rigorous control of vehicle circulation was essential. Laws that authorised IBTR personnel to identify areas of risk enforced this control. A property or region identified as contaminated was put in quarantine under the control of IBTR personnel in the field, and its vehicles were forbidden to leave without fumigation.

The second part of the biological control devised by Enrietti’s service included mapping out the outbreak foci and coordination of countermeasures. IBTR technicians maintained that

⁴⁹⁸ PAP, DAS, IAR, *Relatório de 1945*, Acir Almeida Pinto, ‘Serviço de combate a broca do café’, (1945).

⁴⁹⁹ PAP, DSA, MRE, *Relatórios da S.C.O.I.*, ‘Estrutura do pessoal fixo durante o quinquênio’, (1946).

to deploy these strategies it would be necessary to inspect coffee farms to check infestation levels. IBTR personnel required free access to farms to examine warehouses and other storage facilities in their search for potential foci of berry borers. After this inspection, an estimate of the number of coffee plants in each farm was reported to Enrietti in Curitiba. In one month, field inspectors visited more than one hundred properties.⁵⁰⁰

⁵⁰⁰ PAP, DAS, IAR, *Relatório de 1945*, Acir Almeida Pinto, 'Serviço de combate a broca do café', (1945).

Case Study Five – Research Practices at the Faculty of Veterinary Medicine: The Case of Oscar Palmquist

The Clear and Evident Risk: Local Context of Animal Tuberculin

The first case study of this chapter will focus on the practices of Oscar Krebs Palmquist. Palmquist had many things in common with Outubrino Correa, whose trajectory was studied in Chapter One. Both were born in small towns in Rio Grande do Sul, and both of their families moved to southern capitals before they entered the Faculties of Veterinary Medicine. They not only chose the same undergraduate courses, Palmquist in Curitiba and Correa in Porto Alegre, but they also completed their courses in the same year, 1936. After graduation, both entered public service in 1937; their first jobs were equally relevant to livestock sanitary control. Whereas Correa began his epidemiological studies within the SDAIC, Palmquist became Veterinary Inspector in charge of sanitary conditions in slaughterhouses. Like Correa, Palmquist would also teach at the Faculty in which he studied as an undergraduate while doing research in a local veterinary research centre.⁵⁰¹ Palmquist even used and quoted from the same journals as his counterpart in Porto Alegre did. In addition, as has been demonstrated thus far, Palmquist had funds at his disposal, and, more importantly, he had access to technical solutions supported by reasonably standardised research tools, such as tuberculin. However, when the careers of Correa and Palmquist are compared from the perspective of their achievements in the area of tuberculin use and its research, they stand a world apart.

The disparity between their attitudes towards tuberculin cannot only be ascribed to a different perception of risk. As explained above, Governor Manoel Ribas had been personally involved in these issues in the late 1930s. The involvement of both specialists and major political figures with the issue of bTB suggests that perception of the risk posed by that disease

⁵⁰¹ 'Oscar K. Palmquist', *Revista IBPT*, 14 (1970), 85.

was similar in Curitiba and Porto Alegre and cannot, therefore, explain the striking differences in the way veterinarians in both towns engaged with the problem. More specifically, the distinct approaches of Palmquist and Correa cannot only be ascribed to the absence of information about what tuberculin could accomplish. For instance, João T. Zago, a student from the Faculty of Veterinary Medicine, published an article in the local newspaper, *Correio do Povo*, in 1941, drawing attention to the risk of bTB. His cautionary remarks echoed the guidelines adopted in Porto Alegre, including the necessity of using tuberculin, the three methods of tuberculin use and the high risk of infection from animal to man.⁵⁰² Two years later, in 1943, Jaziél Soto Maior Lagos presented a thesis titled ‘Veterinary inspection routine of hogs contaminated with tuberculosis and cysticercoids in slaughterhouses and lard factories’, this time at the Faculty of Veterinary Medicine of Curitiba.⁵⁰³ Lagos was the Chief Inspector of the Regional Division of the Bureau of Animal Industry, which gave him first-hand knowledge regarding the standard of stock farms in the state. He suggested that in the absence of clinical symptoms, veterinarians must use tuberculin tests to check for contamination in suspected herds. He cautioned, nonetheless, that in Paraná a positive reaction was not a reason to destroy an animal but the opposite; it simply accelerated its slaughtering for consumption. Lagos warned that in the case of contaminated animals, meatpackers had to take extra precautions in disposing internal organs in order to avoid hazardous discharges reaching the population through rivers or streams. He also warned the authorities that the sterilisation equipment on some meatpacking premises, used for carcasses of animals contaminated with bTB, were not always in prime condition and, in fact, sometimes did not exist.⁵⁰⁴

This sort of evidence demonstrated that tuberculin was a well-known technology that could assist in the improvement of milk quality, and the annual consumption of milk in the city

⁵⁰² João T. Zago, ‘Cuidemos de nossa criação’, *Gazeta do Povo*, (21 May 1941), 16.

⁵⁰³ Jaziél Soto Maior Lagos, ‘Rotina de inspeção veterinária nos suínos apresentando tuberculose e cisticercose’, (unpublished UPR Animal Products Inspection and Industrialization Chair admission’s Thesis, 1943).

⁵⁰⁴ *ibid.*

of Curitiba was 4.4 million litres per year.⁵⁰⁵ Despite the availability of information concerning the potential risk of bTB, however, less than thirty per cent of that volume was pasteurised. By the time Palmquist entered public service, evidence of this risk circulated freely in Curitiba, and several of his colleagues studied, published and highlighted the usefulness of tuberculin in identifying contaminated herds.

There are, however, significant differences in the institutional research cultures of the IBTR and IVRDF, which allowed researchers at each institute to handle outbreaks of bTB differently. For instance, unlike events in Porto Alegre related to the foot-and-mouth disease outbreak, no short-term major outbreak confronted Enrietti and Palmquist. They clearly did not organise their research centre around a specific zoonosis, as had been the case with the IVRDF in Porto Alegre. The outbreak of foot-and-mouth disease was the impetus behind the establishment of the laboratory in Porto Alegre, but it neither reached Paraná with the same intensity nor triggered the search for an external specialist to tackle the problem, like Sylvio Torres, who had a solid background in vaccine research. The IBTR research agenda was tentative and ambitious and was probably inspired by the Biological Institute's own foundational goals. It is likely that researchers like Palmquist were free to pick any topic they wished within the far-reaching range of goals stated in the institution's initial letter of intentions. In fact, right after the founding of his first laboratory, Enrietti sent several letters to other research centres asking for samples of bacteria for studies in its new facilities. He wrote:

‘Having the Paraná government created this Laboratory which is aimed at the protection of agriculture and animal husbandry, and not possessing samples of most of the main germs, [...] I request your kindness in supplying, as soon as possible the, following strains:...

A list of twenty-two pathogens including brucellosis, different strains of salmonellas and, more importantly, bTB followed.⁵⁰⁶

⁵⁰⁵ Rodrigues, *A saúde pública no Paraná*, p.175.

⁵⁰⁶ PAP, DSA, SRL, *Recebidos e Expedidos 1940*, From Marcos Augusto Enrietti to undisclosed, (30 Dec. 1940).

Oscar Palmquist's Research Activities

The answers received by Enrietti are unknown, but Oscar Palmquist's research activities revealed an agenda focused on a broad and unspecific range of topics. The Division of Bacteriology and Fermentation Industry that he led was effectively focused on zoonosis but not directly on bTB. In 1945, Palmquist's laboratory produced more than 100,000 vaccine doses against equine adenitis, calf diarrhoeas, blackleg infection (caused by the *Clostridium chauvoei*), avian pox, mange in cattle (caused by anthrax) and rabies.⁵⁰⁷ These diseases were usually fatal and highly transmissible; calves were particularly vulnerable when cattle herds were affected. In other words, Palmquist's priorities were diseases that brought considerable losses to stockmen. In terms of technology, these vaccines were not as complex as those against foot-and-mouth disease nor were they as dangerous as those against brucellosis, both of which were known to Palmquist.⁵⁰⁸

There is little evidence as to why Palmquist chose these specific diseases, nor is there information as to the actual effectiveness of these vaccines. However, sources indicated that he probably had a limited perspective on the needs and requirements of stockmen. By the mid-1940s, Palmquist had no difficulty making his laboratories work at their full capacity. His main concern was how to sell more of their products. He complained that he could considerably improve production of vaccines if sales representatives correctly advertised what they could offer.⁵⁰⁹ Palmquist's effort to improve the public image of the IBTR was voiced since its foundation in 1941. When the institute's first journal appeared, the opening editorial declared that the publication's goal was to make propaganda on behalf of the IBTR. In Portuguese,

⁵⁰⁷ PAP, DAS, IAR, Oscar K. Palmquist, 'Divisão científica de bacteriologia', *Relatório de 1945*, (1945).

⁵⁰⁸ There is evidence that Palmquist worked with the rabies vaccine since 1940, see, PAP, DSA, SRL, *Recebidos e Expedidos 1940*, From Marcos Enrietti to Sandoval Ribas, 28 Dec. 1940. The same vaccines produced by Palmquist were easily available from other suppliers see, 'Senhores Criadores', *A Granja*, 6 (1950), 9; 'Vacinas Manguinhos', *A Granja*, 6 (1950), 9.

⁵⁰⁹ PAP, DAS, IAR, *Relatório de 1945*, Oscar K. Palmquist, 'Divisão científica de bacteriologia', (1945).

propaganda means advertising as opposed to *divulgação*, which is to provide information or to establish communication. It was clear that the IBTR was not trying to communicate or exchange information but to establish a one-way channel of communication.

This lack of interest in engaging stockowners, which was in opposition to the initial all-encompassing declaration of serving animal husbandry, eventually created problems for the IBTR. Not only were the IBTR's products barely known, even around the metropolitan region of Curitiba, but the Service of Livestock Sanitary Control also faced great difficulties in performing its duties. In 1945, Dilermando Pereira de Almeida, one of the IBTR's field inspectors, sent a letter to Palmquist requesting that farmers and stockmen be informed of services provided by the IBTR. Almeida complained that the image of the Service of Livestock Sanitary Control in Paraná was negative because stockmen believed that the state did not have the resources to help them. When Almeida visited properties, 'smiles slipped from lips' as soon as he told stockmen he was a veterinarian.⁵¹⁰ Some of those visited jokingly challenged Almeida to demonstrate that he could effectively cure their animals.⁵¹¹ Whereas stockmen sought assurances regarding cures, the IBTR veterinarian only offered ideas for prevention, suggesting treatment alternatives and probing information to sell the IBTR products. Not surprisingly, this did not facilitate communication between the IBTR and its natural constituency.

Evidence of these dysfunctional exchanges is born out in the figures produced by Mozart Villaca, head of the Service of Livestock Sanitary Control. This was the service Enrietti insisted should become the responsibility of the IBTR. As Almeida reported, veterinarians had to rely on the goodwill of stockmen to assess information about the sanitary conditions of livestock. It is clear, nevertheless, that information was denied to veterinarians. Between 1944

⁵¹⁰ PAP, DSA, IAR, *Relatorio de 1945*, Dilermando Pereira Almeida, 'Serviço de controle sanitário animal', (1945), p.1.

⁵¹¹ *ibid.*

and 1945, when the bovine herd in Paraná totalled close to 650,000 heads, the Sanitary Control had identified less than 40,000 animals.⁵¹² If veterinarians could not even identify the correct number of animals in the state, little could be expected from their epidemiological studies.⁵¹³ The fact that Villaca was based in Curitiba but the headquarters for the Service of Livestock Sanitary Control was in Ponta Grossa, some one hundred kilometres away, did little to help.⁵¹⁴ To oversee his employees and inspect rural properties, Villaca had to drive hundreds of kilometres each month and, not surprisingly, the screening process of his department was unreliable.

In the few samples collected from stockowners by the Service of Livestock Sanitary Control, the results showed reasons for concern. Cases of rabies were among the diseases reported in 1944. It was probably not by coincidence that Palmquist was manufacturing vaccines against these diseases in his laboratory. Sporadically, the IBTR also received samples from the countryside requesting laboratory analysis. Palmquist was then the researcher responsible for issuing and signing official documents answering stockowners. In 1943, he received bovine samples of brains, livers, kidneys and spleens for analysis.⁵¹⁵ The result of these tests revealed the presence of anthrax, another disease against which Palmquist was producing a vaccine. Other than that, Palmquist and other researchers at the IBTR were ‘flying blind’ as far as the state of zoonosis in Paraná was concerned. If the technicians of the Service of Livestock Sanitary Control, like Almeida and Villaca, who were supposed to be the eyes and ears of the IBTR, were struggling to relay information, Palmquist and his colleagues had to obtain epidemiological data from other sources. In 1944, for instance, they used information

⁵¹² PAP, DSA, IAR, *Relatório de 1945*, Mozart Villaca, ‘Seção de controle sanitário animal’, (1945), p. 4.

⁵¹³ There are little reliable data about the total herd numbers before 1970s. The numbers used in this thesis come from a census carried out in 1975. However, figures for the 1940s presented in this study are trustworthy because Paraná’s cattle herd had been accurately estimated in 4,7 million heads in 1970, and the progression suggested for the previous decades is therefore acceptable: 1940 – 400,000; 1950 – 800,000; 1960 – 1,6 million; and 1970 – 4,7 million, see F. J. Pinheiro, *Programa Nacional de Pecuária*.

⁵¹⁴ PAP, DSA, IAR, *Relatório de 1946*, Marcos Augusto Enrietti, ‘Considerações gerais’, (1946).

⁵¹⁵ PAP, DSA, MRE, *Seção Administrativa*, Oscar K. Palmquist, ‘Exame bacteriológico’, (1943), pp. 76-7.

from other states to assess risk to livestock in Paraná. They were aware that Sylvio Torres was developing a vaccine against foot-and-mouth disease in Rio Grande do Sul and that the disease might represent a risk for Paraná in the future since there were already indications of its presence in some properties. They had also been informed of outbreaks of hog cholera in São Paulo on the northern border and of rabies in Santa Catarina on the southern border.⁵¹⁶ Thus, they relied on information from neighbouring states to assess their own region, though they were entitled by law to control, inspect, and study zoonosis.

Whereas Palmquist and his colleagues struggled to identify the epidemiological situation on the ground, Paraná stockmen searched for expertise outside the state. This might seem to be a contradiction, given that the IBTR was closer and, at least on paper, prepared to deal with requests. The journal published by the Oswald Cruz Institute and to which stockowners in Rio Grande do Sul looked for assistance, the *Chácaras e Quintais*, had several subscribers in Paraná. There is evidence that letters sent to this journal from Paraná in the 1940s requested material that could assist stockowners with their practices.⁵¹⁷

Before nationalisation, the lack of interaction and absence of adequate accountability mechanisms did not change much. In fact, there are indications that in many respects the situation only worsened. In 1946, Enrietti admitted that the institute was beginning to experience trouble controlling public opinion. ‘Incomprehension [of our real purposes]...’, he argued, ‘was our main obstacle to moving forward with our objectives’.⁵¹⁸ At the end of World War II, Vargas’ fifteen-year regime came to an end and with it, the repression of dissenting voices also drew to a close. In Paraná, criticism directed at the usefulness of a research centre such as the IBTR was raised, and at each election, Enrietti struggled to convince new administrations to maintain their substantial funding.⁵¹⁹ One of the justifications used by

⁵¹⁶ PAP, DSA, IAR, *Relatório de 1944*, ‘Preparo da vacina Sylvio Torres’, (1944), 6-19.

⁵¹⁷ ‘Curitiba’, *C.E.Q.*, 76 (1947), 143; ‘Curitiba’, *C.E.Q.*, 63 (1941), 664.

⁵¹⁸ PAP, DSA, IAR, *Relatório de 1949*, Marcos Augusto Enrietti, ‘Considerações gerais’, (1949).

⁵¹⁹ As explained in Lunardi, ‘O IBPT’, pp. 118-214.

Enrietti was that his Service of Livestock Sanitary Control was responsible for controlling ‘the main livestock centres of the state, with the objective of tackling endemic and epidemic diseases, the consequences of which are so disastrous to the public economy’.⁵²⁰ But it faced new challenges. In 1946, an outbreak of hog cholera led Enrietti to transfer all field inspectors to the region most affected in order to halt the deadly zoonosis. This decision emptied the staff of the Livestock Sanitary Control, and the service could barely update their annual herd census as a result. When Parana’s herd was close to one million heads in 1946, the Service of Livestock Sanitary Control identified only 3,704 animals.⁵²¹

These figures reveal that the IBTR was in a state of oblivion regarding the sanitary state of Parana’s cattle herd at the end of the decade. Stockowners noticed this neglect and did not suffer in silence. In 1948, the governor of Paraná, Moysés Lupion, reported that he received complaints from stockowners in the southern region, where several cattle farms were located. A commission from the city of Guarapuava, three hundred kilometres west of Curitiba, reported, ‘Our herds have almost no veterinarian assistance. We need a permanent and constant sanitary control aiming at effective prophylaxis.’⁵²² Closer to Curitiba, just one hundred kilometres away, was Ponta Grossa, where complaints also emerged. Stockmen from Ponta Grossa argued that ‘...it is nature that raises our cattle, as we have no technical assistance to tackle a broad variety of diseases which destroy, on average, 30 per cent of our herd’.⁵²³ Finally, from Palmas, to the southwest of Curitiba, a complaint was issued in the form of a request: ‘we would like to wholeheartedly request an outpost in our town because, over the last three years, major epizootics have been causing great losses in our region.’⁵²⁴ What is

⁵²⁰ PAP, DSA, IAR, *Relatório de 1946*, ‘Serviço de Controle Sanitário Animal’, (1946).

⁵²¹ The same zoonosis reached Rio Grande do Sul. Yet although strained by the same relocation of staff, most of the routine inspections in the state continued to function; including monitoring and reporting of bTB through tuberculin testing, ‘Atividades das inspetorias veterinárias em 1948’, *B.D.P.A.*, (1949), 35-6.

⁵²² Moysés Lupion, *Mensagem Apresentada à Assembléia Legislativa do Estado*, (Curitiba, 1948), p. 17.

⁵²³ *ibid.*

⁵²⁴ *ibid.*

remarkable about these requests is that Enrietti managed to convince the governor that actions had already been taken. In 1949, the governor reported that ‘over the last two years, the IBTR has performed significant achievements, in particular, regarding general surveys about the problems related to [animal] production’.⁵²⁵ This report was issued in the same year Enrietti was informed that his divisions in charge of zoonosis had performed 130 laboratory examinations in the entire state, of which only four were conducted on cattle.⁵²⁶ At that point, Parana’s cattle herd was close to one million.

⁵²⁵ *ibid.*

⁵²⁶ PAP, DSA, IAR, *Relatório de 1946*, ‘Serviço de Anatomia Patológica’, (1946).

Technical Expertise: The Case of Equine Encephalomyelitis

Towards the end of the 1940s, more than a decade since the first tuberculin trial in Rio Grande do Sul, the test was used for the first time in Curitiba. At that time, Palmquist was turning his attention to brucellosis. Like Correa in Porto Alegre, Palmquist began to pay attention to this disease as the veterinary community was increasingly shifting its focus from bTB to brucellosis. In the late 1940s, Palmquist also undertook trials to check the existence of brucellosis for the first time; he identified an infection rate of 20.91 per cent.⁵²⁷ Highly contagious and communicable to man through milk, brucellosis was a disease with an evident appeal to both stockowners and public health authorities. While Palmquist was studying brucellosis, he would also carry out his first tuberculin test in Paraná. Perhaps he used the opportunity presented by the brucellosis fieldwork to carry out the test with tuberculin. In total, he tested 234 animals from six towns. The test confirmed that a staggering twenty-six per cent of animals were infected. Although this result was not published, it was informally submitted to José Feldman, a physician from Minas Gerais, who was compiling a thorough national survey of bTB.⁵²⁸ Further studies are necessary to investigate whether Palmquist used tuberculin only to include Paraná in this major work or whether it was part of a new awareness of bTB. Based on what has been shown thus far, the former possibility is much more likely. For instance, it has been suggested that the IBTR centralised research and had great autonomy to define its own research agenda. Close interaction with stockmen was not a driving force behind this agenda. Lack of funds and personnel were also not obstacles to the selection of topics as several areas of focus dealt with issues of greater or lesser social relevance. On the other hand, Palmquist struggled to assess the real needs of stockmen and was not challenged by any formal accountability mechanism. Moreover, Palmquist's colleagues demonstrated

⁵²⁷ Oscar K. Palmquist, 'Brucelose no Paraná', (unpublished UPR Microbiology Chair admission's thesis, 1949), p. 37.

⁵²⁸ José Feldman, 'Tuberculose humana de origem bovina'.

concerns about the public image of the IBTR, particularly with research centres in São Paulo. Therefore, the first tuberculin administration carried out in Paraná can be explained with reference to the peculiar research culture present in the IBTR. This research culture easily migrated into the nationalised university, as many of the IBTR researchers continued to hold chairs after 1950.

One final aspect remains to be covered, namely, technical expertise. It has been mentioned above that it is not possible to assess the extent to which the vaccines Palmquist produced were actually effective. More importantly, our interest in tuberculin administration in Curitiba as a basis for comparison with the situation in Porto Alegre has led to the consideration of elements other than research practices, such as the relative insularity of IBTR researchers. As this inevitable digression might mistakenly suggest that Oscar Palmquist restrained from using tuberculin for lack of technical expertise, it is important to establish his adeptness as a researcher. In other words, as we have already suggested, his neglect of bTB was not the result of ignorance but of the unique research culture prevalent in Curitiba. This point may be made explicit by briefly outlining his works on encephalomyelitis.

Heitor Medina inaugurated studies on encephalomyelitis at the IBTR, following his completion of a training period at the Biological Institute. There, he met Victor Carneiro, who published widely on the topic in the early 1940s.⁵²⁹ When Medina mentioned encephalomyelitis as the research area to which he would give top priority in Curitiba, he mentioned Carneiro and army veterinarians.⁵³⁰ The relevance of military personnel lay in the fact that encephalomyelitis was a severely debilitating disease that threatened animals raised in closed barns, such as those found in barracks. Therefore, army veterinarians had a great interest in this disease and constantly monitored outbreaks. More importantly, studying horses

⁵²⁹ For example, Victor Carneiro, 'Comportamento do vírus da ecefalomielite infecciosa do cavalo', *Arquivos do Instituto Biológico*, 15 (1944), 331-8.

⁵³⁰ PAP, DSA, IAR, *Relatório de 1945*, Heitor Medina, 'Serviço de anatomia patológica', (1945), p. 49.

could be justified on strategic grounds because although the Second World War had just ended when Medina returned from the Biological Institute, the trends associated with the heavy militarisation of the period remained.

Alongside strategic reasons, there were also local incentives for research on encephalomyelitis. Horses were highly cherished at a particular venue in Curitiba: the race track. A visit to the country club to watch a horse race was one of the main social events of Curitiba's elite. Governor Ribas, in particular, was fond of the races and allowed others to photograph him in the private boxes during these events.⁵³¹ In 1945, the journalist Castellano Netto described the fantastic evolution of Paraná as a producer of thoroughbred horses. According to Netto, this evolution stemmed from the patronage of Ribas. He referred to the *Granja Canguiri*, the stud farm noted above, owned by the Paraná state but publicly listed as an asset of the Faculty of Agronomy and Veterinary Medicine. The reason for Netto's enthusiastic description was the exceptional performance of horses raised at *Granja Canguiri*, such as the stallion Peter Pan, imported from England with the assistance of Ribas.⁵³² Praise for Ribas' patronage was due to the fact that stallions he owned were used for artificial insemination and kept in field stations created after the *Granja Canguiri*.⁵³³ In articles about government initiatives on livestock husbandry, the competitiveness of imported thoroughbreds was highlighted as an actual gain for the state of Paraná.⁵³⁴ Government support for the importation and breeding of purebred stallions took place alongside the research on equine diseases at the IBTR and eventually outlasted Ribas' term of office. When Medina introduced the rationale behind studies on equine encephalomyelitis in the IBTR, locals were aware that the disease could also harm the highly praised animals owned by the state.

⁵³¹ Mário M. Albuquerque, *Manoel Ribas* (Curitiba, 1994).

⁵³² Netto, 'Um estabelecimento de criação', p. 21; For other discussions on how to improve the results of state-owned animals, see W. Kost Filho, 'Alguma considerações sobre o cavalo puro-sangue de corrida', *Página Rural*, 1 (1945), 24-5.

⁵³³ 'Localização dos reprodutores de puro-sangue inglês', *Página Rural*, 1 (1945), 18.

⁵³⁴ 'Produção Animal', *Página Rural*, 1 (1945), 16-9.

Two researchers immediately took up the topic of encephalomyelitis: Anchises Marques de Faria and Oscar Palmquist. In 1945, Marques de Faria identified four cases of encephalomyelitis in army barracks located in Castro, two hundred kilometres north of Curitiba.⁵³⁵ Sudden outbreaks had also been identified in two other barracks in Paraná in 1938 and 1945.⁵³⁶ Palmquist, on the other hand, worked with samples collected around Curitiba and confirmed the existence of encephalomyelitis in the area.⁵³⁷

Initially the main objective of Palmquist and Marques de Faria was to isolate the actual pathogenic agent under laboratory conditions. The symptoms of encephalomyelitis were similar to other diseases, and the vector was not precisely known. Both bats and mosquitoes were considered likely candidates, but the results of studies undertaken prior to the mid-1940s were inconclusive. The pathogenic agent had proven to be very unstable in common medium broths; this rendered the transportation of samples over long distances very difficult. Moreover, the process by which agents were isolated demanded a large sample of brain matter from the deceased animal, and this was also an obstacle considering that there were few cases in which the disease was actually identified.⁵³⁸ Despite these problems, and the fact that the agent was thought to be a virus rather than bacteria, Brazilian researchers believed it was possible to develop a vaccine against it. They identified the existence of at least two different viruses, only to realise later that they were innocuous. The challenge was to manage the technical problems and test this hypothesis in laboratory conditions. Until the late 1940s, neither Palmquist nor Marques de Faria attempted to do so.⁵³⁹

⁵³⁵ 'A peste das cadeiras', *Pagina Rural*, 1 (1945), 12-4.

⁵³⁶ Egidio Russo, 'Um provável surto de encefalomielite equina no Estado do Paraná', *Veterinária*, 11 (1957), 39-46.

⁵³⁷ 'A peste das cadeiras', p. 14.

⁵³⁸ Both problems had already been highlighted by Medina immediately after his arrival from São Paulo, see PAP, DSA, IAR, *Relatório de 1945*, Heitor Medina, 'Serviço de anatomia patológica', (1945)

⁵³⁹ In 1948, when a possible outbreak was announced in Paraná, a specialist from the Biological Institute was invited to help, see PAP, DSA, IAR, *Relatório de 1949*, 'Divisão de Biologia Animal', (1949).

Case Study Six – Research Practices at the Faculty of Agronomy

The Case of Lycio Castro Velloso

In the sixth case study, the main focus is on research activity specifically related to the introduction of organochlorine pesticides in Paraná. As demonstrated above, the IBTR had the profile and infrastructure necessary to become a centre of expertise on pesticides. However, as it will be discussed in this case study, it did not engage with the political decision to use massive amounts of pesticides on Paraná farms. This is the reason why Lycio Castro Vellozo's research is so interesting: he was the head of the department in charge of the study of pests and of ways of tackling them. Vellozo's research practices and interests are also important because of his connections to the Faculty of Agronomy of Curitiba. After completing his undergraduate studies in 1941, Velloso became assistant professor at the faculty. Four years later, he took over the Chair of Phytopathology and Agricultural Microbiology, and he became dean of both faculties in 1949. Outside the faculty, Lycio had a successful career as a researcher in charge of the Division of Phytopathology and Entomology. In that position, Velloso was the main figure of a division supposedly responsible for studying pesticides in the state. Both positions were similar to the ones held by Ramiro Gomes da Costa in Porto Alegre. An analysis of the ways in which the approach to pesticides differed so markedly between the two locations will consider the availability of external technicians in Paraná who could be relied upon to tackle the problem, and the arrival – albeit late – of Velloso's subordinate, Milton Vernalha, who took over the entomological division in the late 1940s.

Locusts on the move: Triggering pesticide use in Paraná

Locusts caused the first important outbreak that triggered the adoption of organochlorine pesticides in Paraná. As discussed above, locusts were also the pests that ravaged farms in Rio Grande do Sul in the 1940s. When the locusts struck Paraná's farms in 1946, they divided into two massive swarms. João Alves Júnior, Federal Inspector stationed at the Paraná branch of the National Department of Agriculture, reported that the first one was so large that it took six hours to fly over a fixed point of observation.⁵⁴⁰ Alves Júnior knew the details of the outbreak because he was in charge of coordinating a response. When the swarm struck the south border of Paraná, the Governor who had replaced Manoel Ribas, Moysés Lupion, resorted to help from the Federal Government, which turned to Alves Júnior. The request by Lupion for government assistance contrasts sharply with what occurred in Porto Alegre, where entomologists from the Department of Agriculture were directly involved in the coordination of attempts to tackle the locust outbreak.

The problem Alves Júnior faced was that the swarm that hit Paraná in September of 1946 left in its trail an unusually large number of pods, a fact that was confirmed by the massive number of nymphs that hatched during the first months of 1947. Governor Lupion reported that locusts were 'devastating crops and causing considerable losses to agriculture'.⁵⁴¹ He expressed concern, confirming that 'some cities hit by the swarms suffered a serious setback in their agricultural activity, many of them having to import grains that, in the past, were produced in quantities larger than their individual needs.'⁵⁴² The impact of the outbreak had already been felt in the capital where bread was in low supply. Paraná imported wheat from other states to avoid more severe shortages. Worse still, Paraná's cash crop, coffee, was on the path of the hundreds of thousands of hungry nymphs.⁵⁴³ In reality, the 1946 outbreak did not have the same

⁵⁴⁰ João Alves Júnior, 'Campanhas do Estado do Paraná', *B.F.T.*, 4 (1947-1950), 95-109.

⁵⁴¹ Moysés Lupion, 'Mensagem Apresentada à Assembléia Legislativa do Estado', (Curitiba, 1949), p. 127.

⁵⁴² *ibid.*

⁵⁴³ As suggested later in 'Invadido o E. do Paraná', *A Granja*, 13 (1957), 16-7.

intensity in the north, where coffee farms were, as it did in the south; however, a potential attack on that area could have had a devastating effect on Parana's economy as the state was highly dependent on tax revenue generated by coffee farms, thereby creating palpable fear.⁵⁴⁴

Further studies are necessary to confirm whether or not the prompt and effective response from the Federal Government was related to the fact that Paraná was the last frontier before locust swarms hit the affluent states of Rio de Janeiro and São Paulo. For the purpose of this thesis, however, it is possible to indicate that when Alves Júnior, the Federal Government officer in Curitiba, reported the results of his countermeasures, he did not mention the IBTR. He reported that thirteen methods had been used to contain the locusts' advance, of which five are worth considering because they directly involved the use of chemical pesticides. The first method involved the spraying of a solution of soap and kerosene. It was recorded that 153,000 litres were used, but its results were deemed ineffective since only insects in the first and second moulting stages were killed. The next method used a solution containing the insecticide Dinitrophenol but also delivered an unsatisfactory result. This insecticide had to be slowly diluted in water before being transported to the infested areas, mainly via horse-drawn wagons, and the rough terrain of the affected areas rendered it impractical. The same pesticide was also mixed with a granulated formulant, and although the results were better in logistical terms, it took more time to kill the nymphs.⁵⁴⁵ Alves Júnior reported that the five tons of baits poisoned with arsenic and Paris Green presented excellent results. Unfortunately, they ran out of the bait formulant early in the campaign and had to abandon this alternative.⁵⁴⁶ Finally, the best results were achieved in areas where BHC was administered. However, only 1.4 tons of that pesticide were available, an insufficient amount when the scale of the infestation was taken

⁵⁴⁴ 'Transporte. Principal problema do Paraná', *A Granja*, 9 (1953), 34-5.

⁵⁴⁵ Formulant was the substance with which pesticides were mixed both to control their toxicity and to enable their administration.

⁵⁴⁶ Paris Green was a well-known, highly toxic compound used against agricultural pests.

into account.⁵⁴⁷ In the first campaign, the state of Paraná had paid for all the pesticides, poisoned baits and other material used. The people directly involved in administration of pesticides were usually volunteer farmers and peasants, who hoped to save their crops as well as their community livelihoods.

It is clear from Alves Júnior's final report that the first campaign served as an informal field trial during which different solutions were tested to determine their efficacy against locusts, some for the first time. The shortage of information concerning reliable methods is evident given the use of clearly ineffective techniques, like the soap-kerosene solution that only killed insects in a particular moulting stage. Alves Júnior closed his report by urging fellow researchers to undertake further studies in order to increase the efficiency of pesticides in the event of future attacks.

In the spring of 1947, a second large swarm invaded Paraná, and Alves Júnior again took charge of organising the response. His previous plea for further studies went unanswered, at least by the IBTR, but Alves Júnior narrowed down his combat methods to the two solutions that had previously proven most efficient: BHC and poisoned baits. This time his strategy consisted of dusting a mixture of BHC and formulant over open fields where the largest number of pods were located. 130 tons of the mixture were used, but results varied. After the campaign, Alves Júnior concluded that, among other factors, the time of BHC administration influenced its efficacy. When it was distributed before sunrise, its effectiveness increased: the natural humidity of open fields during the early hours mixed with the pesticide allowed it to evaporate, and the resulting fumes killed the insects more effectively. It was also discovered that different combinations of the active principle and the formulant had to be used depending on the mounting phase of the locust. The case was the same regarding poisoned baits; in total, 120 tons were manufactured and distributed over areas where outbreaks had been the most severe.

⁵⁴⁷ Júnior, 'Campanhas do Estado do Paraná', 95-109.

However, the final conclusion was that insects hatched on different days, so baits had to be replaced more than once in the same areas.

Although the local government purchased over one hundred tons of BHC for these two campaigns, there is again no sign of the participation of IBTR researchers in this decision. From the perspective of the local executive, supplying large quantities of pesticide sent a clear message to the public that something was being done about a highly damaging and far-reaching agricultural pest. In the 1948 annual report signed by Governor Lupion, the campaign against locusts was listed as one of the most important initiatives undertaken by his administration.⁵⁴⁸ From the perspective of the Federal Government, the bargain with the Paraná Government was also profitable; the outbreak was, to a large extent, under control, and major agricultural regions, such as São Paulo's countryside, were spared for the time being.⁵⁴⁹

The second reason for the introduction of organochlorine pesticides in Paraná was more directly related to the IBTR. As explained above, in the early 1940s Enrietti accepted the placement of his research centre as the institution responsible for the control of a campaign against the coffee berry borer (*Hypothenemus Hampei*), which attacked farms in the northern region of Paraná. As in the case of locusts, the presence of coffee berry borers was also used to justify the purchase of massive quantities of BHC. Brazilians had known of the coffee berry borer since the early 1920s, when the Biological Institute in São Paulo was assigned the task of developing a deterrent against the pest because it threatened hundreds of coffee farms. The solution deployed some time later was the introduction of the insect *Prorops Nasuta*, a wasp native to Africa and known in Brazil as the Ugandan Wasp. These wasps fed exclusively on the larvae of the berry borer, and therefore could potentially serve as an efficient natural predator. However, there were technical problems: factors such as altitude, humidity, and

⁵⁴⁸ Moysés Lupion, '*Mensagem Apresentada à Assembléia Legislativa do Estado*', (Curitiba, 1948), p. 127

⁵⁴⁹ There were reports of locusts outbreaks in the Northeast of Brazil in 1948 but from a different species, see Cincinnato R. Gonçalves et al., 'O gafanhoto no nordeste do Brasil', *B.F.T.*, 4 (1952-1955), 27-34.

average temperature often affected the artificial introduction of these wasps. A careful and time-consuming process of acclimatisation was necessary in order to guarantee the wasps successfully adapted to new environments.⁵⁵⁰

Initially Lycio Velloso, Director of the Division of Phytopathology and Entomology, was in charge of this service at the IBTR, but eventually Enrietti personally coordinated the technicians acting in the campaign against the coffee berry borer. In 1948, after the IBTR had been responsible for controlling the coffee berry borer outbreak for almost a decade, their methods were questioned, and their results were deemed far from ideal.⁵⁵¹ When the newly elected governor, Moysés Lupion, took office, Enrietti and his researchers informed him that the coffee berry borer infestation was increasing and necessitated greater caution. More importantly, Enrietti notified Lupion that experiments with a new pesticide called BHC were being conducted in the Biological Institute in São Paulo, although the results were still inconclusive. Lupion was reassured that unlike in São Paulo, where the outbreak extended for ‘thousands of kilometres’, the problem in Paraná was isolated and under control.⁵⁵²

However, public pressure against the IBTR was mounting. In 1948, the head of the IBTR Division of Chemistry, Nilton E. Buehrer, was involved in a controversy over the berry borer campaign. The debate began when Buehrer published an article indicating the suitability of using ground limestone as a formulant in the administration of BHC.⁵⁵³ Paraná had large reserves of limestone, and the extent to which it could be used without affecting the properties of the pesticide was discussed. Buehrer argued that he had undertaken experiments at the IBTR and concluded that using limestone was not a problem. The implication of this statement was

⁵⁵⁰ Flávio Mesquita, ‘A broca do café no Rio de Janeiro’, *B.F.T.*, 1 (1944), 247-54.

⁵⁵¹ Moysés Lupion, ‘*Mensagem Apresentada à Assembléia Legislativa do Estado*’, (Curitiba, 1948), pp. 35-36

⁵⁵² *ibid.*, p. 136.

⁵⁵³ For references to the sequence of articles and the essence of the debate see, Lunardi, ‘Organização da ciência no Paraná’, pp. 118-139. Despite the fact that these articles were published in the popular press, only one article that was written by an IBTR researcher on pesticides during the 1940s has been found, see Buehrer, ‘Um moderno e eficiente inseticida’, *Página Rural*, 1 (1945), 44.

that the government could preserve valuable resources if BHC was bought in its cheaper, concentrated form and mixed on-site. More importantly, this advice demonstrates the extent to which the IBTR felt entitled to advise authorities on the issue of pesticides.

Days later, Roberto Barroso, a journalist from the daily newspaper *Diário da Tarde*, wrote an article accusing Buehrer of failing to provide a straight answer to farmers about whether BHC would effectively exterminate the coffee berry borer. In view of the meagre results so far achieved, he questioned the IBTR's ability to eradicate the pest. This initial discussion opened a heated debate in the popular press, which lasted for several weeks. Buehrer argued that he was not discussing definite ways of exterminating the berry borer but looking at a specific, technical point regarding the effect of limestone on BHC properties. It is important to consider that the *Diário da Tarde* was notoriously opposed to the current Governor Moisés Lupion; however, public opinion recognised that the IBTR had failed to achieve solid results. Buehrer had a valid argument in avoiding discussions relating to the IBTR campaign as he was a chemist and therefore was not directly in charge of campaigns against agricultural pests. However, the journalist who attacked him made a valid argument: the IBTR could not assertively stand by the results of its current campaign, as there was sound evidence indicating that the outbreak was not under control despite previous declarations to the contrary.

With evidence that the IBTR had failed to contain the spread of the coffee berry borer outbreak from São Paulo southwards, and with indications that this issue could become a political liability, Governor Lupion decided to transfer coordination of the campaign from the IBTR to the Department of Agriculture. He also authorised a shift from the use of Ugandan wasps to the massive administration of BHC. In 1949, he authorised the purchase of 275 tons of BHC to be administered on coffee farms. More strikingly, the Governor also authorised the purchase of a helicopter from which the pesticide would be sprayed. Until then, helicopters had only been used against malaria mosquitoes, and the results were mixed to say the least. Coffee

plantations would be a completely different case since farm plots obviously differed from the spatial configuration of native forests.⁵⁵⁴ The enormous amount of pesticide ordered and the new technology needed to spray it required a loan of three million *cruzeiros*, and the financial investment was highly criticised by Lupion's political opponents.⁵⁵⁵ Even more remarkable, as the campaign against locusts demonstrated, is the fact that pesticides had to be extensively tested, sometimes in real conditions, in order to devise an efficient administration strategy. However, Lupion's decision was again founded in a strong political motivation. In purchasing large quantities of pesticides and distributing them free of charge to small properties in the north of the state, the government was undoubtedly seeking political leverage in the region. Until the late 1930s, all coffee harvested in the northern region was transported through the port of Santos in São Paulo, simply because there was no road connecting the north and south of Paraná.⁵⁵⁶ The lack of control over shipments meant that the government in Curitiba could not assess what was being produced or the amount that should be paid in taxes. Thus, the field inspection undertaken by Enrietti's technicians was important because it was an effective way to estimate the amount of taxes farmers should be paying. Not by chance, inspectors were officially sent to identify foci, but the final reports always consisted of detailed information about the number of coffee plants on each farm.

⁵⁵⁴ The helicopter was eventually also used against locusts, and there is a report confirming that it dusted twenty tons of BHC over some infected areas in 1947, see Otoyá, 'Medidas tomadas para combater o gafanhoto no Equador', pp. 82-4.

⁵⁵⁵ Moysés Lupion, '*Mensagem Apresentada à Assembléia Legislativa do Estado*', (Curitiba, 1949), p. 48.

⁵⁵⁶ Bettega, 'Pneumotórax espontâneo benigno', pp. 88-95.

The research practices of Lycio de Castro Velloso

This context, in which political interests could be conveniently accommodated with the assistance of technicians sent by the Federal Government, partly explains the apparent neglect of pest outbreaks by Velloso, whose division was supposed to be in charge of this area. At least on paper, Enrietti had indicated that the IBTR was the official research centre in charge of work on pesticides. There is little evidence, however, that despite the initiative of the chemist Nilton Buhrer mentioned above, other IBTR personnel made any effort to advise authorities about the technical issues related to the massive use of pesticides, sometimes near rural towns. When they did act, as in the case of the berry borer, they failed to contain the spread of an agricultural pest that, some years earlier, had been concentrated in a small area. As the coffee berry borer became a highly visible issue, Enrietti dutifully and gratefully accepted to relinquish responsibility for the control of that harmful pest.

A second explanation for the dissonance between rhetoric and actual results was Velloso's personal research practices, which he shared with other IBTR researchers. As with many of his colleagues before him, his trajectory at the IBTR began after a training period in the Biological Institute in São Paulo. There, Velloso was assigned to the Plant Pathology Laboratory directed by Raul Drummond Gonçalves.⁵⁵⁷ Publications from Gonçalves reveal that his main interest was fungi that caused damage to profitable crops.⁵⁵⁸ Working with Gonçalves, Velloso realised the lack of literature in Portuguese concerning the fundamentals of bacteriology. After his return to the IBTR, his first paper was an in-depth compilation of available techniques in combatting plant pathologies. He described the research as a 'humble contribution' towards his project of amassing all the relevant information concerning

⁵⁵⁷ Brand and Rocha, *Do IBPT de Marcos Augusto Enrietti ao Tecpar*, p. 38.

⁵⁵⁸ Agésilau A. Bitancourt et al., 'Relação das doenças e fungos parasitas', *Arquivos do Instituto Biológico*, 5 (1934), 185-96 ; A. P. Viégas and A. R. Teixeira, 'Alguns fungos do Brasil (Phycomycetos)', *Bragantia*, 3 (1943), 223-69.

techniques that may assist his fellow Brazilian bacteriologists.⁵⁵⁹ He highlighted the fact that there were already established research schools in the area of bacterial classification, but he would use as a reference the work of the American bacteriologist David Hendricks Bergey.⁵⁶⁰ Some years earlier, Bergey led a group of bacteriologists who published the *Manual of Determinative Bacteriology*; this became the standard textbook in bacterial taxonomy, within the discipline known today as microbiology.⁵⁶¹

Another important influence in Velloso's first paper was the work of Robert Koch. Velloso believed that Koch's postulates, devised to identify a disease's aetiology, were the most resourceful method for studying bacteria, and he described them in detail. As Velloso explained the sequence of procedures for the identification of plant pathologies, he made it clear that his division had the equipment, literature and database of specimens to initiate an effective research programme on Phytopathology. The conditions appeared to be ideal for Velloso to replicate in Curitiba what he had witnessed in São Paulo and fulfil part of his division's aim, namely the study of plant pathologies. In 1945, however, he was drafted into the Brazilian Army, leaving the Division of Phytopathology and Entomology completely deprived of personnel without a single person being allotted to it.⁵⁶² Velloso resumed his works when he returned from his military duty in 1946.⁵⁶³ He arrived at the IBTR declaring his intention to reorganise the division through purchasing instruments and regaining lost time. He wrote to Enrietti announcing that he was eager to engage at the earliest opportunity in the production of original research.⁵⁶⁴ Then he went to Rio Grande do Sul to learn what was being done against locusts and reported back to Enrietti.

⁵⁵⁹ Lycio G. C. Vellozo, 'A técnica bacteriológica em fitopatologia', *Boletim do Instituto de Biologia e Pesquisas Tecnológicas*, 6 (1943), 3-57.

⁵⁶⁰ Robert S. Breed, 'David Hendricks Bergey 1860-1937', *J. Bacteriol.*, 35 (1938), 342-5.

⁵⁶¹ James A. Poupard, *A history of microbiology in Philadelphia*, (Bloomington, 2010), pp. 50-51.

⁵⁶² PAP, DSA, IAR, 'Relatório de 1945', Lycio G. C. Vellozo, Divisão Científica de Fitopatologia e Entomologia, (1945).

⁵⁶³ Lycio G. C. Vellozo, 'Lista prévia de fungos', *Arquivos de Biologia e Tecnologia*, 2 (1947), 221-4: p. 221.

⁵⁶⁴ PAP, DSA, IAR, 'Relatório de 1946', Instituto de Biologia e Pesquisas Tecnológicas, (Curitiba, 1946).

Although the nature of his recommendation remains unclear, it is evident that he avoided the complex problem of tackling locusts. His first work after his return to the IBTR was on fungi, the topic on which Gonçalves was working at the Biological Institute in São Paulo.⁵⁶⁵ Also, Velloso, like Gonçalves, declared that his division would be organised to contribute to the ‘radical extermination of plant parasites’, particularly in crops that were economically important.⁵⁶⁶ He initially focused on *Araucaria*, which was the most exported product of Paraná in volume and second in tax revenues.⁵⁶⁷ Velloso studied in detail fungi species that attacked planks made of pine wood. This was a major problem for the thriving lumber industry of Paraná because fungi created permanent blotches on planks, and thus rendered large quantities of the product unfit for commercialisation. Velloso’s research revealed an attention to plant pathologies already observed in Porto Alegre, where Costa Neto also studied harmful fungi species in detail.⁵⁶⁸ Costa Neto was equally concerned with diseases harming profitable crops such as vines, which were extremely important for a sector of Rio Grande do Sul’s economy.

However, similarities with the situation in Porto Alegre dissolve when close attention is paid to the actual research on agricultural pests. While Costa Neto in Porto Alegre focused on Phytopathology, he also entrusted a group of entomologists with the task of investigating agricultural pests. Ramiro Gomes da Costa was made head of this group, as described in Chapter Two. However, although Velloso demonstrated a consistent interest in fungi and a willingness to pursue further study after he resumed his activities in Curitiba in 1946, he continued to be the sole researcher in charge of the entire Division of Phytopathology and Entomology. It is noteworthy that after his return from the Biological Institute, Velloso

⁵⁶⁵ Vellozo, ‘Lista prévia de fungos’.

⁵⁶⁶ Manoel Ribas, *Relatório Exercício 1940 e 1941* (Curitiba, 1941), p. 24

⁵⁶⁷ Lycio G. C. Vellozo, ‘As manchas de pinho do Paraná’, *Arquivos de Biologia e Tecnologia*, 3 (1948), 45-56; Oliveira, *Estudos de desenvolvimento regional*, p. 100.

⁵⁶⁸ Costa Neto, ‘Reconhecimento e controle dos fungos’, 118-122.

declared that his first priority would be plant pathologies and attention to entomology would only occur later.⁵⁶⁹ In fact, the first researcher to be hired to work exclusively on harmful insects was Milton Miró Vernalha in the late 1940s.

The late arrival of Vernalha indicates that Velloso had not rushed to appoint an entomologist for his division. Moreover, Vernalha had little experience in entomology and thus followed in the footsteps of Velloso. For instance, he first went to the Biological Institute for training. There, he studied the entomological collections of the institute, uncovering hundreds of insects from Paraná that had still not been described in any single scientific work. It was in São Paulo that Vernalha was also introduced to applied taxonomy and the basic guidelines used in pesticide studies. After his return to Curitiba, Vernalha signed his first paper with Velloso. The paper was not on entomology but plant diseases, Velloso's main interest.⁵⁷⁰ As will be explored in Chapter Six, Vernalha effectively began publishing in the early 1950s. Like Velloso, one of his first monographs was a compilation of techniques used in the field of which he was then in charge, agricultural entomology.⁵⁷¹ However, when Milton Vernalha was hired to be the chief entomologist of the IBTR, his research centre was already seen as heedless, as in the case of locusts, or inept, as in the case of the berry borer. It was Vernalha's responsibility to try to improve the public image of the entomological services provided by the IBTR, and that would not be an easy task. On the one hand, he was aware that Marcos Enrietti had adopted the strategy of avoiding politically sensitive issues. In the case of locusts, Enrietti argued that 'if more has not been done [by the IBTR] it was because it was beyond' their responsibility.⁵⁷² Regarding the coffee berry borer a similar stance was taken. As soon as the control of the

⁵⁶⁹ Brand and Rocha, 'Do IBPT de Marcos Augusto Enrietti ao Tecpar', pp. 38-39.

⁵⁷⁰ Lycio G. C. Vellozo, Milton M. Vernalha and M.J. Nowacki, 'Contribuição ao levantamento fitossanitário', *Arquivos de Biologia e Tecnologia*, 4 (1949), 9-24.

⁵⁷¹ Milton M. Vernalha, 'Ordens dos insetos', *Boletim IBTR*, 26 (1953), 1-86.

⁵⁷² PAP, DSA, IAR, Marcos Enrietti, 'Considerações gerais', *Relatório de 1949*, (1949).

Service Against the Coffee Berry Borer was taken from Enrietti's hands, the techniques deployed against that pest were no longer considered to be the responsibility of the IBTR.

In addition, there is clear evidence that other research centres filled the void left by IBTR's lack of initiative in the entomological area. For instance, farmers did not rely solely on the IBTR for technical advice on agricultural entomology. The correspondence section of the Oswaldo Cruz Institute's journal, *Chácaras e Quintais*, registered several letters from Paraná farmers, among which some requested information on how to tackle agricultural pests. In 1936, for example, a farmer from Ribeirão Claro, on the northern border of Paraná, asked how ants that were killing tree saplings after they were transferred from the greenhouse to his property could be combatted.⁵⁷³ In 1939, another reader from the city of Senges, also at the northern border of the state, similarly asked for instructions on how to tackle aphids, which he found almost impossible to exterminate with traditional pesticides.⁵⁷⁴ Examples like these that requested information ranging from diverse farming practices to plant pathologies can be detected throughout the 1930s and early 1940s.⁵⁷⁵ This evidence suggests that the Oswaldo Cruz Institute was already a well-established reference point for farmers in Paraná when the IBTR was created, and it continued to be so afterwards when Enrietti failed to establish his research centre's reputation in pest control research.

The tentative beginning of Velloso and the late arrival of Vernalha help to further explain why the IBTR did not pursue research on pesticides, contrary to the case in Porto Alegre. The context presented in this case study suggests that Vernalha faced a considerable challenge as an entomologist of the IBTR in the first years of nationalisation. On the one hand, the unbridled adoption of pesticides in Paraná attests to the availability of funds and, more

⁵⁷³ Antonio Estanislau Amaral, 'Guapovurú e formiguinhas', *C.E.Q.*, 53 (1936), 455.

⁵⁷⁴ Oscar Monte, 'Identificando as pragas para combatê-las', *C.E.Q.*, 59 (1939), 263-4.

⁵⁷⁵ For example, Celeste Gobbato, 'Atrachnose da Videira', *C.E.Q.*, 54 (1936), 464; 'Ponta Grossa', *C.E.Q.*, 62 (1940), 525; A. F. Margarino Torres, 'Combate à murchadeira da batatinha', *C.E.Q.*, 63 (1941), 80; Celeste Gobbato, 'Cultura de Oleaginosas', *C.E.Q.*, 64 (1941), 54-5.

importantly, the availability of technical solutions that were accompanied by reasonably standardised research practices. However, Marcos Enrietti missed the opportunity to get involved in pesticide research, a move that could have channelled resources into his Division of Phytopathology and Entomology. Thus, the safest strategy in administrative terms suffered from the collateral damage of insulating the IBTR research group from new techniques and practices. The price of this insulation was undermining future capabilities and the status of its entomologists. These conditions further our central appreciation of practices that were transferred to the nationalised university when Vernalha took over the Entomology Chair and Velloso the Phytopathology Chair after 1950.

Conclusion

The context of the massive introduction of organochlorine pesticides in Paraná is related to two important outbreaks of locusts and berry borers occurring in the 1940s. By the time Milton Vernalha arrived at the IBTR, in the late 1940s, the official adoption of BHC as the main pesticide was well established. In this context, the most important aspect is that little attempt had been made by Lycio Castro Vellozo to intervene in the decision regarding use of those pesticides before Vernalha's appointment. The specific circumstances in which these decisions were made reveal the entomological research practices prevalent at the IBTR that would remain after nationalisation.

In the case of tuberculin, although Enrietti had continued to publicly declare that the IBTR had an important 'social character' a year before nationalisation, it is difficult to apply this idea in the case of that diagnostic test. It was not until the late 1940s that Palmquist used tuberculin in Paraná. He tested a total of 234 animals at a time when the total herd size of the state was close to one million head. It has been argued in this chapter that this study was not conducted because of lack of information about the risk of bTB, the absence of regulatory safeguards, or even the absence of an institutional environment conducive to research. All these elements existed alongside technical expertise. Palmquist's overall neglect of tuberculin reveals that motivations for veterinary research in Curitiba were very particular.

Interestingly, from an institutional perspective, the IVRDF in Rio Grande do Sul and the IBTR in Paraná, were similar and would indeed interact with similarly equivalent faculties of veterinary medicine, which would in turn, be nationalised in 1950. However, by analysing the motivations behind Palmquist's and Velloso's research in contrast to what has been presented concerning his counterparts Outubrino Correa and Ramiro Gomes da Costa, it is possible to identify important elements that shaped their different trajectories after 1950. For instance, several elements presented in this chapter suggested the existence of a rhetoric

regarding an honest desire to tackle agricultural pests and bovine diseases. At the same time, evidence of political manipulation and an active interest in deploying instruments of social control has also been presented. In fact, the biological control strategy against the coffee berry borer explained above offered several opportunities for political manipulation, and it risked becoming an initiative in which coercion could be exercised. The control of vehicle circulation and the random inspection of farms were only two examples of the ways in which these coercive mechanisms worked. They were essentially as restrictive as were the rights of the IBTR to slaughter any animal suspected by its inspectors to be infected with bTB without having to reimburse the stockmen. It is noteworthy that the laws granting the IBTR these rights were passed during the dictatorship, when Enrietti was the stepson of Governor Manuel Ribas who, in turn, was a political protégé of the head of the regime, Getúlio Vargas. The fact that IBTR inspectors were entitled by law to judge and, if necessary, to impose sentences against stockowners and farmers did not go unnoticed in a period in which the rights for questioning official decisions were non-existent. Although evidence of the exercise of these extreme measures has not been obtained, no one ignored that they were possible, and this did probably constitute a powerful deterrent.

For the purpose of this thesis, the difference between Enrietti's declared intentions and the actual implementation of these intentions has important implications for both entomological and zoonotic research in Curitiba in general and for the role of research practices within the IBTR in particular. Although Enrietti might have been truly concerned about insect outbreaks and bTB epidemics when he concentrated the study of agricultural pests and bovine diseases in his institute, he hindered the diversity that existed, for instance, in Porto Alegre, where harmful insects and zoonosis were studied in different divisions of the Department of Agriculture and in the IVRDF. Enrietti's insistence that his institute would accomplish things that never materialised, like effectively tackling harmful pests or bTB, also reveals more about

the IBTR research culture. The meagre results presented by the IBTR in the area of agricultural pests and bTB appear to confirm that political influence was at least as important as were actual results. While sources indicate that in Porto Alegre researchers at the Department of Agriculture and the IVRDF were constantly worried about public opinion, Enrietti and his researchers in Curitiba appeared to be more interested in meeting the political interests of different administrations. In return, there was no effective accountability for the IBTR personnel and they could avoid situations in which actual results could come under the scrutiny of both the public and specialists.

One of the questions put forward in this thesis is why did some research programmes flourish more in some parts of the nationalised system than in others. The neglect of tuberculin studies and the impact of organochlorine pesticides in Curitiba point to the inadequacy of trying to answer this question by focusing on academic disciplines or institutional trajectories alone. These approaches are inadequate for understanding the failure and neglect of research programmes. Several existing conditions in Curitiba should have allowed tuberculin research and pesticide studies to take place, but still, they did not. However, it would have been difficult to explore what *did not* happen by focusing on the IBTR's institutional trajectory alone. Works covering institutional research programmes have usually focused on successful areas. This chapter demonstrates, however, that an analysis of failures, in the case of tuberculin for example, reveals internal dynamics that are more complex and far-reaching than descriptions derived from works focusing only on institutional trajectories. More importantly, the early neglect and apathy towards bovine diseases and pesticides would permeate the culture of research on bovine diseases and agricultural entomology in the University of Paraná after 1950. Even after 1968, the Faculty of Agronomy and Veterinary Medicine of Curitiba would not implement postgraduate courses in those areas.

Chapter Five

Research Practices in the Faculty of Medicine in Curitiba 1935 –1949

5.1 –The Epidemiological Context of Paraná

When Governor Manoel Ribas stepped down in 1946, Milton Macedo Munhoz became Secretary of Health. One of his priorities was to continue the battle against the tuberculosis epidemic and malaria outbreaks. Tuberculosis had been the main cause of death in the second half of the 1930s.⁵⁷⁶ Between 1940 and 1945, the number of deaths caused by the disease had risen from 69.5 per 100,000 persons to around 110 deaths per 100,000 persons in Paraná, and Munhoz was to take rigorous measures to counteract the worsening trend.⁵⁷⁷ At the same time, malaria and Chagas disease were considered to be great obstacles to the development of the logging industry as well as to the coffee regions. In the 1940s, a serious outbreak of malaria was registered in the eastern and northern regions.⁵⁷⁸ In 1941, the disease represented ten per cent of the total fatalities, making it by far the most common cause of death registered by public health officials. The outbreak was controlled over the two following years, but malaria continued to be represented in official statistics.⁵⁷⁹

In the area of tuberculosis, Munhoz prepared a plan indicating seven areas of priority. Five involved the expansion of existing hospital infrastructure. When he took over, 4,250 hospital beds were available in the state, out of which only 1,500 were in public hospitals.⁵⁸⁰

⁵⁷⁶ Emílio L. M. Sounis, 'A marcha da mortalidade pelas doenças infecciosas', (unpublished Faculdade de Medicina UPR Hygiene Chair admission's thesis 1940).

⁵⁷⁷ Carlos F. F. Costa, 'Aspectos da epidemiologia da tuberculose', *R.M.P.*, 10 (1941), 114-22: p. 120.

⁵⁷⁸ Manoel Ribas, *Relatório Exercício 1940 e 1941*, (Curitiba, 1941).

⁵⁷⁹ Bichat Almeida Rodrigues, *A saúde pública no Paraná*, (Curitiba, 1942).

⁵⁸⁰ Lindolfo R. F. Júnior, *A Secretaria do Estado da Saúde do Paraná*, (Curitiba, 1987): p. 42.

This meant an availability of only one bed per 2,947 people.⁵⁸¹ He also wanted to begin BCG vaccinations, which had not been officially adopted until that point. The two remaining actions were in the field of early diagnosis. In this area, he gave equal attention to x-ray surveys and tuberculin testing. Unlike the other items, however, he gave neither an explanation nor a justification of the use of tuberculin results in epidemiological studies. This attitude ignored the fact that by 1946 it was admitted that scant information existed regarding the main outbreaks outside Curitiba.⁵⁸²

In the case of malaria and Chagas disease, the situation was equally complicated. In 1947, malaria was still considered one of the biggest public health problems in the cities of the northern and eastern regions of Paraná, where it still claimed hundreds of lives every year.⁵⁸³ The Paraná government had no tools to predict or monitor these diseases and usually began organising responses when outbreaks were already well underway. The strategy of Munhoz was, therefore, to continue to collaborate with the federal government, which occasionally offered assistance to coordinate actions on the ground in order to deal with emergency situations. For instance, in the early 1940s, the National Service of Malaria Eradication drained four kilometres of mosquito breeding sites after having confirmed 421 cases of malaria in neighbouring areas. On average, twenty-five per cent of patients examined by federal government officials in Paraná were infected. The National Service of Yellow Fever Eradication, which also helped in the control of malaria outbreaks, had five posts in the state where equipment and pesticides for front line operations were sent.⁵⁸⁴ In the late 1950s, these outposts coordinated the massive administration of pesticides in Paraná, as discussed in Chapter Six. When both malaria and yellow fever were believed to be under control in the state,

⁵⁸¹ According to a 1950 census, see Américo Barbosa Oliveira, *Estudos de Desenvolvimento Regional* (Curitiba, 1959): p. 26.

⁵⁸² *ibid.*; 'Curso intensivo de tuberculose de 1946', *R.M.P.*, 15 (1946), 258-61: p. 259.

⁵⁸³ 'Notícias médicas', *R.M.P.*, 15 (1946), 222-3.

⁵⁸⁴ Barreto, 'A saúde pública no Brasil', pp. 852-854.

Chagas disease turned out to be an equally serious problem. The appalling conditions of households in the countryside offered perfect breeding conditions for the vectors, allowing them to spread quickly in some rural areas.

In the meantime, massive waves of immigrants continued to flock to the countryside in numbers that surpassed predictions and budgetary allotments for epidemiological control.⁵⁸⁵ If there were insufficient hospitals in the countryside until 1945, the situation only worsened in the years that followed. New towns suddenly appeared as the high price of coffee in the international market attracted thousands of immigrants to the region in which it was grown.⁵⁸⁶ In other states, migratory movements contributed to a higher prevalence of tuberculosis, particularly when people from rural areas migrated to more populated centres.⁵⁸⁷ The same applied in the case of malaria and Chagas disease in particular, as it was common for immigrants from infested areas to bring both the vectors and pathogens to their new homes. Migrants, both national and foreign, would invariably find little medical assistance in settlement areas in the countryside. The disturbing inadequacy of the hospital infrastructure in localities faced with massive immigration is well documented.⁵⁸⁸ The plan to create regional centres to assist the expanding population, such as the ones Milton Munhoz desired, turned out to be a complete failure, and people were forced to look for assistance in Curitiba. Throughout the 1950s, Paraná's roads remained in appalling condition, and few ambulances were available to move patients to the capital. Even if transportation could be found and the patient survived the journey along the grossly inadequate roads, patients discovered upon arrival in Curitiba that the first-rate medical facilities were mostly private. On the other hand, public facilities were notorious for the length of their waiting queues and for being severely understaffed. In 1942, the number of registered physicians in the entire state of Paraná was 213, and they were mostly

⁵⁸⁵ Rodrigues, *A saúde pública no Paraná*, p. 62.

⁵⁸⁶ R.F. Júnior, A Secretaria do Estado da Saúde do Paraná, p. 45.

⁵⁸⁷ 'Crônicas', *B.O.S.P.*, 25 (1946), 413-52; p. 413.

⁵⁸⁸ Rodrigues, *A saúde pública no Paraná*.

concentrated in Curitiba and the northern region of the state.⁵⁸⁹ As the career of a civil servant offered a low stipend, it did not attract many of Curitiba's recently graduated doctors. Most of the individuals who advised public health authorities, many of them linked to the Faculty of Medicine of Curitiba, had their own private offices and worked part-time in public and private medical facilities. People from the countryside resorted to these physicians in times of need.

In the face of this complex set of circumstances, Governor Moysés Lupion, who had replaced Manoel Ribas and hired Milton Munhoz as Secretary of Health, admitted that it was impossible 'to practise preventive medicine' because of the 'social conditions of the population'; his focus would, therefore, be curative medicine.⁵⁹⁰ Nevertheless, Paraná remained the state that invested the least in public health in the southern region. Compared with other states, such as the neighbouring Sao Paulo, which spent just over four per cent, and the capital Rio de Janeiro, which spent five per cent, Paraná expended less than three per cent of its budget on public health initiatives.⁵⁹¹

⁵⁸⁹ João B. Barreto, 'A saúde pública no Brasil', *B.O.S.P.*, 22 (1943), 961-76.

⁵⁹⁰ F. Júnior, *A Secretaria do Estado da Saúde do Paraná*, p. 49.

⁵⁹¹ João B. Barreto, 'A saúde pública no Brasil', *B.O.S.P.*, 24 (1945), 193-210: p. 196.

5.2 – Curitiba in the Paraná Context

The monitoring and coordination of actions against the outbreaks in Paraná were supposed to take place in Curitiba. The infrastructure built by Manoel Ribas was maintained after his administration, and every public health post throughout the state had to report to Curitiba. As Lindolfo Junior, former Director of the Health Department located in Curitiba, stated: ‘All the sanitary districts and their units, all the hospitals, the general laboratory and other activities depended on authorizations’ from his department.⁵⁹² However, it was difficult to manage hygiene post requests, which cropped up every month in different places, because there were limited tools for assessing epidemiological conditions beyond the capital.⁵⁹³ For instance, the disconnect between officials and communities in the countryside is clearly identified when looking at the role of visiting nurses, or *visitadoras*, who were at the forefront of Brazilian prophylactic campaigns. They were called visiting nurses because they were supposed to visit patients in their homes. In the absence of a proper medical infrastructure, these women were tasked with reaching out to the population. They were, for example, responsible for administering the BCG vaccine and answering general questions about tuberculosis.⁵⁹⁴ Thus, they served as the main point of contact between the population and the specialists. Their notes detailing conditions found in households were later used to draw epidemiological maps. However, there was no nursing school in Paraná; instead, the nurses were trained in the Centre of Public Health in Curitiba, which offered health services to the general population and opened only in the late 1940s. The problem was that as late as 1951 the centre’s staff, including its nurses, was still severely overstretched.⁵⁹⁵ It was expected that *visitadoras* not only vaccinated

⁵⁹² R.F. Júnior, *A Secretaria do Estado da Saúde do Paraná*, p. 47.

⁵⁹³ *ibid.*

⁵⁹⁴ Pearl T. Siegel, ‘Algo más sobre el BCG’, *B.O.S.P.*, 29 (1950), 872-6; Katherine Z. W. Whipple, ‘El control de la tuberculosis’, *B.O.S.P.*, 19 (1940), 787-93.

⁵⁹⁵ Alice Michaud, ‘O Paraná e o problema da enfermagem’, *Revista do Dept. de Saúde do Paraná*, 1 (1951), 31.

but also monitored suspected cases of tuberculosis in Curitiba and the countryside.⁵⁹⁶ This was not done efficiently, and the picture of the epidemiological status of Paraná that resulted was, not surprisingly, fairly blurred.⁵⁹⁷ Eventually, authorisation for new public health centres was granted, and even in cases when it was refused, outposts were eventually opened without any control or interference by the secretary.

Another responsibility of the Department of Health in Curitiba was to interact with and follow the instructions of the Ministry of Health in Rio de Janeiro. This was particularly important when campaigns were organised at a national level, like those against tuberculosis, malaria and Chagas disease. However, the department was understaffed and handled a growing number of hopeless requests; it was therefore unsurprising that exchanges with the ministry in Rio de Janeiro were becoming increasingly difficult.⁵⁹⁸ In fact, there were several critical problems demanding urgent attention. Only half of Curitiba's households had running water and little more than forty per cent were connected to the public sewage system.⁵⁹⁹ These conditions explained why diseases linked to poor sanitary conditions like typhoid fever still claimed hundreds of lives every year.⁶⁰⁰ To complete the dreadful picture, there was a severe shortage of medicines in the few existing public medical facilities, and the condition of instruments and equipment was often far from ideal.⁶⁰¹

⁵⁹⁶ Homero Braga, 'Contribuição do estudo da alergia infra-tuberculínica', (unpublished Faculdade de Medicina UPR Pediatrics Chair admission's thesis, 1944), p. 20.

⁵⁹⁷ This was a fact even in Curitiba where there were indications that numbers were not accurate, see Carlos F. F. Costa, 'A luta anti-tuberculosa nos Estados Unidos', *R.M.P.*, 14 (1945), 211. Even when public health officials tried to discuss mortality rates caused by tuberculosis, they demonstrated a dissociation with their epidemiological context. In 1951, an official report of the Public Health Department stated that Curitiba had one of the lowest rates among Brazilian capitals, 637 deaths per 100,000 persons. This number was at least twice the highest number known at the time and almost ten times the rate found overseas, Leonel Atílio Muraro, Azor O. C. S. S. Ribeiro, 'Sumário retrospectivo da medicina preventiva', *Secretaria de Saúde e Assistência Social*, 1 (1951), 23-30: p. 26.

⁵⁹⁸ R.F. Júnior, *A Secretaria do Estado da Saúde do Paraná*, pp. 45-53.

⁵⁹⁹ Barreto, 'A saúde pública no Brasil', (1942), p. 856.

⁶⁰⁰ Rodrigues, 'A saúde pública no Paraná', pp. 103-111.

⁶⁰¹ 'Editoriais', *R.M.P.*, 16 (1947), 150-151. For further references on the problem of hygiene in Curitiba, see Deborah Carvalho, 'Das casas de pasto aos restaurantes', (unpublished UFPR Masters dissertation, 2005).

In the meantime, Curitiba was described as a progressive city, and its medical community worked hard to reinforce that image.⁶⁰² When Rafael Souza, Director of the National Department of Tuberculosis Control, visited Curitiba in 1946, his agenda included touring radiology stations that were available to the general population.⁶⁰³ Souza admitted that Curitiba was one of the few capitals he knew that could afford to make such a service available to the common man. With a population of less than three hundred thousand people, radiology was not only available for tuberculosis diagnostics but also for the treatment of cancer. The local Institute of Medicine advertised that its radiological therapies had accomplished excellent results in the fight against that terrible disease.⁶⁰⁴ Professors from the Faculty of Medicine were at the forefront of the application of these new technologies. Advertising their familiarity with the latest breakthroughs in medical technologies was a means by which they attracted customers to their private practices and competed on equal terms with other academic centres, as explained below.

5.3 – The Faculty of Medicine of Curitiba

Despite all its contradictions, it was still expected that solutions to problems like tuberculosis, malaria and Chagas disease would come from Curitiba. More importantly, in this context the experts who were expected to provide those solutions were located in the Faculty of Medicine. In the 1940s, the Faculty of Medicine was the most prestigious centre of medical expertise in the state. If a solution was to be found, it would certainly come from this highly praised educational institution. The Faculty of Medicine of Curitiba, founded in 1912, taught students who endeavoured to fill the highest professional positions available. Medicine, like law and

⁶⁰² The fact that “good air” was no longer taken as a pre-condition for cure is found in lectures in the 1940s, see Evaristo F. F. Costa, ‘Sanatórios’, *R.M.P.*, 15 (1946), 188-92.

⁶⁰³ ‘O novo diretor do Departamento Nacional de Tuberculose em Curitiba’, *R.M.P.*, 15 (1946), 61; Rodrigues, *A saúde pública no Paraná*, p. 136.

⁶⁰⁴ ‘Hospitais e casas de saúde do Paraná’, *R.M.P.*, 9 (1940), 278-9.

engineering, was not only a profession but also, much more than it is today, a sign of status. At the end of the three-year course, students could choose to write a thesis. A pass mark gave them the title of Doctor, an essential distinction for those intending to pursue an academic career. However, common usage dictated that if an individual had studied medicine, after graduation he was automatically called ‘doctor’ and considered a man of science. In the University of Paraná, medicine was the most sought after course, and it had almost the same number of students as all the other faculties combined.⁶⁰⁵

Professors of the Faculty of Medicine were the backbone of an influential community of physicians who called themselves scientists and referred to their practices as scientific endeavours. They declared their intentions to stay ahead of their Brazilian peers in open challenges to faculties elsewhere in the country. In the early 1940s, newspapers in Curitiba closely watched the Faculty of Medicine of São Paulo and voiced the protests of professors from the local Faculty of Medicine when any action conflicted with their interests. When the largest Faculty of Medicine in São Paulo decided to expand annual enrolments to two hundred students, professors from the Faculty of Medicine in Curitiba labelled the idea absurd, claiming it would reduce the considerable number of students who came from São Paulo to study in Curitiba.⁶⁰⁶ Following public protests in the press and political articulations behind the scenes, the faculty in São Paulo relented. Despite the fact that São Paulo was the capital of the richest and most industrialised state in Brazil, Curitiba frequently offered open challenges to its medical schools.⁶⁰⁷

Attempts to compete on equal terms with faculties of medicine required a public image of a modern educational centre; such an image was constantly reinforced by the main figures

⁶⁰⁵ In 1946, the Faculty of Medicine had 838 students whereas engineering, law, science and letters faculties together had 928, *Anuario da UPR 1950*, (Curitiba, 1951): p. 90.

⁶⁰⁶ ‘Ainda bem!’, *O Diário da Tarde*, (16 Mar.1940), 7; ‘Ameaça de ficar sem alunos a Faculdade de Medicina’, *O Diário da Tarde*, (5 Mar. 1940) 9.

⁶⁰⁷ Baranow and Siqueira, *Universidade Federal do Paraná*, p. 86.

of the faculty. The connection between professors and medical facilities that offered the latest technologies was part of this effort. However, beneath the façade of modernity, deeply traditional customs and ideas remained; these are revealed in professors' theoretical affiliations. For instance, views of society propagated by the eugenic movement, a popular cause in Brazil since the 1920s, found their way into the speeches of some of these influential individuals. When the growing rural population was analysed, for example, assessments were clearly inspired by eugenic doctrines. Small farmers and peasants were considered prone to disease since they were weakened by 'bad habits', such as poor hygiene and excessive drinking.⁶⁰⁸ Such deviant behaviour was sometimes related to race. 'Inferior' races tended to behave badly; thus, traditional medicine could do little to help.⁶⁰⁹ Milton de Macedo Munhoz, the aforementioned Secretary of Health after the Ribas administration, was one of the main figures of the Faculty of Medicine to advocate these ideas. Munhoz served as the Executive Secretary of the Faculty of Medicine for almost two decades. Thus, he acted in the second most important post after the institution's Dean. Munhoz, like Jandyr Faillace in Porto Alegre, held the Chair of Hygiene in the Faculty of Medicine of Curitiba and belonged to the same generation as his counterpart in Porto Alegre. Whereas Faillace also advocated some of the tenets of eugenics linked to so-called deviant behaviours such as alcoholism, Munhoz was more concerned with racial issues. Munhoz' views on hygienist doctrines can be traced back to his undergraduate studies. His doctoral thesis was titled 'Sexual Education in Schools' and dealt with the necessity of imposing limits on child behaviour, particularly boys, to avoid the risk of 'organic degeneration' associated with habits such as masturbation.⁶¹⁰ Later in his career, Munhoz pushed child education aside to focus on eugenics. He relied on the main tenets of the

⁶⁰⁸ Homero Braga, 'O melhor imigrante', *A Divulgação*, 19 (1949) 8-9.

⁶⁰⁹ Carmen Silva da Fonseca Kummer, 'Não esmorecer para não desmerecer', (unpublished UFPR Masters dissertation, 2007), pp. 75-76.

⁶¹⁰ Diva da Conceição Ribas Mezzomo, 'Médicos e educadores', (unpublished UFPR Masters dissertation, 1990), p. 76.

Brazilian School of Eugenics, usually associated with the work of Renato Kehl.⁶¹¹ Among Munhoz' interests were ways in which public authorities could promote discussions on family planning policies to avoid further propagation of 'degenerative' traits. Munhoz usually quoted two sources to illustrate his position. The first was the Bible. Biblical texts were frequently invoked as examples of social medicine, such as the prohibition of marriage among alcoholics.⁶¹² The second source of Munhoz' analogies was agriculture and animal husbandry. He argued that as in agriculture, where seeds had to be selected, and in animal husbandry, where he claimed, 'good chickens were kept, and the bad ones ended up in the pan', humans should also eliminate the bad seeds among themselves.⁶¹³ His definition of 'bad seeds' included those who were 'abnormal, weak, sick, alcohol or drug dependent, mentally ill or disabled'.⁶¹⁴

It is noteworthy that Munhoz' position was shared by other physicians in the Faculty of Medicine. Homero Braga, for example, Professor of Paediatrics and Child Hygiene, declared that Paraná had to devise a strategy for selecting arriving immigrants to avoid incorporating individuals described as 'ignorant and racially inferior' into the community.⁶¹⁵ This position was also explicit in the doctorate thesis of the physician Theodorico da Silva, which was presented in 1940 and approved with distinction. Silva described workers on dairy farms with similar disdain. He claimed that they clearly presented low levels of hygiene and it would be useless imposing fines since:

'it would only create a sense of negativity because they are usually ignorant people who do not know the language, norms of hygiene, regulations and laws. After paying the fine, they will try to deceive the sanitary control in order to recover their financial

⁶¹¹ Milton Munhoz, 'A importância da higiene mental', (unpublished UPR Hygiene Adjunct Professorship admission's thesis, 1929), p. 200.

⁶¹² Milton Munhoz, 'Palestra no Centro Acadêmico Nilo Cairo', in Hamilton Lacerda Suplicy and Pio Taborda Veiga (eds.), *Milton de Macedo Munhoz*, (Curitiba, 1987), pp. 287-92.

⁶¹³ Munhoz, 'Exame pre-nupcial', p. 248.

⁶¹⁴ *ibid.*

⁶¹⁵ Braga, 'O melhor imigrante', pp. 8-9. In 1946, Braga and Munhoz together made the opening speeches of the first Seminar on Tuberculosis organised in the Faculty of Medicine, see Milton M. Munhoz, 'Curso intensivo sobre a tuberculose', in Hamilton Lacerda Suplicy and Pio Taborda Veiga (eds.), *Milton de Macedo Munhoz* (Curitiba, 1987), pp. 283-6.

loss. The worst cases are those created by immigrants who, in their great majority, have one single goal: to get rich in Brazil'.⁶¹⁶

5.4 – The Faculty Arms: Local ramifications of the medical community

Amongst the important ramifications of the Faculty of Medicine was the Medical Association of Paraná, the origin of which was linked to the Medical Union of Paraná. As had been the case in Porto Alegre, this union was organised in 1931 with the aim of regulating the medical profession. Regulation included, among other things, abolishing voluntary work in 'hospitals and kindergartens' and tackling 'the illegal practice of medicine, folk medicine, quackery, and dishonest advertising'.⁶¹⁷ In 1931, the Medical Association already existed and was linked to the Faculty of Medicine. Although all members of the Association were also union members, each entity pursued a different objective. The Union concentrated its efforts on protecting and regulating the medical profession, whereas the Association focused on the cultural and so-called scientific activities of the medical class.⁶¹⁸ Later in the decade, a federal law demanded that no more than one association or union could be present in each state, so the Medical Union was incorporated into the Medical Association. Its link to the Faculty of Medicine survived the merge, and according to the association's statute, in the case of its dissolution, its assets should be transferred to the Faculty.⁶¹⁹

In the 1940s, the association convened once a month when members read papers and discussed matters concerning the medical profession. All hospitals and private clinics had at least one representative in the association, and its members therefore represented the medical establishment of the town.⁶²⁰ Its research activities are revealed in transcriptions of papers

⁶¹⁶ Theodorico Raphael Silva, 'Aspectos da fiscalização sanitária do leite de Curitiba', (unpublished UPR Ph.D. thesis, 1941).

⁶¹⁷ Márcia Delladone Siqueira, '*Associação médica do Paraná*', (Curitiba, 1993).

⁶¹⁸ For an overview of the relationship between Curitiba physicians and local midwives, also one of main points related to professional debates in Porto Alegre, see Fabiano C.S.A. Farias, 'A institucionalização do parto e do ensino de parteiras', (unpublished UFPR Masters dissertation, 2010).

⁶¹⁹ *Estatutos*, (Curitiba, 1949), p. 14.

⁶²⁰ For example each of the institutions related to the Association had their services constantly advertised in its journal, see 'Hospitais e casas de saúde do Paraná', 278-9.

reprinted in the association's journal.⁶²¹ Meetings were called 'scientific', and each paper presented was followed by a lengthy, although well organised, discussion. Sometimes lectures were announced in local newspapers and open to students from the Faculty of Medicine, but, in general, they were closed to non-members.⁶²²

The association's journal became a crucial tool for communicating with external medical communities, and its long list of publication exchanges attested to this fact.⁶²³ Throughout the 1940s, the association received no fewer than one hundred journals from Brazil and overseas; this number was sufficient to keep them up-to-date with the latest developments in the main medical centres. Munhoz, the aforementioned advocate of eugenics, had a central role in the history of this journal. He had been the main sponsor of the Medical Association's journal (*Jornal da Associação Médica do Paraná*) until the association merged with the Medical Union. After the merge, he agreed to hand the journal over to the new board of directors under two conditions: his name was to remain on the cover as founder of the journal, and he would appoint a specific person to control advertising. Not surprisingly, the journal advertised the x-ray services Munhoz offered in his private clinic.

Science and Research

The wide-ranging influence of the Faculty of Medicine is important to recognise because it allows us to deepen our understanding of the priorities and intentions of its academics as well as the ways in which terms like 'science' and 'scientific research' were both understood and articulated by this community. As these independent centres of medical expertise and professional regulations were considered sites of medical science, it is important to understand the ways in which they influenced contemporary meanings of science and scientific activity in

⁶²¹ For example, 'Atividades médicas', *R.M.P.*, 15 (1946), 261-3.

⁶²² 'Em proveitosa atividade a Associação Médica do Paraná', *O Diário da Tarde*, (29 Mar. 1946), 11.

⁶²³ 'Recebemos e agradecemos', *R.M.P.*, 9 (1940), 106-8.

that context. When the faculty was created in 1912, the official slogan of the institution was ‘*Scientia et Labor*’.⁶²⁴ The slogan symbolised the intention of the founders to combine practical work with theoretical knowledge.⁶²⁵ One particular field in which theory and practice came together was homeopathy, which was the main area of expertise of influential chair holders such as Nilo Cairo, who was also one of the founders of the faculty.⁶²⁶ Cairo was a controversial figure; he attracted the attention of the press with ideas such as his opposition to compulsory vaccination based on the fact that it represented the monopoly of allopathy.⁶²⁷ Cairo’s influence and the importance of homeopathy could still be felt in the Faculty of Medicine decades later. By the 1940s, there were more books on homeopathy than on physiology in the faculty’s library, and the active Students’ Union of the Faculty of Medicine bore his name.⁶²⁸

During the decade before nationalisation, professors at the Faculty of Medicine continued to use the word *science* in their papers, speeches and articles for the popular press. However, a careful study of their use of *science* reveals at least three distinct meanings. One was synonymous with ‘body of knowledge.’⁶²⁹ This was the most common meaning of the word, and it was found in sentences like the one voiced during a graduation ceremony by Alo Guimaraes, Professor of Psychiatry at the Faculty of Medicine, who declared: ‘No science may serve more the spirit of investigation and understanding of human nature than medicine’.⁶³⁰ It was because of this meaning that Guimaraes and his colleagues used the word *scientist* as a synonym for *physician*.⁶³¹ After all, it was expected that a physician was familiar with a

⁶²⁴ Cintra, ‘*Scientia et labor*’, pp. 58-81. The faculty adapted, albeit incorrectly, the Latin motto *Scientia et Labore*, through knowledge and education.

⁶²⁵ *ibid.*

⁶²⁶ Although homeopathy had never been included in the Faculty curricula.

⁶²⁷ Renata Palandri Sigolo, ‘Em busca da *Scientia Medica*’, (unpublished UFPR Ph.D. thesis, 1999), p.167.

⁶²⁸ Cintra, ‘*Scientia et Labor*’, pp. 54-55; Márcia Delladone Siqueira, *História do Diretório Acadêmico Nilo Cairo*, (Curitiba, 2004). For further references on the work and life of Nilo Cairo, see Renata Palandri Sigolo, *Nilo Cairo*, (Curitiba, 2012).

⁶²⁹ J. Mesquita Carvalho, *Dicionário prático da língua nacional*, (Porto Alegre, 1945), p. 219.

⁶³⁰ Alô Guimarães, ‘O valor da cultura na formação espiritual dos médicos’, *R.M.P.*, 18 (1949), 423-28.

⁶³¹ ‘A ciência médica Paranaense como símbolo de cultura’, *O Diário da Tarde*, (11 Feb. 1946) 12.

considerable body of knowledge. Therefore, anything related to medicine might be called scientific. For example, members called the Medical Association of Paraná a ‘scientific institution’, although it also actively worked to regulate the medical profession.⁶³²

A second use of the word *science* was slightly more specific. As contemporary dictionaries defined it, science consisted of a ‘body of knowledge coordinated and relative to the phenomena of a specific class or order’.⁶³³ This use of the word was found frequently in the popular press in headlines like ‘The medical science of Paraná as a symbol of culture’.⁶³⁴ The same applied to works in specific fields within medicine, such as obstetrics or diabetes. A seminar on one of these areas would be called scientific because it was specific to that particular area.⁶³⁵ A third meaning was related to the systematic way in which knowledge was acquired and organised.⁶³⁶ This definition was most common when the words *science* and *knowledge* were used together. For example, Glaucio Bandeira, a physician from Curitiba, opened one of his papers in the early 1950s with the assertion that ultimate truths were always the end goal of ‘scientific knowledge’.⁶³⁷ After José Rosemberg, a specialist in tuberculosis from Sao Paulo, visited Curitiba in 1949, a note in the Medical Association journal described him as having a scientific personality, meaning that he worked systematically and diligently.⁶³⁸

One practical implication of the different uses of the word *science* is that when researchers working in laboratories such as the Oswaldo Cruz Institute in Rio de Janeiro visited Curitiba, they were welcomed at the Medical Association as equals, although their research practices were completely alien to most members of the local medical community.⁶³⁹ In

⁶³² ‘Associação médica do Paraná’, *R.M.P.*, 11 (1943), 107.

⁶³³ Hildebrando Lima and Gustavo Barroso, *Pequeno dicionário brasileiro de língua portuguesa*, (São Paulo, 1951), p. 286.

⁶³⁴ ‘A ciência médica Paranaense’, p. 12.

⁶³⁵ ‘Em proveitosa atividade a Associação Médica do Paraná’, p. 11.

⁶³⁶ As defined in the dictionary, Alvaro Magalhães, *Dicionário enciclopédico Brasileiro*, (Porto Alegre, 1943), p. 391.

⁶³⁷ Gláucio Bandeira, ‘Síndrome de Dumas’, *R.M.P.*, 21 (1952) 67.

⁶³⁸ ‘Notícias médicas’, *R.M.P.*, 18 (1949), 124.

⁶³⁹ Celso Valério and Pereira Cunha, ‘Associação Médica do Paraná’, *R.M.P.*, 11 (1943), 572.

Curitiba, physicians rarely used the term *research* to describe their empirical practices.⁶⁴⁰ But when researchers came from Sao Paulo, they were treated as equals because physicians in Curitiba called themselves scientists, using one of the definitions mentioned above.⁶⁴¹

Although members of the Faculty of Medicine may have grasped the differences between these meanings, other professionals could not use the term science with the same authority. As in Porto Alegre, physicians in Curitiba called an institution like the IBTR a ‘technical institute’, although Marcos Enrietti and his subordinates undoubtedly dealt with different bodies of knowledge, pursued them systematically, and undertook proper research.⁶⁴² Physician’s “monopoly” of the word *science* also created contradictions. For instance, professors were in favour of practical classes in laboratories located at the Faculty of Medicine, but they would never have called them empirical activities. In Curitiba, the word *empiricism* was used, like it was in Porto Alegre, to define something unorganised, unsystematic and amateurish.⁶⁴³ An empirical activity was, in fact, taken to be the exact opposite of a scientific activity. The same confusion arises when the term *scientific fact* is analysed. Alo Guimaraes, the aforementioned Professor of Psychiatry at the Faculty of Medicine, defined a scientific fact as the result of erudition and culture.⁶⁴⁴ Consequently, proper scientific knowledge and scientific facts were the result of thoughtful analysis and familiarity with available bodies of literature. Devising experiments and testing them in laboratories, as was done by researchers in places like the Oswaldo Cruz Institute and the local IBTR for that matter, could not, therefore, be further from the definition of science used by medical “scientists” in Curitiba. Finally, the most paradoxical use of the word *scientist* was in the expression ‘man of science’.

⁶⁴⁰ Victor F. Amaral, *Anuário da UPR 1948*, (Curitiba, 1949).

⁶⁴¹ In the rare cases when the word research was used, it was not associated with science, see Amaral, *Anuario da UPR 1948*, p. 58.

⁶⁴² *ibid.*

⁶⁴³ As in *Instituto de Biologia e Pesquisas Tecnológicas*, (Curitiba, 1953), p. 2; ‘Empreendimentos referentes ao fomento da cultura do algodão’, *Página Rural*, 1 (1945), 18-19, p. 18; M.V., ‘Abaixo com o empirismo’, *Página Rural*, 1 (1945), 35-6.

⁶⁴⁴ Guimarães, ‘O valor da cultura na formação espiritual dos médicos’, p. 428.

At graduation ceremonies in the Faculty of Medicine, Louis Pasteur, for example, was invariably referred to in speeches as a ‘man of science’.⁶⁴⁵ The students who were about to become doctors, however, were also addressed as ‘men of science’. There was no contradiction here, since according to one of the definitions just described, a man of science could be a wise and erudite individual, something that all medical students aspired to be, or it could refer to a person who systematically excelled in a particular field, like Louis Pasteur. In fact, between 1912 and 1949, only forty-six final year theses were presented despite the fact that 879 undergraduate students completed the course in medicine.⁶⁴⁶ Therefore, less than ten per cent of the students actually carried out a literature review, which these theses usually were, let alone undertook original research of any kind in their final year. In fact, a thesis presented at the end of the undergraduate period was something so rare that it was given special attention in annual reports.⁶⁴⁷ The example of Atlantido Cortes, Chair of Clinical Practice in the Faculty of Medicine and specialist in tuberculosis, illustrates that students’ approach to research practices resembled the behaviour of their professors before 1950. Cortes completely disregarded the usefulness of laboratory analysis in assisting tuberculosis specialists. Literature reaching Curitiba suggested that laboratory analyses were essential in the United States to help identify whether tuberculosis lesions in x-ray plates were active or inactive and, in fact, whether they were actually tuberculosis or whether they were other pulmonary diseases.⁶⁴⁸ The search for tubercle bacilli using microscopes was possible after growing bacilli in laboratory conditions and analysing its morphology. Animal inoculation was a second method used in laboratories, and although time consuming, it helped identify cases where the results of other diagnostic tests were uncertain. In Porto Alegre, Newton Neves da Silva, one of Faillace’s

⁶⁴⁵ *ibid.*

⁶⁴⁶ Cintra, ‘*Scientia et labor*’, p. 206.

⁶⁴⁷ For example, see *Relatório do ano de 1941*, (Curitiba, 1942), p. 30.

⁶⁴⁸ Martin M. Cummings, ‘The laboratory diagnosis of tuberculosis’, *American Journal of Public Health*, 39 (1949), 361-6.

assistants, adopted laboratory practices as a standard procedure to assist doubtful diagnoses.⁶⁴⁹ In Curitiba, however, Cortes declared that technology would never replace clinical experience. Although he conceded that radiology helped clinicians, he maintained that the experience of physicians interpreting results was essential to obtain a correct diagnosis. More importantly, laboratory analysis was simply too inaccurate by Cortes' standards and, thus, a worthless practice for experienced clinicians.⁶⁵⁰

⁶⁴⁹ Silva, 'Diagnóstico da tuberculose', 125-8.

⁶⁵⁰ Atlântido Borba Cortes, 'Formas iniciais da tuberculose pulmonar do adulto', (unpublished Faculdade de Medicina UPR Ph.D. thesis, 1940).

Case Study Seven – Medical Entomology at the Faculty of Medicine of Curitiba – Milton Erichsen Carneiro and the Chair of Parasitology

The etymological interpretation and use of the word *science* provides a proper introduction to our case study on Milton Erichsen Carneiro, holder of the parasitology chair, which included medical entomology. Carneiro understood the flexibility of the term, but he went much further: he explicitly opposed the incorporation of research practices into the routine of the Faculty of Medicine. For the purpose of this thesis, Carneiro's hostility towards research is almost more revealing than if he had actively undertaken entomological research. His steadfast attitude will expose a facet of the Faculty of Medicine of Curitiba that helps to further understand the stance taken by medical professors toward academic research after nationalisation.

Carneiro's father was Abdon Petit Guimarães Carneiro, one of the founders of the Faculty of Medicine of Curitiba. Carneiro senior had held several chair positions during the first decades of the faculty, including Medical Natural History – a post that the younger Carneiro would hold after its name was changed to the Chair of Medical Parasitology. Carneiro junior entered the Faculty of Medicine of Curitiba in 1918 when his father was one of the chair holders, and he studied there for three years. After this period, he went to Rio de Janeiro to complete his studies, which he did in 1923. Having worked for one year as a private practitioner, he returned to Curitiba to apply for the Chair of Medical Natural History, formerly held by his father.⁶⁵¹ Raul di Primio had also held the Parasitology Chair in Porto Alegre, and the course under its jurisdiction included the study and identification of malaria and Chagas disease vectors in its syllabus.⁶⁵² Having assumed the post with a thesis titled 'Paleontological basis of the transformist doctrine', Carneiro began a long career as a medicine professor until

⁶⁵¹ The Faculty of Medicine had its own pension scheme that secured a lifetime stipend for Chair holder heirs. Carneiro Senior died in 1940, so his son, Milton Carneiro, started to receive his share that lasted until 1950 when nationalisation finished the scheme, see *Relatório do ano de 1941*, (Curitiba, 1942).

⁶⁵² Milton Carneiro, 'Parasitologia', *Programas do Curso de Medicina*, (1959), 42-4.

succeeded by his son, Milton Carneiro Filho, in 1960.⁶⁵³ Carneiro took his teaching responsibilities seriously, and later in his career he would proudly assert that he helped to train more than three thousand physicians. Friends considered him to be the ‘perfect professor’ because of his communication skills and his dedication to teaching.⁶⁵⁴

Carneiro was a prolific writer; throughout his professional life, he wrote not only newspaper articles but also poetry and prose.⁶⁵⁵ In one of his articles written in 1946 for the daily newspaper *Gazeta do Povo* and reprinted in the journal of the local Medical Association, titled ‘Research or High-Culture?’, he summarised his views on academic research. He began with a comment that it had become fashionable in Sao Paulo to claim that a university was synonymous with a research establishment. There, they believed that a higher education institution could not be referred to as a university if it did not include research among its activities. He claimed that this idea originated in Germany and was then transplanted to the Americas. He questioned the relevance of the Brazilian version of science because it attempted to explore the precise knowledge of eccentricities. He referred to studies on dwarf turtles and exquisite varieties of peaches as indicative of meaningless research topics treated as science only because his peers included abstracts in English.⁶⁵⁶ Carneiro displayed great contempt for such authors and believed that what they did was not science. According to him, science had been and always would be an ‘intimate acquaintance with general knowledge’ (in Portuguese, *minucioso conhecimento do geral*).⁶⁵⁷ The concept of a university as a centre of research therefore ‘should be modified and adapted to Brazilian reality because, in its original sense, it

⁶⁵³ Iseu Affonso Costa and Eduardo Corrêa Lima, *O ensino da medicina na Universidade Federal do Paraná* (Curitiba, 2007): p. 84.

⁶⁵⁴ *ibid.*: p. 82.

⁶⁵⁵ Among his literary works are ‘Milton Carneiro, *Tricentenário de Paranaguá*, (Curitiba, 1956); Milton Carneiro, *Procissão de Eus*, (Curitiba, 1961); Milton Carneiro, *Paranaguá* (Curitiba, 1964); Milton Carneiro, *Sobre Machiavel*, (Curitiba, 1965); Milton Carneiro, *Paranaguá*, (Curitiba, 1966).

⁶⁵⁶ He would make the same point in other works, see Milton Carneiro, *História da doença de Chagas* (Curitiba, 1963), p. 10.

⁶⁵⁷ Milton Carneiro, ‘Pesquisa ou cultura geral?’, *R.M.P.*, 15 (1946), 227-8: p. 228.

was simply an unachievable utopia'.⁶⁵⁸ He used the definition of university put forward by Ortega Y. Gasset to maintain that the role of such institutions should be the teaching of high culture. He argued that Pasteur was an example of a man who founded microbiology not because he had a background in research but because he had been initiated into circles of high culture and suitable educational environments.⁶⁵⁹ He finished his article with a suggestion that students in search of research should seek out faculties of philosophy.⁶⁶⁰ The distinctions he made in this article are important because it implies that faculties of medicine continued to be seen as places of science but not of research.

Two aspects of Carneiro's antagonism towards the model of academic research referred to in his article are important. The first is that he referred only to Sao Paulo. As suggested above, professors at the Faculty of Medicine of Curitiba considered the Faculty of Medicine at the University of Sao Paulo to be their most important competitor.⁶⁶¹ For this reason, Carneiro was only giving voice to the well-rehearsed claim that although Curitiba may have been a small town when compared to Sao Paulo, its Faculty of Medicine had an equivalent, high quality standard of teaching; therefore, chair holders like Carneiro could question the activity of their peers in Sao Paulo on equal terms. This stance indicates a second interesting point about Carneiro's position. He tried to differentiate the faculty by insisting that in Curitiba a more traditional, perhaps classical, method of medical teaching was being preserved. He attempted to create this differentiation by arguing that in Curitiba they focused on science rather than research. The two activities were essentially different in Carneiro's mind. Research, or knowledge concerning eccentricities, was conducted in the Faculty of Medicine of Sao Paulo.

⁶⁵⁸ *ibid*

⁶⁵⁹ The same reasoning was applied to explain Carlos Chagas' career, see Carneiro, *História da doença de Chagas*, p. 10.

⁶⁶⁰ Carneiro, 'Pesquisa ou cultura geral?'

⁶⁶¹ Throughout the 1940s, São Paulo remained the main destination for students requiring transfers from the Faculty of Medicine of Curitiba, see *Relatório do ano de 1943*, (Curitiba, 1944), p. 12; *Relatório do ano de 1944* (Curitiba, 1945), p. 15; *Relatório do ano de 1945*, (Curitiba, 1946), p. 26. The geographical proximity and the facility to make the transfer forced professors in Curitiba to pay close attention to developments in neighbouring state faculties.

In Curitiba, on the other hand, the Faculty practiced science, a broader approach to medical knowledge that also encompassed an element of high culture.⁶⁶² This explains the title of his piece; students could choose an approach that had been inappropriately labelled research in Sao Paulo or join the medical ranks in Curitiba where true science, or high culture, was encouraged. When his position on this issue is considered, it comes as no surprise that it caused Carneiro little embarrassment not to be recognised as the local expert on insect-borne diseases. Obtaining detailed knowledge of things such as insect taxonomical classification or the impact of pesticides on particular species was a task that technicians in Sao Paulo or Rio de Janeiro could address. A Chair holder like Carneiro was expected to understand a diverse and broad base of knowledge that included as many elements as possible within a particular topic. For instance, when Carneiro was asked to write about Chagas disease he produced a colourful overview of the circumstances surrounding the discovery of the vector, the long debate that followed in the Brazilian Academy of Sciences, the repercussions overseas, and several other peculiarities relating to the history of the disease. More mundane aspects, such as the geographical distribution of vectors in Paraná, were mentioned only briefly.⁶⁶³

⁶⁶² Simon Schwartzman has identified the same approach in Brazil during the earliest part of the twentieth century, although he did not provide examples, see Schwartzman, *América Latina*, p. 26.

⁶⁶³ Milton Carneiro, *História da doença de Chagas*, pp. 61-63.

Malária, Chagas disease and the local use of organochlorine pesticides

While Carneiro publicly opposed scientific research in the Faculty of Medicine, public health authorities struggled to tackle the causes of insect-borne diseases. In the early 1940s, malaria was clearly on the radar of the public health authorities in Paraná. Constant outbreaks threatened strategic regions of the state such as large rural areas that provided essential income for the state's booming economy. In 1948, facing the permanent threat of pest without a local specialist willing to help devise a well-informed strategy, Governor Lupion signed a five-year agreement with the federal government to tackle malaria in the state; chemical pesticides were the main weapons in that initiative.⁶⁶⁴ Both parties agreed to spray DDT in 113,000 households and buildings, and the work began immediately after the official agreement was signed. As it was in the case of BHC against locusts, and later with the outbreak of coffee berry borers, Paraná paid for the pesticides while the federal government coordinated their administration. Results of the campaign against malaria in Paraná soon began to emerge in official publications. In 1950, Governor Lupion published a report highlighting the massive campaign against malaria vectors.⁶⁶⁵ In total, 816,000 litres of insecticide solution containing DDT were used in approximately 430,000 homes.⁶⁶⁶ Even if these numbers were exaggerated and only ten per cent of that total was used, the amount would have been over 80,000 litres of DDT solution, a substantial amount considering that no previous studies had been undertaken regarding mosquitoes' fauna, their biology, or even the quantity of DDT required against the different species present in Paraná. These issues nevertheless began to surface as soon as the campaign was underway in the state. Reports issued in 1949 revealed that several questions remained unanswered. In an article written by René Rachou and his colleagues from the

⁶⁶⁴ Moysés Lupion, *Mensagem*, (Curitiba, 1948).

⁶⁶⁵ Moysés Lupion, *A concretização do plano de obras do Governador Moysés Lupion*, (Curitiba, 1950).

⁶⁶⁶ Moysés Lupion, *Mensagem*, (Curitiba, 1950): p.130.

National Service of Malaria, the group in charge of the Paraná campaign, it was argued that when they began the work they lacked answers to the following questions:

- 1) Should DDT be sprayed in all rooms in a household or only in the bedrooms?
- 2) Should DDT be sprayed only on walls or also on ceilings?
- 3) Was it necessary to spray the entire surface of the walls or was spraying to a certain height effective?
- 4) If it was effective to spray to a certain height, what height was appropriate?
- 5) Should DDT be sprayed over curtains, furniture, etc.?

After the first months of work, Rachou concluded that the answers to such questions varied according to the insect species present. For the sub-genera *Kaerstezia*, which was endemic on the east coast of Paraná, entire households had to be sprayed. The *Darling* preferred the lower walls of homes; therefore, spraying up to two meters was considered sufficient.⁶⁶⁷ However, these conclusions referred to the small area in which results were carefully monitored, and further research was required to map out the insect fauna in different locations of the state. Technicians and researchers from the National Service had to cover an immense geographical area and take care of several aspects of the outbreaks. Help in this context, particularly from local experts, would have been warmly welcomed.

Another example of a detailed research programme being carried out close to the Faculty of Medicine in Curitiba was the one undertaken by researchers from the Oswaldo Cruz Institute. Between 1949 and 1953, these researchers travelled to the south of Brazil several times to investigate the life cycle of malaria vectors found in the region's Atlantic Forest.⁶⁶⁸ Four towns and their surrounding areas were considered in this research, including one located in Paraná. The objective was to understand the behaviour of wild varieties that deposited their

⁶⁶⁷ René G. Rachou et al., 'Observações no Estado do Paraná', *Revista Brasileira de Malariologia*, 1 (1949), 288-98.

⁶⁶⁸ Henrique P. Veloso, 'Os anofelinos do sub-gênero *Kerteszia*', *M.I.O.C.*, 54 (1956), 1.

larvae into a plant of the *Bromeliaceae* family, of which there were several kinds. Without that knowledge, it would be counterproductive to devise DDT administration over large areas. The problem was that the plant grew on three different levels of the native Atlantic forest: on the ground, on tree branches, and close to the canopies. At each of these levels, the temperature, humidity and luminosity differed with resulting diversity in the mosquito fauna. It took the researchers almost four years even with the assistance of foreign botanists – who helped to classify the different plants – to reach a preliminary conclusion about how those variables affected the population of mosquitoes. Their conclusion was that the ecology of native forests close to urban areas should be studied in depth before any prophylactic campaigns were devised. In addition, researchers suggested that both DDT and BHC were less effective against larvae and mosquitoes in native areas than Paris Green was; in this way, they opposed the method adopted by the Paraná government. The most important realisation of the study was that mosquitoes and their plant hosts varied in different conditions, and tailored strategies were required for each specific environment. To attend to these particularities, local help would be essential.

The situation with Chagas disease was similar. Brazilian researchers also urged colleagues in Paraná to collaborate on the campaigns underway. For instance, in 1942, Emanuel Dias, researcher at the Oswaldo Cruz Institute, wrote an article in the journal *O Hospital*, which was published in Sao Paulo and also sent to the Medical Association. There, he argued that more information about Chagas disease in Paraná was necessary.⁶⁶⁹ He claimed that little information was available and a joint effort would be necessary to discover the geographical distribution and the actual species found in the state. Dias offered to classify the insects if physicians from Paraná would send samples to him. Nine physicians answered Dias' call and

⁶⁶⁹ Emanuel Dias, 'A distribuição da doença de Chagas no interior do Brasil, apelo aos clínicos, *O Hospital*, 21 (1942), 921-6.

sent samples captured in different parts of the state; but Milton Carneiro was not among them.⁶⁷⁰

Research practices in the parasitology chair

Although Carneiro publicly criticised the idea of incorporating research practices that would expand and update knowledge about malaria and Chagas disease vectors into the priorities of his Chair, he could have allowed others to carry out research if they wished. Chair holders usually had assistants who, in some cases, undertook more detailed studies on topics under the chair's jurisdiction. In fact, not only were researchers from other states willing to investigate the important problem of insect-borne diseases in Paraná, but also there were at least two assistants, Alceu Santos de Almeida and Carlos F.F. da Costa, who were interested in investigating Chagas disease. Almeida worked in the Department of Health in Paraná. He began collecting data on Chagas disease when the Director of the Department, Bichat A. Rodrigues, identified cases of patients showing clinical signs of the disease during a routine inspection and collected samples of *Triatominae*, the vector. Physicians from Paraná did not conduct studies on Chagas disease before 1943, although many specialists outside the state had registered the presence of the disease in the state. Prominent individuals from the Brazilian School of Research on Tropical Medicine – including Adolfo Lutz – had occasionally visited Paraná and written about the different varieties of *Triatominae* in the state.⁶⁷¹

When Almeida published his first and only article, he acknowledged these earlier contributions and declared his intention to expand the available knowledge about the disease.⁶⁷² His research goals were simple: he wanted to identify the vectors and later the pathogens present in both insects and infected patients. As demonstrated in the case of Raul Primio in

⁶⁷⁰ A. J. Simões, 'A doença de Chagas no estado do Paraná', *M.I.O.C.*, 39 (1943), 279-90.

⁶⁷¹ Carlos F. F. Costa, 'Comunicação a respeito de triatomíneos', *R.M.P.*, 9 (1940), 299-300; p. 479.

⁶⁷² Alceu dos Santos de Almeida, 'Sobre a doença de Chagas no Paraná', *R.M.P.*, 15 (1946), 153-8.

Porto Alegre, this was the standard methodology among many medical entomologists studying Chagas disease. After visiting five towns in rural areas, Almeida confirmed the presence of Triatominae in at least three of them. However, he warned the medical community that because the type of household where the samples were collected were quite common throughout the countryside, it was likely that Chagas disease was present in many other parts of the state. It is clear that Almeida intended to expand his study to other cities since he would have further opportunities to continue his work on the topic as a public servant in the Department of Health. He carried out this research in the Department of Health's Laboratory of Chemical Analysis.

The only obstacle to Almeida's plan to pursue further studies was an absence of local support. In the 1940s, Almeida became Milton Carneiro's assistant to the Chair of Parasitology, and it is possible that he was not encouraged to continue his research within the Faculty of Medicine. In any case, Almeida's interest in insect-borne diseases would be short-lived as will be discussed in Chapter Six. After 1950, lacking recognition and support for his research on insect-borne diseases and their vectors, Almeida redirected his scientific research to the field of pulmonary surgery.

Almeida was not the only assistant of Carneiro who tried to initiate research in the area of medical entomology. In 1936, in the last year of his undergraduate studies, Carlos Franco Ferreira da Costa became the assistant of Milton Carneiro.⁶⁷³ Despite his obligations to the chair holder, Costa collected some Triatominae out of personal interest and sent them to Rio de Janeiro for classification. The main feature of this initiative was that he managed to identify the vector of Chagas disease in Curitiba for the first time.⁶⁷⁴ Like Almeida after him, however, Costa was not inspired to pursue that topic further, and he began studying tuberculosis immediately after his graduation.

⁶⁷³ Victor F. Amaral, *Relatório do ano de 1936*, (Curitiba, 1936).

⁶⁷⁴ Costa, 'Comunicação a respeito de triatomíneos'; H. C. Souza-Araujo, 'A doença de Chagas no Paraná', *M.I.O.C.*, 52 (1954), 477-85.

Carneiro's influence extended not only over his assistants but also over the local medical community as a whole. Between 1939 and 1949, only four out of more than two hundred papers submitted to the Medical Association's journal were about malaria and Chagas disease, and they were all published in the early 1940s, when a major malaria outbreak took place in the state.⁶⁷⁵ Unsurprisingly, Carneiro was not considered a local expert capable of answering specific questions about the topics of his Chair. When physicians in Curitiba needed a more in depth analysis of insect-borne disease vectors, external specialists were consulted.⁶⁷⁶ In 1942, the director of the leprosy hospital in Curitiba, Ruy Noronha Miranda, sent a request for the identification of ticks captured in his ward to the researcher Heráclides Araujo, who worked at the Oswaldo Cruz Institute.⁶⁷⁷ Miranda was concerned that parasites infesting the animals used in his hospital might also transmit leprosy. The fact that Araujo turned to Rio de Janeiro for the identification of the collected ticks is enlightening considering that Carneiro, holding the Chair of that area, would usually have been considered the local specialist.

⁶⁷⁵ They are: Costa, 'Comunicação a respeito de triatomíneos'; Celso Caldas, 'Malária nas Ilhas das Cobras', *R.M.P.*, 9 (1940), 30-3; Celso Caldas, 'Malária em Matinhos', *R.M.P.*, 8 (1939), 149-56; Celso Caldas, 'Malária em Caiobá', *R.M.P.*, 8 (1939), 157-64.

⁶⁷⁶ H. C. Souza-Araujo, 'Poderá o carrapato transmitir a lepra?', *M.I.O.C.*, 37 (1942), 95.

⁶⁷⁷ *ibid.*

Case Study Number Eight – João Ernani Bettega and the Chair of Hygiene of the Faculty of Medicine of Curitiba

The context of tuberculin use in Curitiba

The second part of the chapter will focus on Joao Ernani Bettega's early research on tuberculosis. Bettega was initially interested in tuberculin but later turned his attention to surgical procedures. This transition would bear important fruits after nationalisation when he helped to organise a research centre on thoracic surgery inside the Faculty of Medicine. Therefore, Bettega's career starkly contrasted with that of Milton Carneiro, whose apathy towards academic research has already been examined. Before looking at Bettega's specific research interests, the local context of his research must be understood. Unlike medical entomology, where discussions among local experts concerning ways of tackling insect outbreaks were virtually non-existent, several aspects of tuberculosis were scrutinised by the local community of physicians. Malaria and Chagas disease were isolated for the most part in rural areas and mainly affected the lower socioeconomic classes. Tuberculosis, on the other hand, was a universal problem and affected even those very close to the daily clinical practices of physicians linked to the Faculty of Medicine of Curitiba.

As a result of his influential role as Secretary of Health, which placed him in charge of defining the state agenda on tuberculosis, Milton Macedo Munhoz was among the main figures discussing tuberculosis. More specifically, his interpretation of the role of tuberculin in the fight against tuberculosis may be considered representative of attitudes in the 1940s. The main reference in Munhoz' works regarding tuberculosis was to the French hygienist, Leon Bernard (1872-1934). Munhoz understood that, according to Bernard, the problem of tuberculosis was

more social than medical.⁶⁷⁸ For Munhoz, it was impossible for an adult to avoid contact with the pathogenic bacillus because tuberculosis was so widespread in Brazil. Almost one hundred per cent of the population had been exposed to the bacillus, but only some would develop the disease. He believed that the disease only progressed as a result of internal or external factors. Internal factors included those provoked by concomitant diseases or a period of stress; whereas external factors involved an attack by a pathogenic strain of the bacteria.⁶⁷⁹ Therefore, some diagnostic measures, such as tuberculin testing, had no practical meaning. Attempts to assess the epidemiological situation appeared untenable if the entire population was almost certainly infected; the tuberculin test would be positive in all cases. In fact, Munhoz argued that negative reactors were the most vulnerable group because they had no immunity against the disease.⁶⁸⁰ Munhoz believed that rather than worry about testing, the state should ensure the expansion of hospital services so that the sick could be isolated and treated accordingly.⁶⁸¹ In terms of epidemiological studies, he supported the extensive use of x-rays.⁶⁸² Munhoz was familiar with that technology since he had owned the only piece of x-ray equipment in Curitiba for some years and frequently gave talks on the radiological diagnosis of tuberculosis.⁶⁸³

⁶⁷⁸ The definition of tuberculosis as a disease that was linked to social conditions is constantly found in his works, see PTD, MMM, Atas 1949-1976, (28 Oct. 1946).

⁶⁷⁹ Milton Munhoz, 'Epidemiologia', in Hamilton Lacerda Suplicy and Pio Taborda Veiga (eds.), *Milton de Macedo Munhoz*, (Curitiba, 1987), pp. 267-76.

⁶⁸⁰ The same idea of considering the contact with virulent bacillus to be a positive way of triggering the immune system was shared by other epidemiologists. In São Paulo, the influential tuberculosis researcher A. Mac-Dowell, argued that the administration of BCG would be another way to trigger the immune system, see A. Mac-Dowell, 'Primeira cruzada contra a tuberculose', *Revista Brasileira de Tuberculose*, 6 (1937), 219-20.

⁶⁸¹ Munhoz, 'Curso intensivo sobre a tuberculose', pp. 283-6.

⁶⁸² Milton Munhoz, 'Instalação do curso intensivo de medicina', in Hamilton Lacerda Suplicy and Pio Taborda Veiga (eds.), *Milton de Macedo Munhoz* (Curitiba, 1987), pp. 337-9.

⁶⁸³ 'Associação Médica do Paraná', *R.M.P.*, 15 (1946), 261.

The Centre of Expertise: A Phthisiology Society

João Bettega was also shaped by his participation in the activities of the Phthisiology Society. The society was under the sphere of influence of the Faculty of Medicine, directly through its members taking part in its proceedings, and indirectly through the Medical Association, which was under the control of the Faculty. The name of the society came from the Greek word *Phthisis*, meaning consumption, and Phthisiology was the term commonly used in Brazil to describe the study of tuberculosis. The Phthisiology Society was a branch of the Medical Association, and only members of the association were allowed to join. Members of the society publicly declared their intention to serve as an advisory group for public health authorities, which would be extremely useful in face of the alarming state of the tuberculosis outbreak described above. Of the seven main objectives of the society, three mentioned public health. Their initial purpose was to suggest modifications and innovations in the area of tuberculosis control to public health authorities. In addition, they wanted to promote public initiatives that aimed to combat the disease, and, at the same time, they hoped to ‘present works that contribute to public hygiene’.⁶⁸⁴ Private practice was also mentioned, but they clearly intended to be the locus of expertise for public health authorities. Their noble objective will be discussed more closely below because by proclaiming themselves to be experts on tuberculosis, any public health initiative in that area would have to undergo their scrutiny.⁶⁸⁵ As a result, the society became an extension of the Department of Health, which, as demonstrated above, was already unable to manage its normal responsibilities. The informal role of the society was extremely important because it meant that a civil organisation was *de facto* the one controlling the prophylactic campaign, including interaction with the National Service of Tuberculosis, which, at least in theory, was supposed to work with the state departments of health.

⁶⁸⁴ PTD, MMM, ‘Atas 1949-1976’, (26 Jan. 1949).

⁶⁸⁵ For references to further independent institutions, see Márcia Delladone Siqueira, *Lacen - Laboratório Central do Estado* (Curitiba, 1996).

Carlos F.F. Costa was another important name within the context of Bettega's research. Costa had been a founding member of the Phthisiology Society and was its president from 1939 to 1946, assistant editor of the Medical Association's journal from 1940 to 1942, and, several times, a member of its so-called scientific council. After nationalisation, he became an Assistant Professor of Phthisiology alongside Jose Seiler Giglio, under the Chairmanship of Joao Ernani Bettega.

Costa was a staunch admirer of American medicine. In 1945 and 1959, he made two long trips to the United States, apparently at his own expense, to visit medical facilities. On his first trip, he visited Miami and Washington, and he spent a few weeks with physicians in charge of the tuberculosis control campaign in the state of New York. Together they visited Oneonta, Ithaca, Ray Brook, and New York. In November 1945, Costa reported his findings to the Medical Association. His enthusiasm for what he had seen was unmistakable. He argued that the United States had 'the world's most perfect strategy against tuberculosis' and the state of New York, in particular, 'had the world's best prophylaxis services'.⁶⁸⁶ One noteworthy remark in his report was the 'surprising' interaction between 'private medical practice, hospital infrastructure and public health policies'.⁶⁸⁷ He identified a marked contrast between the United States and Paraná, where the boundaries between these categories were apparently well defined and impermeable.⁶⁸⁸

Moreover, when Costa applied to the Chair of Phthisiology, a position eventually taken up by Bettega, his thesis was an ambitious epidemiological survey. He focused on the study of the tuberculosis epidemics in the city of Antonina, seventy kilometres east of Curitiba and near the Atlantic. To compile his numbers, he oversaw and helped to test more than four thousand

⁶⁸⁶ Carlos F.F. Costa, 'Aspectos da Luta Anti-Tuberculosa nos Estados Unidos', *R.M.P.*, 14 (1945), 211.

⁶⁸⁷ *ibid.*

⁶⁸⁸ Costa made this point in some of his previous works, declaring that general practitioners were responsible for early diagnosis, but hygienists were responsible for epidemiological studies, Carlos F. F. Costa, 'Seguro contra a tuberculose', *R.M.P.*, 18 (1940), 49.

people, concluding that tuberculin was the best diagnostic tool for the epidemiologist. With the aid of tuberculin, he identified that more than fifty per cent of his sample was infected with tuberculosis.⁶⁸⁹ On a previous occasion, Costa had shown concern for the disturbing epidemiological statistics on tuberculosis and urged the medical community to make improvements.⁶⁹⁰ He had expressed his concern to the Phthisiology Society, when making a motion to assist the Secretary of Health on matters regarding tuberculosis.⁶⁹¹ He continued to identify himself as a clinician rather than an epidemiologist and maintained an interest in studies such as clinical diagnosis and surgical procedures. He had been operating on patients since the late 1930s.⁶⁹² He specialised in a procedure known as collapse therapy, which consisted of using air or liquid to inflate capsules between the pleural membrane surrounding the lung and the lung itself. The objective of the procedure was to reduce the size of the lungs and halt the progression of tuberculosis lesions. This was considered a highly advanced procedure, and it demanded both experience and surgical skills.⁶⁹³

Although Costa declared that more work should be done in the area of epidemiology, he did not personally undertake such studies because he was a general practitioner specialised in thoracic surgery. Nevertheless, he sometimes entered into what he deemed to be the realm of epidemiologists. In the case of tuberculin, this meant that Costa urged others to use the test to improve knowledge about outbreaks in the state and based his thesis on this knowledge. He nevertheless declared that he did not have the ability to handle prophylactic programmes with such a tool. The paradoxical position assumed by Costa created a grey area in which tuberculin was used in spite of the fact that no one claimed responsibility for its systematic

⁶⁸⁹ Carlos F. F. Costa, 'Contribuição à epidemiologia da tuberculose em Antonina', (unpublished UFPR Phthisiology Chair Application thesis, 1949); Besides Costa work, sources indicate only one other study using tuberculin, see Eleonora Godo Rocha, 'Cadastro tuberculínico-torácico no 6º Distrito Sanitário', *R.M.P.*, 16 (1947), 189-91.

⁶⁹⁰ Costa, 'Aspectos da epidemiologia da tuberculose'.

⁶⁹¹ PTD, MMM, 'Atas 1949-1976', (9 Apr. 1942).

⁶⁹² Carlos F. F. Costa, 'Desigualdade pupilar e tuberculose', *R.M.P.*, 8 (1939), 11-6.

⁶⁹³ Reginaldo Fernandes, 'Review of A. Ibiapina', *Revista Brasileira de Tuberculose*, 6 (1937), 265-666.

administration.⁶⁹⁴ This is particularly relevant considering that the Society of Phthisiology, where Costa played a major role for several years, declared on several occasions, as explained above, that it would ‘study and technically assist’ the Director of Public Health in the fight against tuberculosis.⁶⁹⁵ In other words, they claimed expertise in an area that they later declined to pursue.

On the other hand, it is noteworthy that whereas Costa and his colleagues may have been genuinely concerned about the tuberculosis epidemic, and they used individuals from deprived areas for their studies, their personal interests lay with patients who could afford private medical services. Whereas specialists constantly emphasised that tuberculosis was a disease of the poor, general practitioners, such as Costa, certainly had private patients in mind; in fact, both Costa and Munhoz owned private clinics.⁶⁹⁶ At that point, there was no social security in Brazil and, as noted above, public services were persistently overstrained. Thus, when Costa made a distinction between clinical practice and epidemiological studies, it would not be far-fetched to imagine that he was implying the existence of markedly different social groups. Epidemiological studies were mostly undertaken on economically deprived individuals. Costa admitted that the majority of people tested in his 1949 trial lived in abject poverty. Some years earlier, Homero Braga carried out a similar survey in Curitiba and described his sample as ‘children of humble nature [...] undernourished and living in terrible sanitary conditions’.⁶⁹⁷ Braga stated that their parents ‘did not have any sanitary concern, both

⁶⁹⁴ Only one other work with tuberculin has been found during the entire decade. This case was carried out by a resident physician of the Secretary of Health located in the north of the state, see Rocha, ‘Cadastro tuberculínico-torácico no 6º Distrito Sanitário’.

⁶⁹⁵ First of all, the first article of the Society statute stated that its primary objective was to congregate specialists in tuberculosis in Curitiba, PTD, MMM, ‘Atas 1949-1976’, (26 Jan. 1949), p. 7. Moreover, among the remaining six objectives, three of them mentioned public health. For instance, it was stated that the Society would be in charge of suggesting modifications and innovations in the area of tuberculosis public policies to public authorities. The intention of encouraging public initiatives that aimed to tackle the epidemics was also explicit in another objective. Finally, it had been also been promised that the Society would collaborate on works that may benefit public hygiene. As private practice was only briefly mentioned, it was clear that members intended to be the source of reference to public health authorities, *ibid.*

⁶⁹⁶ Rosenberg, ‘Guerra a peste branca’, p. 142.

⁶⁹⁷ Braga, ‘Contribuição do estudo da alergia infra-tuberculínica’, p. 11.

their households and way of life can be described as miserable'.⁶⁹⁸ In Porto Alegre, epidemiological surveys were also carried out within poverty stricken groups. However, physicians there argued that they were genuinely involved in prophylactic campaigns aimed at controlling the tuberculosis outbreak. In Curitiba, the attitude was different; the work being done with the poorest social groups served a distinct purpose, such as compiling data for a thesis required in the admissions test for a Chair. Once a successful applicant had assumed his position, he turned to other issues related to clinical practice. This rationale explains why Costa was surprised with the constant exchange between private practice and public services in the United States. More importantly, this rationale reveals that research practices were undertaken with specific personal goals in mind, such as a successful application for an academic post; the research results were often not followed by further actions.

The Surgical Sanatorium of Portao

Beyond the reservations of the major figures in the medical community concerning what could be achieved with tuberculin, the available hospital infrastructure in Curitiba also posed some constraints for the development of tuberculosis related research practices. The Surgical Sanatorium of Portao exemplifies this situation, as it was the first centre dedicated to tuberculosis in the state. More importantly, the Sanatorium would acquire an important place in the ensuing research programme led by Ernani Bettega.⁶⁹⁹ Its construction was initiated under Manoel Ribas in 1945, but it was opened only in 1947. Since its inception, the Portão Sanatorium had a focus on thoracic surgery; during its first two years its surgical team operated on 319 patients.⁷⁰⁰ The influence of João Luiz Bettega, Ernani Bettega's brother, could already

⁶⁹⁸ *ibid.*

⁶⁹⁹ The Faculty of Medicine of Curitiba offered to its students two alternative locations for practical classes: the *Santa Casa de Misericórdia* and a maternity hospital funded by the faculty, see *Relatório do ano de 1944*, (Curitiba, 1945), pp. 4-5; For further references on other hospital facilities in Curitiba see 'Editoriais', *R.M.P.*, 16 (1947).

⁷⁰⁰ João Ernani Bettega et al., 'A cirurgia torácica', *Revista do Dept. de Saúde do Paraná*, 1 (1951), 56-9: p. 56.

be seen in the hospital's orientation and achievements. Ever since he completed his medical studies, Luiz Bettega wanted to specialise in thoracic surgery. The opportunity came when he was invited to be the Director of the Sanatorium, a position he would hold from 1947 to 1968.⁷⁰¹ In the late 1940s, it was estimated that more than seventy per cent of all patients arriving at the sanatorium already showed signs that their disease was in advanced stages.⁷⁰² Therefore, Luiz Bettega knew when he took over his position that his surgical centre would need experts to manage the constant stream of severe cases. The initial capacity of the sanatorium was 150 patients, although the waiting list of patients whose conditions were severe was estimated to be at least three times longer. As this waiting list added pressure to release patients early, surgery was accepted as a safe procedure that addressed severe cases that would otherwise require longer hospital stays. Curitiba did not have hospital facilities where tuberculosis patients could stay for more than three months. In 1951, construction of a hospital with a capacity of five hundred patients was planned for that purpose, but this project never materialised.⁷⁰³

⁷⁰¹ Costa and Lima, *O ensino da medicina na Universidade Federal do Paraná*, p. 200.

⁷⁰² Salustiano Santos Ribeiros, 'Organização do Departamento de Saúde', *Secretaria de Saúde e Assistência Social*, 1 (1951), 5-7: p. 7.

⁷⁰³ *ibid.*

Bettega's research practices in the area of tuberculin

It is in this context that the research practices of Joao Ernani Bettega are better understood. Bettega was born and educated in Curitiba, studying as an undergraduate at the local Faculty of Medicine. After finishing his course, he spent some months as a trainee in the Hospital Sao Luiz de Gozanga in the city of Jaçana in Sao Paulo, which had opened recently. One of the most significant lessons he learned from his experience there was the necessity of acquiring administrative skills to manage a new hospital facility. Back in Curitiba, he gathered together a small group of physicians who opened a new hospital in the city of Sao Jose dos Pinhás with the help of private donations. From its beginning, Bettega became an interim physician at this hospital and had first hand experience with tuberculosis patients there. The new hospital specialised in pulmonary diseases under the influence of Bettega, who had demonstrated his interest in tuberculosis from the beginning of his career. From this position, he built a reputation for himself, and he was among the founders of the Phthisiology Society. His status was reinforced when he won the competition for the Chair of Phthisiology.⁷⁰⁴ There, he became an important member of the local medical community, known both academically and for his influence in the Medical Association and Phthisiology Society.⁷⁰⁵

Bettega's research interests can be traced back to the beginning of his academic career. The topic of the thesis that enabled Ernani Bettega to secure the Chair of Phthisiology concerned tuberculin allergy.⁷⁰⁶ More specifically, he wanted to understand the extent to which antibiotics altered tuberculin testing results. This was an issue related to a new antibiotic called streptomycin, which was expected to be as effective against tuberculosis as penicillin had been against other bacterial infections. Ernani Bettega studied the relationship between tuberculin

⁷⁰⁴ 'Noticiário', *R.M.P.*, 19 (1938), 169-70.

⁷⁰⁵ For instance, he would be president of the Medical Association for two years, see Siqueira, *Associação médica do Paraná*, p. 102. His brother also occupied important positions at the Association, see Siqueira, *Associação médica do Paraná*, p. 101.

⁷⁰⁶ João Ernani Bettega, 'Flutuações da alergia tuberculínica', (unpublished Faculdade de Medicina UPR Phthisiology Chair Admission's thesis, 1949).

and streptomycin at a time when this antibiotic was still difficult to obtain in the market. Mass production and distribution of the drug had begun towards the end of 1947 in North America and only slowly reached the Brazilian market.⁷⁰⁷ By 1949, Ernani Bettega had already admitted that the initial enthusiasm for antibiotics had been dampened by unsatisfactory results. The medical community accepted that streptomycin was effective only for suppressing overall symptoms of tuberculosis and admitted that it was necessary to administer another new drug, para-aminosalicylic acid (PAS), with streptomycin to cure the disease. According to Ernani Bettega, PAS was almost impossible to find, and only one paper on the subject had been published in Brazil. Thus, Ernani Bettega tackled a particularly valid question regarding an advanced treatment that could result in an unprecedented, non-invasive cure for tuberculosis. No doubt the examiners at the Faculty of Medicine were impressed with his research; it secured for him the position of Chair over Carlos F.F. Costa.

Ernani Bettega also impressed examiners with the content of his thesis. He based his research on the effect of antibiotics within the ongoing debate concerning the faulty results of tuberculin tests that captivated the international community of tuberculosis specialists. He used evidence from several international journals to demonstrate that the issue was controversial and unresolved. Preliminary tests had shown that guinea pigs treated with streptomycin failed to react to tuberculin tests even when later necropsy revealed tuberculosis lesions, a classic case of false negatives.⁷⁰⁸ At the same time, other works revealed no change in tuberculin reactions even after antibiotic treatment, which was evidence of false positives.⁷⁰⁹ The issue remained open to debate, and Bettega set out to attain a definitive result with the tools at his disposal.

⁷⁰⁷ 'Streptomycin checks TB', *The Science News-Letter*, 51 (1947), 99-100.

⁷⁰⁸ H. Corwin Hinshaw et al., 'Streptomycin in tuberculosis', *The American Journal of Medicine*, 2 (1947), 429-35.

⁷⁰⁹ H. J. Corper and Maurice L. Cohn, 'Various phases of the use of streptomycin in tuberculosis', *JAMA*, 137 (1948), 357-62.

He began by acknowledging that there were several reasons for the absence of reactions to tuberculin; concomitant diseases were one. Smallpox and whooping cough were known to suppress tuberculin reactions in patients who had small lesions. Patients with hyperthyroidism also failed to react to tuberculin even when other methods clearly indicated active lesions. Finally, pregnancy, though not a disease, was also known to suppress tuberculin reactions. On the other hand, hypersensitivity, the name used to describe false positives, also had several causes. Ernani Bettega highlighted the well-known fact that impurities in the tuberculin solution were known to cause local skin reactions that appeared similar to a reaction to tubercle bacilli. He was certainly aware that tuberculin allergy had become a popular topic in Brazil as a result of the studies carried out by Arlindo de Assis. Evidence of irregular tuberculin reactions in vaccinated children was accumulating, and it increased the uneasiness of Brazilian specialists about the massive BCG vaccination programme. Therefore, the issue Ernani Bettega set out to solve was important, difficult, and of interest to both national and international communities, including the highly admired American specialists.

For his clinical trial, Ernani Bettega used tuberculin produced by the Oswaldo Cruz Institute in Rio de Janeiro. In total, sixty-four patients from the São José and Portao sanatoriums, headed respectively by him and his brother, were selected for this trial. All patients were treated with antibiotics, and tuberculin reactions were recorded from the day of their admission onwards. X-rays were used alongside clinical examinations to check the progression of the patients' lesions. At the conclusion of the trial, Ernani Bettega reported that there was no concrete evidence to suggest that antibiotics effectively changed tuberculin reactions, despite the fact that radiologic and clinical examinations demonstrated that the patients had recovered from the disease. Ernani Bettega suggested that this was more evident

in cases of patients treated with higher doses of para-aminosalicylic acid. He reasoned that ‘apparently, the antibiotic reacted somehow directly to tuberculin’.⁷¹⁰

It is noteworthy that although it was common practice at the time, Ernani Bettega did not publish his results in English nor did he include an abstract of his thesis that was written in English. Although he suggested that his research might contribute to ongoing discussions overseas, he adopted a cautious position before making the results of his trial public. It is also important to note that Ernani Bettega only worked with hospitalised patients; thus, his study represented only a small fraction of the population that generally lacked access to hospital facilities. In the hospital where he worked, tuberculin was routinely used as a diagnostic tool alongside x-ray and sputum analysis. The results of his thesis, however, indicated that the introduction of antibiotics would almost certainly eliminate the usefulness of tuberculin.⁷¹¹ Moreover, he narrowed his research topic even further when he discussed the expensive and almost inaccessible new antibiotics.

In spite of the highly specific approach taken by Ernani Bettega, his work presented key characteristics that would be crucial for the introduction of an unprecedented research programme in the Faculty of Medicine in one of the sub-fields of his chair, thoracic surgery. Firstly, Ernani Bettega and his brother Luiz Bettega had full access to the wards of two major hospitals where most of the tuberculosis patients in Curitiba were concentrated. Because of their prominent positions in these hospitals, it was relatively easy for them to secure the consent from patients for participation in their trials. A second aspect was that there were few options among hospitals; long periods of hospitalisation were not acceptable, and patients usually arrived at a hospital’s doors with advanced stages of the disease. In these circumstances, invasive procedures like surgery may have appeared appealing for both physicians and patients.

⁷¹⁰ Bettega, ‘Flutuações da alergia tuberculínica’.

⁷¹¹ João Luiz Bettega, ‘Pneumotórax espontâneo benigno’, *R.M.P.*, 16 (1947), 88-95.

Moreover, one aspect of João Ernani Bettega's teaching style was that he wanted his students to learn outside the classroom, as close as possible to the reality of their future profession. Since the beginning of his professorship, he taught his theoretical classes at the *Policlínica Prof. Eurípedes Garcez do Nascimento*, which was built with private and public donations to provide services for those who could not afford private healthcare.⁷¹² His practical classes were held at the *Núcleo Profilático Universitário Prof. Pereira Filho* and at the Surgical Sanatorium of Portão. The former was a non-profit office in the Faculty of Medicine that also provided services for homeless people, and the latter was the hospital run by Bettega's brother. Incidentally, it was in the context of his brother's interest in sophisticated thoracic surgical procedures that Ernani Bettega's research programme was enacted. Luiz Bettega had been working consistently on the procedure called thoracoplasty, which began to be developed by the Swiss surgeon Edouard de Cérinville in 1885.⁷¹³ It was more invasive than the collapse therapy practiced by Carlos F.F. da Costa; collapse of the lung walls to avoid the expansion of lesions was achieved in thoracoplasty by either sectioning the ribs over the affected lung or cutting the internal nerves that sustained the lung walls. Initially, both alternatives were traumatic and painful because few effective anaesthetics were available, but as the use of drugs such as chloroform were perfected, surgical procedures became increasingly common. By the 1940s, thoracoplasty remained highly invasive and could cause severe deformations and postural problems, but it was considered a valid treatment for its effectiveness in high-risk patients nevertheless. In 1946, Luiz Bettega published his first major article describing twenty operations and presenting x-ray plates taken before and after seven surgical procedures. He discussed his results in relation to the rich bibliography available on the topic and concluded that the procedure was 'highly effective' because no deaths occurred as a result of the

⁷¹² *Relatório do ano de 1944*, (Curitiba, 1945), p. 5.

⁷¹³ C. D. Haagensen and Wyndham E. B. Lloyd, *A hundred years of medicine* (New York, 1943), pp. 331-332.

surgery.⁷¹⁴ As his sample size grew, however, it was impossible to sustain his flawless record of positive outcomes. In 1949, he updated his results. He and his surgical team, which included his brother Ernani Bettega, operated on eighty patients. The death rate rose to ten per cent, but the surgery was curative in eighty per cent of the cases. Luiz Bettega compared his results with national and international studies to show that he had the second highest percentage of curative results and the third lowest rates of death among the seven studies presented.⁷¹⁵ Luiz Bettega's papers revealed the establishment of a consistent research programme undertaken out of personal interest and presented to local peers as a legitimate research project. Although Luiz Bettega validated his work by quoting external experts, his papers, like those of his brother, were not published outside Paraná. The reluctance of the Bettega brothers to face the scrutiny of external peers coincided with an increasing number of claims by other surgeons that thoracoplasty should be adopted only for cases in which tuberculosis lesions were not clearly developing. Fernando Paulino, for example, a surgeon from Sao Paulo who had operated on more than 1,200 tuberculosis patients argued that indiscriminate use of thoracoplasty pleased only 'surgeons and their journals'.⁷¹⁶ His argument was that extreme cases progressed too quickly for surgical procedures to make any difference. This would become more evident with the use of antibiotics, as severely ill patients first had to go through an extensive course of drugs to ensure that their disease was under control before undergoing any operation.

⁷¹⁴ João Luiz Bettega, 'Estado atual da toracoplastia no tratamento da tuberculose pulmonar', *R.M.P.*, 15 (1946), 235-40.

⁷¹⁵ João Luiz Bettega, 'Resultados da toracoplastia no tratamento da tuberculose pulmonar', *R.M.P.*, 19 (1950), 268-71.

⁷¹⁶ 'Professor Fernando Paulino', *O Dia*, (17 Apr. 1946), 9; 'Tratamento cirúrgico da tuberculose pulmonar', *R.M.P.*, 17 (1948), 184.

Conclusion

The case studies explored in this chapter revealed two perspectives on the medical approach to academic research in the University of Paraná during pre-nationalisation years. João Ernani Bettega and Milton Erichsen Carneiro represented two divergent but co-existing perspectives that significantly influenced the development of research programmes after 1950. A focus on tuberculin testing allowed glimpses into the research practices of João Ernani Bettega and some of his colleagues who circulated throughout three closely linked spaces: the Paraná Society of Phthysiology, the Medical Association of Paraná, and the Faculty of Medicine. These institutional settings concentrated the medical elite of Paraná, and its members would occupy leading positions in the University of Paraná after its nationalisation. In Curitiba and Porto Alegre, research programmes using tuberculin testing were undertaken outside academic environments. Detailed descriptions of some of these research projects, presented in Chapters Two and Five, demonstrated that despite their outward similarities, they were the result of remarkably distinct research practices.

In Porto Alegre, Faillace used studies involving tuberculin to draw epidemiological maps and raise awareness of the tuberculosis problem. He worked in a public laboratory that focused on public health issues. In Curitiba, however, individuals also administered tuberculin outside university settings, but more often this was the result of private interests. Applying for an academic job was the usual reason for employing a diagnostic tool such as tuberculin. The most striking aspect of the contrast between the two cities examined was not that physicians in Curitiba paid little attention to public health issues but that they implied that the results of their research would somehow contribute to the population's welfare. Although individuals like Bettega, Munhoz and Costa clearly specialised in specific areas of tuberculosis studies, they claimed expertise and authoritatively spoke about the disease as a whole.

Bettega's study was a world apart from the epidemiological trials carried out by Jandir Faillace in Porto Alegre. Faillace and his subordinates in the Department of Public Health were mostly concerned with constructing epidemiological maps based on tuberculin reactions, while Ernani Bettega advocated the use of x-ray results as a way of drawing epidemiological maps. In 1950, for example, he gathered all x-ray surveys ever undertaken in Curitiba, which included the results of almost 100,000 individuals examined over the previous decade, and published one of the most complete epidemiological maps entirely based on x-ray diagnoses.⁷¹⁷

In both towns, surgery appeared to be a field capable of generating important insights in the area of tuberculosis research. While holders of chairs of surgery in Porto Alegre took precedence in this discussion, interest in surgical procedures in Curitiba was the result of the personal initiatives of individuals such as the Bettega brothers who controlled no less than the two main sanatoriums in the state, the Chair of Phthisiology in the Faculty of Medicine, and main positions in the Paraná Society of Phthisiology. Having economic power, social influence and unprecedented access to vulnerable patient populations, they could pursue whatever topic they wished, and their surgical procedures represented the most advanced techniques of the time. Thoracic surgery would become a specialty in Curitiba in later years because of the opportunities to operate on several severe cases of pulmonary tuberculosis. Luiz Bettega may have gone against the current climate of opinion by insisting on thoracoplasty when specialists argued that it entailed unnecessary risks for patients, but his initiative would bear fruits after nationalisation. His systematic study of thoracoplasty would continue to expand, and it was transformed in the 1950s into an official research programme inside the Faculty of Medicine. Comparison between the medical communities in Curitiba and Porto Alegre reveals that the same disciplinary labels were used to describe remarkably different activities and practices. A continual process through which ideas were selected and adapted was used to serve individual

⁷¹⁷ 'Como doença do trabalho', *B.O.S.P.*, 29 (1950), 114.

interests. The focus on tuberculin and DDT enabled an investigation of this diversity, which characterised medical communities before 1950.

Analysis of pest control studies in Paraná from the perspective of Milton Erichsen Carneiro enabled further understanding of research practices during the pre-nationalisation years. Carneiro provided an example of what the notion of medical science in Curitiba could create in terms of academic research. In the years leading to nationalisation, he attested to the presence of unequivocal hostility towards research inside the Faculty of Medicine. It comes as no surprise that his assistants would eventually abandon studies in the area of Chagas disease. Carneiro also represented the reaction to the arrival of a new style of medical teaching from Sao Paulo, a region closely watched by Curitiba's medical professors. The new approach included academic research, and this major shift could not be disregarded by academics in Curitiba. After nationalisation, signs that medical teaching was changing, not only in Sao Paulo but also overseas, would become increasingly evident, forcing academics in Curitiba to reassess their positions regarding medical research. This chapter provided strong evidence to suggest that while Chair holders like Carneiro remained in positions of power, any changes in the research culture of the Faculty of Medicine would face strong resistance. Carneiro's stance against research was clear, and his and his colleagues' insularity was, indeed, remarkable. Their reluctance to engage in research on insect-borne diseases, either inside or outside the Faculty of Medicine, stood in stark contrast to what was taking place in Curitiba, where local authorities were increasingly interested in the control of insect-borne diseases.

As had been the case with the IBTR, outbreaks of insect-borne diseases in Paraná offered opportunities for medical entomologists like Carneiro to study a variety of topics, from pesticide impact and prophylactic campaign management to geographical distribution of the species present using local, original evidence. Answers to the relevant research questions related to these issues may have saved a considerable number of lives. In the case of pesticide

studies, funds for research had been raised after solid evidence was presented concerning potentially damaging outbreaks. However, an even greater obstacle prevented Carneiro from recognising research as one of the priorities of his Chair. This was an academic culture in which research was synonymous with meaningless pursuits and activities that might distract scholars from their ultimate aim of fostering high culture. As far as Milton Carneiro was concerned, knowledge available locally almost certainly was not the result of recent and updated scientific research. Carneiro resorted to the classics despite the fact that original knowledge was being generated as a result of research practices undertaken in Paraná. This local research focused on outbreaks threatening the local population and was available to professors like Carneiro through publications exchanged with other medical communities.

Milton Carneiro also provided an example of the different ways in which the word *science* was used in Curitiba and Porto Alegre. In Curitiba, physicians used the term more liberally than it was used in Porto Alegre. Medicine was undoubtedly considered to have greater authority than other bodies of knowledge had, and this status legitimised their “monopoly” of the word. A clear hierarchy was present in this definition. Traditional bodies of knowledge such as medicine were considered scientific as opposed to other forms of knowledge, which were deemed technical – that is, organised but not the result of reflection and canonical wisdom. For example, veterinarians worked in ‘technical’ not ‘scientific’ settings, typified by the Medical Association. In terms of tradition, veterinary medicine was not considered to be as established a discipline as medicine was, since medicine could trace its roots back to Ancient Greece. The Greek physician Hippocrates was considered to be the forefather of all medical undergraduates embarking on their studies. Although the IBTR was well-organised and employed more than two hundred people, it was a young institution and, as such, its research programmes were considered, at best, tentative. On an individual level, older generations of physicians were considered men of science due to their experience and

knowledge, and they added to this image by modelling themselves on great figures, such as Louis Pasteur. Younger generations, on the other hand, aspired to reach the same level of knowledge and erudition.

Chapter Six

The impact of nationalisation in the faculties of Medicine, Agronomy and Veterinary Medicine of Curitiba 1950-1955

‘The institution we are used to calling University actually does not exist in the old traditional sense; what we have today is just a pompous label that hides mere degree-issuing faculties, where professors are in charge of lecturing boys three hours per week about some outdated knowledge they sometime in the past studied in old books. The real University, however, is a living and dynamic organism, that acts for the present while helping to shape the future of our nation [...] we are not yet a university like this [...] we still have the mentality of an *École Centrale*, and great effort and determination will be required to get rid of the illusory brightness of titles that do nothing other than blind us all.’⁷¹⁸

These were the opening remarks made by Flavio Suplicy de Lacerda, Vice-Chancellor of the Federal University of Paraná, at the annual meeting of Faculties Councils in 1951, the first year after nationalisation. He announced the need for change and, by then, the possibility of doing so as a result of the major step that nationalisation represented. This chapter will analyse how these strong words and firm intentions eventually affected the course of research practices of the individuals whose career trajectories were analysed in Chapters Three and Four.

⁷¹⁸ Flávio S. Lacerda, ‘Relatório do Reitor’, *Anuário da UPR 1951*, (Curitiba, 1951), pp. 87-9.

6.1 – Research practices at the Faculty of Agronomy and Veterinary Medicine after 1950: Oscar Krebs Palmquist, Lycio Castro Velloso and Milton Vernalha

6.1.1 – Oscar Krebs Palmquist and the IBTR inertia

After 1950, Oscar Krebs Palmquist had his division's name changed to the Division of Animal Pathology, where he remained as the chief veterinarian. In any case, Palmquist's division continued to be advertised as the authority on studies concerning bovine diseases. He, for instance, maintained his interest in brucellosis, the topic to which he had turned in the late 1940s. At the same time, Palmquist's academic progress was steady. His preliminary 1949 study of the disease, explored in Chapter Three, was written as part of his application for the Chair of Microbiology. Prior to that work, he had been teaching two courses: Clinical Veterinary Medicine and Laboratory Practices. Following the successful viva of his thesis, he became the holder of the Chair of Microbiology and Immunology.⁷¹⁹

In 1952, he decided to expand the size of his 1949 cattle sample to include what he considered to be one third of the entire dairy herd supplying Curitiba, around seven hundred head of cattle.⁷²⁰ In both works (1949 and 1952), Palmquist adopted the diagnostic procedure that was then in vogue in North America known as the 'rapid slide agglutination method'.⁷²¹ He stated that he had successfully replicated this procedure according to the instructions of the Animal Diseases Station of the National Agricultural Research Centre in the United States.⁷²² Using this method, Palmquist concluded that in 1949 almost twenty per cent of Parana's cattle

⁷¹⁹ 'In Memoriam', *IBPT - Ciência e técnica a serviço da produção*, 14 (1970), 84-5.

⁷²⁰ Palmquist, 'Brucelose no Paraná', *Boletim do Instituto de Biologia e Pesquisas Tecnológicas*, (1949), 2-39; Oscar Krebs Palmquist, 'Contribuição ao conhecimento da incidência da brucelose no Estado do Paraná', *A.B.T.*, 7 (1952), 3-8.

⁷²¹ Wendell H. Hall and Robert E. Manion, 'Comparison of the coombs test with other methods for brucella agglutinins in human serum', *The Journal of Clinical Investigations*, 32 (1952), 96-106.

⁷²² 'Technique for conducting the tube agglutination test for Bang's Disease', *Animal Disease Station National agriculture Research Centre - Beltsville Maryland*, (1938).

and nineteen per cent of its swine population were infected with brucellosis.⁷²³ In 1952, he confirmed this high level of contamination after visiting eighteen other towns, where he found dairy farms with thirty per cent of their herds infected with brucellosis.⁷²⁴

When compared with the literature to which Palmquist referred, the main methodological point that stands out in these two works is his disregard for the many shortcomings of his diagnostic method. For example, researchers considered its preparation time consuming and subject to many errors.⁷²⁵ In addition, the variability in interpretations of the results obtained through this method remained a highly controversial point. An experiment carried out by North American researchers indicated that laboratory technicians interpreted agglutination results differently when the same samples had their labels changed. Similar discrepancies occurred between different technicians who, in the same experiment, interpreted agglutination levels with marked differences.⁷²⁶ This shortcoming was recognized to such an extent that it was argued in the veterinary community that ‘one could not expect to eliminate all discrepancies in the results of the agglutination method’.⁷²⁷ North American researchers emphasised that perceptible discrepancies were common even under ideal laboratory conditions, and therefore tests carried out in the field – as Palmquist’s were – were bound to be subjected to even greater inconsistencies. Besides, the dilution of the solution containing the virulent strains used in the agglutination test varied from state to state in the United States; as a rule, the more diluted it was, the more difficult it would be to get a positive diagnosis.⁷²⁸

⁷²³ The effort to undertake this study came at a personal cost to Palmquist, who was infected with a virulent strain of brucellosis after handling contagious samples. He described in his paper the excruciating headaches and high fever that kept him in bed for almost two weeks, see Palmquist, ‘Brucelose no Paraná’, pp. 2-39.

⁷²⁴ Palmquist, ‘Contribuição ao conhecimento da incidência da brucelose no Estado do Paraná’.

⁷²⁵ P. S. V. Cox, ‘A Comparison of the rapid slide and standard tube agglutination tests’, *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 62 (1968), pp. 517-21.

⁷²⁶ *ibid.*

⁷²⁷ *ibid.*

⁷²⁸ Yet researchers argued that the agglutination test was still the most reliable, see C. P. Fitch and C. R. Donham, ‘Agglutination test in the diagnosis of infectious abortion in cattle (Bang’s disease)’, *The Journal of Infectious Diseases*, 51 (1932), 162-90.

Palmquist may have ignored these shortcomings because he had in mind a greater goal, such as the identification of a major animal health issue, which was the brucellosis outbreak. After all, his division in the IBTR continued to be responsible for monitoring zoonosis in the state. In addition, as explained above, Palmquist wrote his first work in 1949 conscious of the requirements of the application for the Chair position. The focus on purely academic goals might explain the reason for Palmquist's disregard of the shortcomings inherent to the method he had chosen. The admission process for chairs usually required only the proper replication of experiments rather than original contributions to a specific topic. Having only procedural steps in mind would also explain his moderate assessment of the brucellosis outbreak when compared with the terms used in the literature from which he drew his quotes. First of all, he did not use the word *epidemic* either in 1949 or 1952 when he stated in his conclusions that in some areas almost thirty per cent of the animals were contaminated. There was also no mention of the slaughtering that North Americans recommended in their eradication campaigns. In short, despite the adoption of the North American standard for diagnosis, the implications of the results obtained from that method were ignored without specific justification.

Regarding the social impact of the problem studied by Palmquist, it is noteworthy that nationalisation enabled the interaction with professors from the Faculty of Medicine because the groups were no longer isolated in separate institutions. They now operated under the same academic umbrella, sharing, for example, academic councils. Therefore, more opportunities for contact and exchange did in fact emerged. Unlike patients infected with tuberculosis, patients who ingested milk contaminated with brucellosis had no opportunity for treatment through antibiotics or surgical procedures. In humans, brucellosis caused high fever, muscular pain and excessive sweating. In addition, technicians and physicians of the Public Health Department of Paraná began to look at mounting evidence that brucellosis was reaching alarming levels among certain professional categories. In 1953, a paper signed by ten

physicians from Curitiba, including Jayme Drummond de Carvalho, Director of the Department of Public Health, revealed the results of a trial in which blood samples from 2,464 people were examined.⁷²⁹ The result suggested a high concentration of positive cases, particularly among slaughterhouse workers and other professionals involved with the manipulation of cattle carcasses, such as tanners and veterinarians. The second piece of evidence indicating a high level of brucellosis contamination among Paraná's herd was that in all positive cases, more than sixty per cent had either consumed raw milk or butter, which was often made from unpasteurised milk. The conclusion was that brucellosis had become a major public health issue in Paraná and should be treated accordingly. However, there were few practical recommendations concerning how veterinarians and public health officials may work together on the issue. Professors from the Faculty of Medicine remained outside this discussion; none of the authors of the above-mentioned paper held academic positions. Even Xavier Vianna, who was the Chair of Microbiology in the Faculty of Medicine in Curitiba, where the study of brucellosis was part of the curriculum, did not participate in this study.⁷³⁰ Likewise, although Oscar Palmquist's work was quoted, there was no indication that he had been invited to participate in the analysis of the problem.

One reason for the apparently paradoxical isolation of professors at the same university is that they belonged to a generation that up to the late 1940s was not accustomed to working together. Interdisciplinary endeavours were still an alien concept among most of these academics. As seen in Chapters Three and Four, the extremely high regard with which physicians were considered in Curitiba also did little to facilitate their interaction with veterinarians who were both fewer in number and occupied low paying public jobs. Beyond social conventions and traditional academic practices, there was a further reason directly

⁷²⁹ Jayme Drummond Carvalho, 'Subsídios para o levantamento da brucelose no Estado do Paraná', *Revista do Dept. de Saúde do Paraná*, 3 (1953), 43-52.

⁷³⁰ J. Xavier Vianna, 'Microbiologia', *Programas do Curso de Medicina - Aprovados pela Congregação - 3º Ano*, (1954), 3-7: p. 5.

related to research practices. Members of the Faculty of Veterinary Medicine adopted a perspective on brucellosis that took them away from what medical researchers were doing. Fridolim Schlögel, who was Palmquist's assistant at the IBTR, expressed the viewpoint of veterinarians on the issue.⁷³¹ In 1952, Schlögel confirmed that around twenty per cent of the cattle in Paraná were contaminated with brucellosis. He admitted that this high contamination level posed serious risks to the population who drank milk, workers and veterinarians who dealt with sick animals, and ranchers who suffered a loss in productivity due to the disease. Yet Schlögel declared that the state had no arrangements in place for reimbursing dairy farmers who were responsible for destroying their own sick animals. Dairy farmers could choose to vaccinate their cattle instead of facing this drastic option, but Schlögel did not provide details on how this would be done.

Years later, when Schlögel became an Assistant Professor in Microbiology under Palmquist, his position regarding the risk posed by contaminated milk took another, even more surprising, turn. In that year, he published an article that was not entirely supportive of pasteurisation.⁷³² Schlögel referred to an experiment in which calves were fed exclusively with pasteurised milk with the objective of testing the quality of raw milk as opposed to the pasteurised alternative. According to Schlögel, the cattle fed exclusively with pasteurised milk died prematurely. His explanation for this unexpected result was that pasteurisation depleted the milk of most of its nutrients and therefore deprived calves of essential minerals, such as calcium. Then, he made the controversial remark that unpasteurised milk should, in fact, be allowed in Paraná because:

⁷³¹ Fridolim Schlogel, 'Considerações em torno da brucelose bovina', *IBPT - Ciência e técnica a serviço da produção*, (1952), 6-8.

⁷³² This was the single article published by the IBTR between 1956 and 1971 that addressed either the problem of brucellosis or bovine tuberculosis, or the issues related to milk consumption. Fridolim Schlogel, 'O leite como veículo de Micróbios', *IBPT - Ciência e técnica a serviço da produção*, (1960), 46-8.

‘...in any case there are insufficient numbers of veterinarians available for undertaking sanitary controls and there are no resources for sponsoring these kinds of controls; there is also an overall lack of prestige of veterinarians who do not receive the proper support and the essential comprehension for a dignified exercise of their profession; in addition, dairy farmers do not obey the rules created to promote the control over their activities; and finally, those who should be responsible for taking care of such important problems both in terms of animal production and public health are treated by the public with outright indifference [...]’.⁷³³

This statement suggests a clear shift in the position of IBTR veterinarians after their positions were consolidated within the nationalised Faculty of Veterinary Medicine. After having worked during the 1940s to maintain the monopoly of the study of cattle diseases, they now argued that they accomplished little due to persisting social problems. The remarkable aspect of this perspective is that previous chapters have demonstrated how little had been done to improve communication between veterinarians and the general public during the previous decade.

In addition, Schlögel’s advice to allow unpasteurised milk had potentially damaging effects because, as already mentioned, until the late 1950s most of the milk sold in Curitiba continued to be unpasteurised.⁷³⁴ In terms of interdepartmental interactions, his remarks also indicate that even if communicable diseases like brucellosis offered a potential meeting ground, professors from the Faculty of Medicine and Veterinary Medicine in Curitiba would have few reasons to work together since veterinary professors now argued that there was little they could do.

Regarding tuberculin tests in cattle, Palmquist, as Chief Microbiologist at the IBTR, continued to declare throughout the 1950s that he and his colleagues were in charge of ‘carrying out studies on [...] bTB’.⁷³⁵ This assertion probably referred to the work Palmquist undertook to provide Jose Feldman, Professor at the Faculty of Medicine in Minas Gerais, with a sample

⁷³³ *ibid.*

⁷³⁴ Moysés Lupion, *Mensagem*, (Curitiba, 1956): p. 24.

⁷³⁵ PAP, DSA, IAR. *Relatório de 1954*, ‘Administrative Division Report’, (1954), 76-95: p. 76.

from Paraná, as described in Chapter Three.⁷³⁶ The claim of responsibility for bTB is also remarkable considering that, as has also been demonstrated in Chapter Three, not a single work on the disease had been published during the 1940s. Even so, Palmquist repeated in his report to Marcos Enrietti, the IBTR director, that bTB was one of his priorities because it had become one of the most serious threats to cattle herds in Paraná.⁷³⁷ In practice, only one work had been produced on bTB before 1960, and it was not written by an IBTR employee. In 1962, Ari Stechman, a physician from Curitiba, wrote a thesis on reactions to tuberculin. He was interested in the ways in which results from tuberculin testing ‘fluctuated’ in bTB studies and explored different hypotheses to explain this issue. His thorough bibliographical review, which encompassed all studies published in Paraná, including the internal reports produced by the IBTR, revealed that only seventy-five animals had ever been tested in the state.⁷³⁸ Not surprisingly, this neglect would have lasting effects. In the mid-1970s, a national survey on zoonosis among fourteen Brazilian states revealed that Paraná had the highest percentage of bTB contamination.⁷³⁹

Although he worked at the IBTR until 1966, Palmquist’s 1952 article was the last work he published. In his final years as the head of the Department of Microbiology, he focused on methods of vaccine production; he did not resume his work on brucellosis or bTB.⁷⁴⁰ Palmquist’s research choices after nationalisation typify the general attitude towards bovine diseases in the Faculty of Veterinary Medicine: like him, only a few individuals among the first generation of IBTR employees published in the area of bovine diseases after their integration with the nationalised university.⁷⁴¹

⁷³⁶ Feldman, ‘Tuberculose humana de origem bovina’, p. 112.

⁷³⁷ *Instituto de Biologia e Pesquisas Tecnológicas. Organização e realizações 1940-1953*, (Curitiba, 1953).

⁷³⁸ Ari Stechman, ‘Flutuações da alergia tuberculínica’, (unpublished UFPR Ph.D. thesis, 1962).

⁷³⁹ Pinheiro, *Programa Nacional de Pecuária*, p. 134.

⁷⁴⁰ PAP, DSA, MCM, ‘Atas 63-64’, (10 Sept. 1964); PAP, DSA, MCM, ‘Atas 63-64’, (18 Aug. 1964); PAP, DSA, MCM, ‘Atas 63-64’, (20 Oct. 1964); PAP, DSA, MCM, ‘Atas 63-64’, (24 Nov. 1964); PAP, DSA, MCM, ‘Atas 63-64’, (29 Dec. 1964).

⁷⁴¹ As it was in the case of Porto Alegre, other Faculties of Veterinary Medicine followed a completely different path, publishing intensely on bovine diseases, including works on bTB, see Jerome Langenegger, ‘Um caso de

6.1.2 – Lycio Castro Velloso, Milton Miró Vernalha and the Faculty of Agronomy

Whereas Palmquist represents the Faculty of Veterinary Medicine, Lycio Castro Velloso and Milton Miró Vernalha are prominent examples of continuity in the Faculty of Agronomy. After 1950, Lycio Castro Velloso became more involved with the administration of the Faculty of Agronomy and Veterinary Medicine. As a spokesman for the institution on several occasions in the early 1950s, Velloso revealed his commitment to the institution and his vision for its future. He believed that the faculties should be more attuned to the problems and needs of the rural classes. The previous decade had, unfortunately, been marked by political mismanagement and chairs had been organised in such a way that they essentially had no connection to one another. Research and experimentation, for example, had not been a priority; that would have to change. Velloso's interest in improving the Faculty and his willingness to work for a better organisation led to his successful election as Dean of the Faculty of Agronomy and Veterinary Medicine in 1959. The appointment put an end to his engagement with the IBTR.

While Velloso was increasingly involved with the Faculty, Milton Miró Vernalha occupied the position as chief entomologist at the IBTR. In fact, Vernalha was in a similar position to Ramiro Gomes da Costa and Emir Kober at the Department of Agriculture in Rio Grande do Sul. Like them, Vernalha was expected to study pesticides used against agricultural pests. Similar to Gomes da Costa, Vernalha was Professor of Entomology at the Faculty of Agronomy. Coincidentally, when Vernalha published his first series of papers after nationalisation, one of them was on leaf-cutter ants, the specialty of Gomes da Costa.⁷⁴² Vernalha studied the ant *Atta sexdens rubripilosa*, Forel 1908, a variety similar to the one

paraplegia em bovino', *Veterinária*, 9 (1955), 55-66; D. C. de Freitas, 'Resutados preliminares de investigações sobre a ocorrência de m. tuberculosis', *Revista da Faculdade de Medicina Veterinária*, 5 (1955), 339-45; I. S. Schneider, 'Aspectos bacteriológicos de produtos embutidos', *Revista da Faculdade de Medicina Veterinária* 5 (1953).

⁷⁴² Milton M. Vernalha, 'Algumas formigas que ocorrem no Estado do Paraná', *A.B.T.*, 7 (1952), 43-51.

investigated by Gomes da Costa in Porto Alegre, namely, the *Atta sexdens ssp. Pirventris*, *Santshchi* 1919.⁷⁴³ Both varieties were common in the southern region; in fact, their popular names were practically the same: Sauva Limão (*Forel*) and Sauva Limão-sulina (*Santshchi*).

Although these researchers studied similar varieties of the same species, their research practices could not have differed more. In Porto Alegre, as has been described in Chapter One, Gomes da Costa studied effective ways of killing leaf-cutter ants and proposed a method using methyl bromide; in Curitiba, Vernalha focused on their taxonomical description and dismissed the indiscriminate administration of pesticides. Vernalha's work on ants was based on the specimens kept in the collection of the Biological Institute in Sao Paulo. In 1952, he spent time training there, and he also had the opportunity to work with the specimens from Paraná.⁷⁴⁴ Upon returning to Curitiba, he published his work on leaf-cutter ants and repeatedly mentioned the insect in internal reports to Marcus Enrieti, the IBTR Director.⁷⁴⁵

However, in his main study on leaf cutter ants, he dismissed the use of pesticides in cases in which a prior study of the anthills to be destroyed had not been carried out. In 1952, Vernalha signed an article with Mauro Autuori, the most renowned specialist on ant biology in Brazil, explaining the rationale behind his stance. Vernalha argued that no more than two per cent of anthills survived longer than a year as a result of a variety of issues, such as excessive rain, natural predators and even competition amongst rival species. He concluded that it would therefore be 'useless' to tackle anthills less than a year old.⁷⁴⁶ Interestingly, Vernalha neither mentioned ways in which farmers should look for clues to identify premature anthills nor which pesticide to use. Vernalha also reported tests with different commercial brands of methyl bromide, the chemical identified by Ramiro Gomes da Costa as effective against leaf-cutter

⁷⁴³ Costa, 'Um novo formicida', 12-4.

⁷⁴⁴ 'Bolsas de Estudos', *IBPT*, 1 (1952), 2.

⁷⁴⁵ Moysés Lupion, *Mensagem*, (Curitiba, 1956): p. 56.

⁷⁴⁶ Mário Autuori and Milton M. Vernalha, 'Da inutilidade do combate às içás e saueiros iniciais', *IBPT - Ciência e técnica a serviço da produção*, 1 (1952), 14-5: p. 16.

ants.⁷⁴⁷ It is unclear whether Vernalha himself carried out field experiments testing those pesticides; he appears to have simply summarised other researchers' works. Vernalha rarely discussed the extent to which the species may have caused actual harm to crops in Paraná.⁷⁴⁸ It was an outsider who wrote the first article published in Paraná on how to tackle the insects that was based on fieldwork. In 1956, Herculano Paula, an entomologist from Rio de Janeiro, published the first study identifying the geographical distribution of the species in Paraná. After carrying out research in the countryside at his own expense and without the support of the IBTR, Paula provided evidence that leaf-cutter ants were infesting at least twenty-three towns in the region, posing a particular threat to cotton and fruit trees.⁷⁴⁹

Concerning other species, Vernalha was even more reluctant to work with pesticides. In 1953, he published a two hundred-page article describing the entire IBTR collection of pests belonging to the superfamily *Coccoidea*.⁷⁵⁰ Although these scale insects were parasitic to a large number of plants in Paraná, this article was entirely descriptive and contained no details concerning how to combat them.⁷⁵¹ In another paper published in the same year, Vernalha described an outbreak of a terrestrial slug, *Vaginula Férrusac*, in banana plantations near Paraná's Atlantic coast.⁷⁵² It was estimated that around 50,000 plants were fatally infested by the parasite. In the face of such a damaging threat, Vernalha declared that something had to be done and offered his contribution.⁷⁵³ However, instead of indicating ways of tackling the species as, for instance, Emir Kober was doing in Porto Alegre, Vernalha transcribed the taxonomy of the insect from a German systematics handbook published in 1931 without

⁷⁴⁷ Milton M. Vernalha, 'Alguns dados sobre novos formicidas', *IBPT - Ciência e técnica a serviço da produção*, 2 (1953), 17.

⁷⁴⁸ Vernalha, 'Algumas formigas que ocorrem no Estado do Paraná', 43-51.

⁷⁴⁹ Herculano S. P. Paula, 'Ocorrência de saúvas no estado do Paraná', *B.F.T.*, 6 (1956), 153-8.

⁷⁵⁰ Milton M. Vernalha, 'Coccídeos da coleção I.B.P.T.', *A.B.T.*, (1953), 111-304.

⁷⁵¹ The production of long articles by Palmquist and other members of the IBTR staff usually was not groundless. Vernalha's work served as the basis for his application to the Chair of Entomology at the Faculty of Agronomy Milton M. Vernalha, 'Contribuição para o conhecimento dos Coccídeos', (unpublished UFPR Entomology Chair admission's thesis, 1957).

⁷⁵² Milton M. Vernalha, 'Uma nova praga dos bananais Paranaenses', *A.B.T.*, 8 (1953), 305-7.

⁷⁵³ *ibid.*

translating it.⁷⁵⁴ It is also noteworthy that he did not suggest ways to tackle that particular pest. In 1953, Vernalha wrote a third article, deploying the same strategy with reference to a beetle of the family *Curculionidae*. This insect was attacking walnut tree saplings in reforestation areas; Kober tested different dusting methods to solve the same problem in Porto Alegre.⁷⁵⁵ Vernalha's description of this insect was transcribed from a taxonomical textbook written in 1943 in original Latin, and again, he did not translate it nor did he comment on how to tackle the pest.⁷⁵⁶ While Vernalha continued to neglect the study on pesticides in the IBTR, the state of Paraná was heavily investing in BHC. As has been demonstrated in Chapter Three, use of BHC began in 1948 with an initial purchase of thirty-two tons by the state government.⁷⁵⁷

It was also in 1948 that authorities realised that the berry borer was a much greater threat than was previously thought. Subsequently, even before there was solid evidence that BHC would solve the problem, Governor Moises Lupion was informed that 3,700 tons of the pesticide would be necessary to protect all the coffee farms in the state. In 1948, his annual report to the Legislative Assembly of the state suggested that Paraná had approximately 224 million coffee plants, of which around twenty per cent were already infested with the berry borer, as described in Chapter Two.⁷⁵⁸ As indicated above, Lupion decided to transfer responsibility for the Service against the Berry Borer from the IBTR to the Secretary of Agriculture in 1949. The strategy continued under new management, and consumption of pesticides grew steadily in the early part of the 1950s. In 1952 alone, the state subsidised the distribution of 667 tons of BHC to the northern region of the state, where most of the coffee farms were located.⁷⁵⁹ This volume would grow to 764 tons in 1953, and two thousand tons in

⁷⁵⁴ J. Thiele, *Handbuch der Sytematischen Weichtier-Kunde*, (Jena, 1931).

⁷⁵⁵ Milton M. Vernalha, "'Heilipus Parvulus" Bohn, 1843 - Praga da Imbúia (Phoebe Porosa)', *A.B.T.*, 8 (1953), 309-12.

⁷⁵⁶ Further papers presented similar styles, see Milton M. Vernalha, 'Coleópteros que atacam cereais armazenados', *IBTR*, (1953), 6-46; Milton M. Vernalha and M. J. Nowacki, 'Fungo entomógeno da *Ilex* sp.', *A.B.T.*, 8 (1953), 107-8.

⁷⁵⁷ Moyses Lupion, *Mensagem*, (Curitiba, 1948): p. 137.

⁷⁵⁸ *ibid.*, p. 135.

⁷⁵⁹ Bento Munhoz da Rocha Neto, *Mensagem*, (Curitiba, 1952): p. 58.

1955. In the late 1950s, after a short interruption in this steady increase due to a lack of resources and strong frosts, subsequent administrations resumed massive BHC dusting until 1985 when the pesticide was banned in Brazil because of its unacceptable toxicity.⁷⁶⁰ By that time, Paraná was the largest consumer of BHC in Brazil, using thousands of tons every year.

As demonstrated above, Vernalha, as Chief Entomologist in the IBTR and Chair of Entomology in the Faculty of Agronomy in Curitiba, ignored the dusting regime altogether. During the eight years in which the state of Paraná subsidised the purchase of more than three thousand tons of BHC (1948-1955), the IBTR was the only public department with an entomological section in charge of studying ways ‘to combat pests, and testing fungicides and pesticides in order to identify their efficacy and practicality’.⁷⁶¹ Although Vernalha was in charge of this department, he chose not to concentrate on this topic, despite the fact that the Biological Institute in Sao Paulo had several researchers studying BHC efficacy against the berry borer.⁷⁶² As it has been explained in Chapter Three, the Biological Institute, where Vernalha had been trained, had been the main reference for the IBTR researchers. In addition, Governor Moises Lupion, back in 1948, had argued that their initial adoption of BHC was because of the preliminary research developed by the Biological Institute.⁷⁶³ Vernalha could have taken advantage of the close relationship that the IBTR and the Biological Institute tried to preserve, and he was also in charge of a division, at least on paper, that was supposedly dedicated to tackling agricultural pests. During these years of intense pesticide use, Vernalha’s division was presented as responsible for ‘identifying pests that pose threats to crops [...] and investigating both specific and general combat methods against them’.⁷⁶⁴ There was no

⁷⁶⁰ Bento Munhoz da Rocha Neto, *Mensagem*, (Curitiba, 1953): p. 51; *ibid.*, p. 27; ‘Banido há 25 anos’, *Folha de Londrina*, (13 June 2006).

⁷⁶¹ PAP, DSA, IAR, *Relatório de 1954*, Marcos Augusto Enrietti, ‘Introduction to Annual Report’, (1954), 80-81.

⁷⁶² For example, E. Issa, ‘Combate a broca do café’, *O Biológico*, 20 (1954), 163-4; H. F. G. Sauer, G. Duval, and O. Falanghe, ‘Combate à broca do café e a possibilidade do emprego de inseticidas’, *O Biológico*, 13 (1948), 205-14; C. A. Seixas, ‘A prática do combate químico a broca do café’, *O Biológico*, 14 (1948), 71-89.

⁷⁶³ Moyses Lupion, *Mensagem*, (Curitiba, 1948): p. 136.

⁷⁶⁴ PAP, DSA, IAR, *Relatório de 1954*, Marcos Augusto Enrietti, ‘Introduction to Annual Report’, (1954), 80-81.

indication that the berry borer was an exception. In fact, Vernalha would study coffee culture parasites later in his career.⁷⁶⁵

Vernalha's production of a series of papers in the early 1950s came to a halt in 1955. From a previous average of 360 entomological analyses per year, he would report only twenty-two in 1956.⁷⁶⁶ Vernalha also stopped publishing entomological works, and this sudden change coincided with the fact that he secured his position as holder of the Chair of Entomology in the Faculty of Agronomy in 1955. His thesis for this position was on the *Coccoidea* about which he had published a two hundred-page paper some years previously.⁷⁶⁷ Herculano de Souza Paula was the other contender for the Chair and presented a thesis on the leaf-cutter ant *Atta*, which Ramiro Gomes da Costa had also studied in Porto Alegre.⁷⁶⁸ After securing his post in 1955, Vernalha's work in the IBTR was also reduced to a minimum. In 1957, he stated in the annual report that his main responsibility was updating the IBTR's Entomological Museum.⁷⁶⁹ Vernalha would resume publishing only in the early 1970s, just before his retirement. The resulting works were made possible because of an agreement signed between the Brazilian Institute of Coffee and the Faculty of Agronomy, which made available considerable sums for the study of pests attacking coffee farms and training of technicians to work on the field. As he did in his few works in the early 1950s, he would again focus on taxonomical descriptions rather than on pest control.⁷⁷⁰ However, at a later age, Vernalha discovered a talent for writing

⁷⁶⁵ Milton M. Vernalha, 'Sobre a distribuição geográfica do Meloidogyne Coffeicolla Lord', *Acta Biol. Par.*, 1 (1972), 29-33; Milton M. Vernalha et al., 'A necrose foliar do cafeeiro produzida pela Perileucoptera Coffeella', *Acta Biol. Par.*, 5 (1976), 77-82.

⁷⁶⁶ PAP, DSA, IAR, *Relatório de 1954*, Marcos Augusto Enrietti, Introduction to Annual Report, (1954), p. 31; PAP, DSA, IAR, *Relatório de 1955*, Marcos Augusto Enrietti, Administrative Division Report, (1955), p. 28.

⁷⁶⁷ Vernalha, 'Contribuição para o conhecimento dos Coccideos'.

⁷⁶⁸ Herculano S. P. Paula, 'Estudo do gênero *Atta* fabr. no Estado do Paraná', (unpublished UFPR Ph.D. thesis, 1957).

⁷⁶⁹ PAP, DSA, IAR, *Relatório de 1957*, Marcos Augusto Enrietti, Relatório Divisão Administrativa, (1957).

⁷⁷⁰ Vernalha, 'Sobre a distribuição geográfica do Meloidogyne Coffeicolla Lord'; Vernalha et al., 'A necrose foliar do cafeeiro produzida pela Perileucoptera Coffeella', 77-82.

other literary genres such as history, poetry and prose. The history of the judicial systems of Paraná and Saint Benedict were among his new interests.⁷⁷¹

6.1.3 – A troubled beginning of the decade

Unlike what happened in Porto Alegre, where the integration of the Faculty of Agronomy and Veterinary Medicine within the nationalised university was automatic, the situation in Curitiba was much more complicated. It is necessary to briefly explore this contrast in order to consider the lack of interest in topics of major social impact, such as bTB and coffee berry borers outbreaks, that was demonstrated by Palmquist and Vernalha after 1950. Their indifference may be ascribed not only to the research culture prevalent at the IBTR, which was clearly less active than the IVRDF and the Department of Agriculture in Porto Alegre, but also to the fact that the two researchers faced more obstacles during the nationalisation of their faculties.

Having applied for federalisation independently of the University of Paraná, the request of the Faculty of Agronomy and Veterinary Medicine in Curitiba was granted in January 1950 when, in theory, a new phase in its institutional life should have begun. As noted above, the job descriptions of professors like Palmquist had already changed, which would facilitate a rapid conversion to the federal ranks. However, despite these preliminary arrangements, what followed would turn into one of the worst phases of the institution's history. As soon as the Faculty was nationalised, its most basic requests became entangled in a complex maze of bureaucratic procedures in Rio de Janeiro, the capital. Without the size and influence of the Federal University of Paraná, where several professors also held political positions, the Faculty of Agronomy and Veterinary Medicine in Curitiba struggled to put its federal status into effect. The main problem was that the transfer of assets from the Faculty to the Federal Union came

⁷⁷¹ Vernalha's new interests also included the history of Paraná and drug abuse, as the titles of some of his books suggest, see Milton M. Vernalha, *Entorpecentes*, (Curitiba, 1980); Milton M. Vernalha, *O Caudilho Branco*, (Curitiba, 1988); Milton M. Vernalha, *Centenário da Comarca de Antonina*, (Curitiba, 1992).

to a standstill as a result of bureaucratic issues between departments of state in Rio de Janeiro.⁷⁷² With the transfer of assets incomplete, the Faculty could not be considered officially nationalised; therefore, its professors could not be transferred to the Federal Government ranks and were furthermore unable to receive their salaries. As the state of Paraná no longer accepted responsibility for the Faculty's funding, professors could not be paid by the state. This impasse led to the suspension of salaries until assets were transferred.⁷⁷³ Completion of the transfer took no fewer than five years, and during this period, the Faculty survived with partial subventions from the state government, which were enough to pay only part of the Faculty's basic maintenance costs. In 1955, when the situation was finally resolved, professors received salaries equivalent to the previous five years, a sum that, at that point, was considered a 'small fortune'.⁷⁷⁴ The Faculty's budget also jumped from 800,000 *cruzeiros* in 1949 to 31 million *cruzeiros* in 1956.⁷⁷⁵

After solving the administrative problems that had crippled the institution, the Faculty was now ready to expand. The next task was to define which administrative configuration was preferable. Three alternatives divided the professors: the first was to merge its structure with the IBTR, bringing together research and teaching. The second was to remain as they were and to create postgraduate courses in order to become an 'Agrarian University', a new modality adopted elsewhere in Brazil. Finally, there was the alternative of joining the congregation of faculties that formed the Federal University of Paraná. From the perspective of research, the first two alternatives looked most promising according to the elements seen thus far. Professors like Palmquist and Vernalha were already part-time employees of the IBTR and might indeed initiate consistent research programmes. In the end, however, the alternative of joining the University of Paraná was chosen. In 1957, the Faculty formally requested its inclusion in the

⁷⁷² Doni Filho, *História da Escola Agrônômica do Paraná*, pp. 86-93.

⁷⁷³ *ibid.*, pp. 86-96.

⁷⁷⁴ *ibid.*, p. 96.

⁷⁷⁵ *ibid.*, p. 99.

University's congregation of faculties, and its request was finally accepted in 1959. Whereas, institutionally speaking, the IBTR and the Faculty of Agronomy and Veterinary Medicine remained separate, most of the chair holders of the Faculty continued to work at the IBTR in 1961, including Milton M. Vernalha and Oscar Palmquist.⁷⁷⁶ Interestingly, Palmquist was one of the members of the commission organised to study the pros and cons of the three alternatives, and there is no indication that he made any particular effort to bring research more in line with the academic environment.

In 1959, when Lycio Castro Velloso, then Director of the Faculty of Agronomy and Veterinary Medicine, wrote about the challenges his institution faced during that decade, he argued that most professors considered their work at the Faculty 'a temporary, part-time job' until 1954 because of the initial uncertainties.⁷⁷⁷ After the professors' situation in the Faculty became more stable, things began to change, but Velloso warned that no short-term impact on the research culture of the Faculty should be expected. In fact, in the early 1960s, Velloso stated that they still did not have 'adequate facilities for laboratories' and that 'it would be unwise to expect any sort of research to be carried out in the short-term in the faculties'.⁷⁷⁸

On the rare occasions that research did take place in the Faculty of Veterinary Medicine, the topics Palmquist and his colleagues preferred to explore during the 1940s continued to set the agenda after nationalisation. For example, professors and students alike neglected bovine diseases, despite the fact that livestock activity in Paraná – one of their potential markets – continued to grow. Milk production went from 35,000 litres in 1950 to 190,000 litres in 1960. A smaller but steady growth could also be seen in the meat industry. From 28,000 tons of meat produced in 1950, the amount grew to 46,000 tons in 1960.⁷⁷⁹ Despite this potential demand for veterinary assistance, none of the twenty theses presented to Chairs' admissions tests

⁷⁷⁶ *Anuário da UPR 1960-1961* (Curitiba, 1961): pp. 68-69.

⁷⁷⁷ FAV-PR, DIM, ADM, *Bases para um Plano Diretor*, (Curitiba, 1959).

⁷⁷⁸ *ibid.*

⁷⁷⁹ LDA, MDO, *Plano Diretor 1975*, (1975), p. 66-75.

between 1950 and 1960 addressed bovine diseases. On the other hand, two focused on studies of how to improve the performances of racing horses. The topics selected reflected the prevalent agenda of the IBTR during the 1940s.⁷⁸⁰

⁷⁸⁰ Ruy Santos, 'Determinações hematológicas em cavalo P.S.I. de corrida', (unpublished UFPR Ph.D. thesis, 1960); Annibal de Paiva Campello, 'Teores de alguns compostos nitrogenados no sangue de cavalos P. S. I. de corrida', (unpublished UFPR Ph.D. thesis, 1958).

6.2 – Research practices of professors from the Faculty of Medicine after 1950: João Ernani Bettega and Milton Erichsen Carneiro

6.2.1 – Medical Research in Paraná in the 1950s

While the Faculty of Agronomy and Veterinary Medicine struggled to define its future after 1950, the Faculty of Medicine rapidly reaped the full benefits of nationalisation. As the largest faculty, it received the major share of the substantially increased new budget. Its professors, including João Ernani Bettega, Chair of Phthisiology, were the first to be transferred to the federal ranks immediately after nationalisation. In the second part of this chapter, the ways in which this successful transfer affected medical research practices considered thus far will be analysed.

6.2.2 – João Ernani Bettega and the postgraduate course on surgery

During the 1950s, João Ernani Bettega's influence outside academic circles flourished. He was elected President of the Medical Association (1954-1960) and remained on the Board of Directors of the State of Paraná Phthisiology Society. Within the Faculty of Medicine, Bettega continued to dictate priorities among the wide range of new research areas in tuberculosis studies. For instance, like Carneiro in Porto Alegre, Bettega expressed strong opinions early in the decade about the role of hospitals in the fight against tuberculosis epidemics, the profile of which was transformed after the arrival of antibiotics. As director of one of the largest hospitals of Paraná, however, Bettega's perspective differed from that of Carneiro. Bettega admitted that higher morbidity rates were the new challenge, but like Schlögel, who blamed stockowners for the brucellosis outbreak, Bettega ascribed some responsibility for the appalling state of overcrowded hospitals to patients. The tuberculosis sanatorium he directed began the decade with its statutory capacity almost doubled. The daily stream of critically ill patients arriving in Curitiba included people of all ages, sexes and geographical locations. In 1952, Bettega

reported that the problem lay in the presence of ‘irrecoverable’ individuals among these patients who could be neither discharged nor cured by available treatments.⁷⁸¹ Bettega complained that these patients took the spaces of those who could be cured but who, instead, remained on endless waiting lists. He also argued that the main reason that patients did not have any chance of recovery was that they had been carelessly given antibiotics and therefore arrived at his hospital with drug-resistant strains of the tubercle bacilli. Almost all new patients presented tuberculosis lesions classified by Bettega’s assistants as advanced or highly advanced.⁷⁸² According to Bettega, forty per cent of these patients were already resistant to one or more drugs. Bettega complained that resistance to antibiotics made treatment courses more time-consuming and expensive; there was, therefore, little he or his team could do except recommend patients for immediate surgical intervention.⁷⁸³ The large number of critical patients referred for surgery eventually contributed to the keen interest in surgical procedures that Bettega and his brother had demonstrated since the 1940s.

In the few papers published by Bettega in the early 1950s, lung surgery overshadowed all other discussions of tuberculosis treatment. He conceded that antibiotic-based therapy was an area that required further study, but he expected new knowledge to be generated locally in the field of lung surgery.⁷⁸⁴ His interest in highly specific surgical procedures stood in stark contrast to the broad perspective of Carneiro in Porto Alegre. On the other hand, concentration in one area allowed Bettega to specialise and to create a research programme unlike anything that existed in the Faculty of Medicine in Porto Alegre. In 1955, Ernani Bettega and his brother set up a Tuberculosis Research Centre to ‘study, research and improve surgical procedures for

⁷⁸¹ João Luiz Bettega, ‘A situação da tuberculose no Paraná’, *Revista do Dept. de Saúde do Paraná*, 1 (1952), 26-7.

⁷⁸² João Ernani Bettega et al., ‘Tratamento da caverna tuberculosa em função do teste de resistência’, *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 4 (1962), 27-44.

⁷⁸³ *ibid.*

⁷⁸⁴ João Ernani Bettega, Silvio B. Linhares, and Alceu dos Santos de Almeida, ‘Reajustamento dos programas de luta antituberculosa’, *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 1 (1956), 7-24: p. 19.

tuberculosis'.⁷⁸⁵ As almost all of the conditions of patients arriving at his hospital were severe, there were endless numbers of patients on which to operate. The Research Centre would work almost as an extension of the Surgical Centre from which the case studies came. The creation of this Research Centre was announced in the journal of the State of Paraná Phthisiology Society as a joint initiative, enabled 'thanks to the moral and financial support of the University of Paraná, in particular, its vice-chancellor Flavio Suplicy de Lacerda [...] and Professor João Ernani Bettega, holder of the Phthisiology Chair'.⁷⁸⁶ The Research Centre was located in the Sanatorium Portão, directed by Ernani Bettega's brother, Joao Luiz Bettega, and was presented as a centre of expertise in thoracic and vascular surgery.⁷⁸⁷

In the first two years of activity, 198 'experiments' were carried out in the Research Centre, and some of them were described in the journal *Anais Paranaenses de Tuberculose e Doenças Torácicas*, published by the State of Paraná Phthisiology Society. Most of these experiments focused on the study of specific suture techniques used on animals, usually dogs.⁷⁸⁸ The objective was to advance surgical methods used in the sanatorium to improve recovery rates.⁷⁸⁹ Meanwhile, several physicians volunteered to participate in the surgeries carried out in Luiz Bettega's Sanatorium. That possibility offered a unique opportunity for specialisation in highly sophisticated procedures and also the chance to practise surgical procedures on real patients.⁷⁹⁰ Soon, physicians from the Department of Public Health, Faculty of Medicine and private practitioners, who belonged either to the Medical Association or to the State of Paraná Phthisiology Society, were participating in surgeries undertaken in the

⁷⁸⁵ 'Trabalhos do laboratório de pesquisas da cadeira de tisiologia', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 2 (1957), 109-10.

⁷⁸⁶ *ibid.*

⁷⁸⁷ *ibid.*

⁷⁸⁸ For example, Giocondo V. Artigas et al., 'O emprego da plástica em Z', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 2 (1957), 135-42; Giocondo V. Artigas et al., 'Transplantação de segmentos de aorta torácica', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 2 (1957), 111-34.

⁷⁸⁹ Experiments were presented and discussed during meetings of the Phthisiology Society before being published, see PTD, MMM, 'Atas 49-76', (17 Sept. 1957), 135-7.

⁷⁹⁰ In the first three years of the centre, 425 patients received operations, see Helio Brandão et al., 'Complicações bronco-pulmonares', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 4 (1962), 171-94.

Sanatorium Portao.⁷⁹¹ The results of these surgeries were then analysed in the Research Centre by surgeons and by Ernani Bettega's students. Initially, studies on surgical procedures were related only to tuberculosis, but later other pulmonary diseases were considered. For example, in 1953 a three-year old boy had his left lung excised in the Sanatorium Portao after initial diagnosis indicated severe inflammation of his pulmonary bronchioles. Subsequent laboratory analyses demonstrated that the disease – a form of acute bronchitis – still puzzled local physicians.⁷⁹² As the number of qualified surgeons grew, non-pulmonary surgeries also increased. By 1962, pulmonary operations represented only one third of surgeries being carried out in Curitiba.⁷⁹³

The Tuberculosis Research Centre also enabled the study and discussion of fields associated with surgery, such as anaesthesia. There were still many doubts about the methods involved in anaesthetic procedures, and the field was developing fast. Amadeu Beduschi, chief anaesthesiologist of Bettega's sanatorium, declared that 'we do not always feel good when we have to change our recommendations but our patients can rest assured that, at least, we always try our best'.⁷⁹⁴ Beduschi was justifying the rapid changes in his field and his decision to adapt his methods, some of which had recently led to the death of patients. He proclaimed that they were able to reduce the number of deaths resulting from complications related to anaesthesia from four to 1.5 per cent as a result of studies undertaken in the research centre.⁷⁹⁵

Interestingly, tuberculosis specialists outside Curitiba were losing interest in surgical procedures. In 1953, the National Congress of Tuberculosis demonstrated that the field was going in a different direction, as Carneiro had perceived in Porto Alegre. The section dedicated

⁷⁹¹ For example, João Luiz Bettega, 'Resultados tardios do Pneumotorax Extrapleural', *R.M.P.*, 25 (1956), 93-100.

⁷⁹² Artigas, Giocondo V. et al., 'Ressecções Pumonares na Infância', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 1 (1956), 43-56.

⁷⁹³ 786 general surgeries were conducted as opposed to 425 lung surgeries, see Helio Brandão, 'Complicações bronco-pulmonares', pp. 173-175.

⁷⁹⁴ Amadeu Beduschi, 'Anestesia para a cirurgia da tuberculose pulmonar', *Anais Paranaenses de Tuberculose e Doenças Torácicas*, 4 (1962), 89-102: p. 91.

⁷⁹⁵ *ibid.*, 90-91.

to surgery in this congress had the lowest attendance.⁷⁹⁶ The focus of most specialists was the severe lack of hospital beds and the sharp increase of morbidity rates. Their priority lay in improving early diagnoses through large-scale tuberculin testing and abreugraphy exams to avoid treating thousands of in-patients with expensive, invasive and risky surgical procedures. Bettega acknowledged these changes but remained focused on his research on lung surgery. Consequently, he did not resume his studies on the effect of antibiotics on tuberculin tests that he initiated in the late 1940s. He did not address, for example, the discussion raised by Carneiro in Porto Alegre regarding changing perceptions of allergy, immunity and disease resistance. His lack of familiarity with new developments did not prevent Bettega from authoritatively giving advice on a variety of topics related to public health. For example, he continued to express his opinion on the BCG vaccine, for which tuberculin testing had been the standard tool used in Brazil to prove its efficacy. Now specialists, like Fernando Carneiro in Porto Alegre, were suggesting that efficacy results had to be reconsidered. Ignoring this debate altogether, Bettega declared in 1953 that the efficiency of oral BCG was ‘absolutely certain according to modern medical science’.⁷⁹⁷ This position would only be contested some years later, when local physicians argued that there was an urgent need to change the policy regarding tuberculin in Paraná. In 1962, the Department of Public Health reviewed Bettega’s recommendation for indiscriminate vaccination and suggested the use of tuberculin testing as a screening device, as only non-reactors would be vaccinated with BCG. Although Bettega and his colleagues had neglected the latest developments, other Brazilian states had adopted the Danish standardised strain of tuberculin, and authorities in Paraná decided to follow suit.⁷⁹⁸

⁷⁹⁶ Paulo de Souza Lima, ‘Posição dos antibióticos e dos métodos de colapso-terapia’, *Anais do X Congresso Brasileiro de Higiene*, (1953), 857-8.

⁷⁹⁷ Silvio B. Linhares and João Ernani Bettega, ‘Premunicação pelo B.C.G. em Curitiba’, *Anais do Congresso Brasileiro de Higiene*, (1953), 737-9; João Ernani Bettega, ‘Aula inaugural’, *Anuário da UPR 1952-1953*, (1954).

⁷⁹⁸ Hélio Fraga, ‘Prova tuberculínica em saúde pública’, *Anais Paranaenses de Tuberculose e Doenças Torácicas*, (1962). For other local works on tuberculin, see Ari Stechman, ‘Avaliação dos resultados de provas tuberculínicas’, *Anais Paranaenses de Tuberculose e Doenças Torácicas*, (1962), 7-26.

Bettega remained Professor of Phthiology until 1974, when his chair was dissolved and transferred to a new department specialising in pneumonia. Throughout this entire period he did not resume his studies on tuberculin.⁷⁹⁹ In 1978, a Master's course in surgery was created in the Faculty of Medicine. Further studies are necessary to establish its likely link with the research centre created by Bettega in 1955.

6.2.3 – Milton Erichsen Carneiro: Malária and Chagas disease in Paraná

After nationalisation, medical entomology was potentially a second area for research within the Faculty of Medicine. As demonstrated in Chapter Five, chair holders in several Brazilian faculties of medicine were undertaking extensive research both in their academic departments and in the facilities of the National Service. Malaria and Chagas disease were of particular interest.⁸⁰⁰

While Raul di Primio continued to hold the Chair of Parasitology in Porto Alegre, Milton Erichsen Carneiro remained the specialist in parasitology in the Curitiba Faculty of Medicine. As Primio was outspoken about malaria and Chagas disease in Porto Alegre, the same could have been expected from Carneiro. In Paraná, the malaria outbreak had been serious earlier in the decade. In 1950, the government subsidised the purchase of 816,000 litres of DDT solution for administration by the technicians of the National Service Against Malaria. Governor Moises Lupion reported that approximately 430,000 households had been sprayed with the insecticide.⁸⁰¹ This massive campaign began despite the fact that many doubts existed regarding the efficacy of DDT on species specific to different environments. However, the

⁷⁹⁹ Costa and Lima, *O ensino da medicina na Universidade Federal do Paraná*.

⁸⁰⁰ For examples of medical research, see Mauro Pereira Barreto, 'Sobre a sistemática da subfamília Phlebotominae (Diptera, Psychodidae)', *Ciência e Cultura*, 6 (1954), 180; Mauro Pereira Barreto, 'Em defesa da sistemática', *Ciência e Cultura*, 6 (1954), 85-8; A. L. Auroza Galvão, 'Relatório das pesquisas entomológicas realizadas na Amazônia', 12 (1942), 233-41. For a discussion on medical entomology in the period, see Hochman, 'Brazil isn't only disease', 313-31.

⁸⁰¹ Moyses Lupion, *Mensagem*, (Curitiba, 1950).

decision to subsidise this substantial amount of insecticide was made without the technical opinion of Erichsen Carneiro, who, according to his academic specialty, was the local expert on that vector. As demonstrated in Chapter Four, Erichsen Carneiro had indeed opposed research within the academic environment in the 1940s, and nationalisation did not change his stance. However, as in Rio Grande do Sul, the number of deaths caused by malaria by the mid-1950s had fallen sharply, which may have made further actions appear unnecessary.⁸⁰²

Chagas disease was altogether a different case. As shown in Chapter Four, the disease was known in Paraná because of case studies carried out by outsiders in 1936 and again in 1943.⁸⁰³ Alceu de Almeida, who had been Carneiro's assistant, undertook the first local study on Chagas disease in 1946; the initial stages of major outbreaks of Triatominae, the Chagas disease vector, were identified in at least four cities.⁸⁰⁴ In 1953, the local government allowed the National Service Against Malaria to update the epidemiological information concerning Chagas disease in Paraná. The result of this work, published a year later, indicated that seventy-five per cent of the towns visited were infested with the disease vector and more than three hundred people had tested positive for Chagas disease.⁸⁰⁵ However, mounting evidence of the problem, combined with greater awareness by the research community – as Primio's case attested in Porto Alegre – again failed to attract Erichsen Carneiro's attention. His neglect of research that might have contributed to the amelioration of this alarming situation remained unchanged after nationalisation. Almeida, on the other hand, who could have continued his work on the Chagas disease vector, changed his area of interest. He joined the surgical team organised by Bettega and began publishing work on tuberculosis and lung surgery.⁸⁰⁶ Thus, the Faculty of Medicine lost its most outspoken member and one of the few who had demonstrated

⁸⁰² Bento Munhoz da Rocha Neto, *Mensagem*, p. 228. By 1953, Malária was no longer considered a threat, see Bento Munhoz da Rocha Neto, *Mensagem*, (Curitiba, 1954).

⁸⁰³ Souza-Araujo, 'A doença de Chagas no Paraná', pp. 477-85.

⁸⁰⁴ Almeida, 'Sobre a doença de Chagas no Paraná', pp. 153-8.

⁸⁰⁵ Souza-Araujo, 'A doença de Chagas no Paraná', p. 479.

⁸⁰⁶ Bettega, Linhares, and Almeida, 'Reajustamento dos programas de luta antituberculosa', p. 9.

interest in studying the Triatominae in some detail. As before nationalisation, there were resources in Paraná for medical entomological research, and there was a definite epidemiological problem. Yet the Faculty of Medicine's chair holder showed little interest in engaging in research on insect-transmitted diseases. Until Erichsen Carneiro's retirement in the 1960s, no local studies on malaria were undertaken in Paraná.⁸⁰⁷

6.2.4 – Serendipity: The Institute of Human Genetics

Unlike his peers in other Brazilian states, Erichsen Carneiro once again had little interest in the local availability of resources that might have helped to bring medical entomology research into the Curitiba Faculty of Medicine in the 1950s. However, medical entomology was introduced in his faculty with full force in the early 1950s as a result of the initiatives of two professors. The first was Jesus Moure, from the Faculty of Natural History, who invited the geneticist Newton Freire-Maia from Sao Paulo to set up a research centre in the area of human genetics in Curitiba. Although Moure worked in systematics, since the 1940s he had been close to the group of entomologists who pioneered the study of genetics in the country. For example, in 1943 the Ukrainian geneticist Theodosius Dobzhansky was working with Frederico Lane and Lauro Travassos.⁸⁰⁸ The former was Moure's scientific mentor, and the latter was the co-author of Moure's work on systematics; both contributed to the Paranaense Museum journal.⁸⁰⁹ In addition, in 1953, Moure had co-authored the first book in Portuguese about human

⁸⁰⁷ Bertoli, Marta, 'Malária no Estado do Paraná' *Revista da Sociedade Brasileira de Medicina Tropical*, 34 (2001), 43-7. After handing his position to his son, Carneiro became dedicated to writing. Among the titles written in this phase were Carneiro, *Tricentenário de Paranaguá*; Carneiro, *Paranaguá*; Carneiro, *Sobre Machiavel*.

⁸⁰⁸ Theodosius Dobzhansky and Crodoaldo Pavan, 'Studies on Brazilian Species of *Drosophila*', *Biologia Geral - USP*, 36 (1943), 7-72. The introduction of genetics in the country is ascribed to Dobzhansky, see Thomas F. Glick, 'Establishing scientific disciplines in latin america', in A. Lafuente, M. L. Ortega, and Elena Ortega (eds.), *Mundializaion de la ciencia y cultura nacional*, (Madrid, 1991), 364-75; Francisco M. Salzano, 'Estudo sobre a evolução biológica no Brasil', in Shozo Motoyama and Mário Guimarães Ferri (eds.), *História das Ciências no Brasil*, (São Paulo, 1980), 250-9.

⁸⁰⁹ Moure, Jesus and Travassos, Lauro, 'Notas Sobre a Nomenclatura dos Grupos Superiores a Gêneros' *Off-Print Museu Paranãense*, (1947), 3-19; Frederico Lane, 'Descrição do alótipo de *Metopoicoilus Picticollis* Melzer', *AMP*, 3 (1943), 95-108.

evolution with André Dreyfus, a friend of Dobzhansky's.⁸¹⁰ Another important name in Moure's network was Frota-Pessoa, who was one of Dobzhansky's disciples in Brazil, and who published works in the Paranaense Museum journal on *Drosophila* taxonomy after receiving an invitation to do so from Moure.⁸¹¹ More importantly, Frota-Pessoa was the tutor of Newton Freire-Maia, who was invited by Moure to teach genetics in the Faculty of Medicine.

The second person who helped Freire-Maia transfer to Curitiba was Homero Braga, Chair of General Biology. Braga's ideas were explored in Chapter Five because he had supported a programme to select migrants moving into Paraná. According to Braga, the state needed to devise a selection strategy in order to prevent the settlement of new immigrants identified as 'ignorant and racially inferior'.⁸¹² Braga's assistance was indispensable because he was the professor who favoured the creation of Freire-Maia's laboratory that was associated with his discipline.

Although Freire-Maia was interested in human genetics, he continued to work with *Drosophila*, more commonly known as the fruit fly. Such work was considered by some to belong in the field of medical entomology, the area related to Milton Carneiro's chair.⁸¹³ Starting in the Faculty of Medicine in 1951, Freire-Maia became one of the leading Brazilian researchers in human genetics.⁸¹⁴ He published on a variety of areas, from congenital anomalies to disorders caused by consanguinity.⁸¹⁵ Freire-Maia created a school around his work and several of his pupils left Curitiba to take over research centres in other parts of Brazil. His brother, Ademar Freire-Maia, for example, went to the city of Araraquara in São Paulo, where

⁸¹⁰ Salzano, 'Estudo sobre a evolução biológica no Brasil', p. 252.

⁸¹¹ O. Frota-Pessoa, 'Revision of *Tripunctata*', *AMP*, 10 (1954), 253-330.

⁸¹² Braga, 'O melhor imigrante', pp. 8-9.

⁸¹³ For example, Lloyd E. Rozeboom and Barbara N. Gilford, 'Sexual isolation between populations of the *Culex pipiens* complex in North America', *The Journal of Parasitology*, 40 (1954), 237-44.

⁸¹⁴ Bernardo Beiguelman, 'A genética humana no Brasil', in S. (Org.) Motoyama (ed.), *História das ciências no Brasil*, (São Paulo, 1980), pp. 273-305: pp. 279-280.

⁸¹⁵ For example, Newton Freire-Maia and A. Freire-Maia, 'The structure of consanguineous marriages and its genetic implications', *Annals of Human Genetics*, 25 (1961), 29-39; Newton Freire-Maia et al., 'Genetics of acheiropodia', *American Journal of Human Genetics*, 27 (1975), 521-7.

he set up a large research centre in human genetics. Ademar Freire-Maia was as prolific as his brother, publishing hundreds of articles throughout his scientific career.

Newton Freire-Maia remained in Curitiba for the rest of his professional career, and he transformed the image of the Faculty of Medicine, where his laboratory was located. Because of his work, the Faculty as a whole came to be known as a progressive higher educational institution with a highly sophisticated scientific research department, which, ironically, began in the locally neglected field of medical entomology.⁸¹⁶ After the 1968 reform, the laboratory Freire-Maia created in 1951 became the Department of Genetics, and, it has offered a Master's course in Genetics since 1971, the first linked to the Faculty of Medicine of Curitiba. Freire-Maia worked at the Department of Genetics until 2003 when he died of lung cancer.⁸¹⁷

6.2.5 – Reactions in the Faculty of Medicine to the signs of change

Bettega's research centre and Freire-Maia's genetics laboratory were two highly visible scientific initiatives within the Faculty of Medicine during the first years after nationalisation. Their success, however, should not obscure the research ethos of the majority of medical professors. One way of exploring the underlying values among professors is by looking at the work of Milton Munhoz. Chapter Five demonstrated that while Munhoz was the local expert in radiography, one of the most advanced technologies in the 1940s, he continued to uphold the main tenets of the eugenic movement, which at that time were not as popular as they had been two decades earlier. After nationalisation, ten years later, Munhoz announced changes in the medical field, while once again holding strong traditional ideas. His interpretation of these changes is important because it was Munhoz who gave voice to the need for reform that was also advocated in Porto Alegre. More importantly, Munhoz continued to hold an influential

⁸¹⁶ Salzano, 'Estudo sobre a evolução biológica no Brasil'; Bernardo Beiguelman, 'A genética humana no Brasil'.

⁸¹⁷ <http://www.genetica.ufpr.br/newton.html> access 04/04/2012.

position in the nationalised university, being both in the academic council of the Faculty of Medicine until 1952 and the most voted candidate to take over the direction of the Faculty in 1956.⁸¹⁸

As discussed in Chapter Two, Munhoz had travelled to Uruguay to attend a major congress where medical teaching was discussed while a delegation from Rio Grande do Sul attended a similar conference in Sao Paulo.⁸¹⁹ After returning to Curitiba, Munhoz reported the latest developments to his colleagues. He warned chair holders that they should be aware of fundamental changes taking place in other universities and argued that medical teaching would have to follow the same path that the changing field of medicine was taking. ‘Teaching students about things they will never use’, as Munhoz saw it, was no longer acceptable. As an example, he targeted the emphasis given to morphology in the Faculty of Medicine of Curitiba. According to Munhoz, students had to memorise endless names of cavities, bones, arteries and tissues that were of little use in their professional lives. This exercise was time-consuming, and time was something that they could not afford to waste since medical knowledge was rapidly evolving. He described the ‘traditional idea that our duty is *sedare dolorem*’ as outmoded.⁸²⁰ Munhoz told his colleagues that teaching medicine must have the new goal of training students ‘to acquire knowledge, to take a proper professional attitude and to attain an awareness that enabled them as physicians to preserve and restore health’.⁸²¹

In addition, Munhoz touched upon the issue of medical research, which was also being discussed in Porto Alegre. He revealed that research was becoming an expected feature of

⁸¹⁸ *Anuário da Universidade do Paraná* (Curitiba, 1954): p. 3; Munhoz was eventually not elected because he was not from the same political party of the Brazilian president who had the last word on the matter, see Divonsir Borba Cortes, ‘Professor Emérito’, in Hamilton Lacerda Suplicy and Pio Taborda Veiga (eds.), *Milton de Macedo Munhoz*, (Curitiba, 1987) 27-9: p. 28.

⁸¹⁹ Milton Munhoz, ‘O Ensino Médico’, in Hamilton Lacerda Suplicy and Pio Taborda Veiga (eds.), *Milton de Macedo Munhoz*, (Curitiba, 1987): pp. 299-312.

⁸²⁰ The term *sedare dolorem* came from the medical motto about physician’s responsibility, *Divinum est Opus Sedare Dolorem* (Those who conquer pain are divine) Oya Yalcin Cok, ‘Divinum est opus sedare dolorem’, *Southern Medical Journal*, 103 (2010), 187.

⁸²¹ Munhoz, ‘O ensino médico’, p. 300.

faculties of medicine. For instance, full-time positions were now considered a necessity because they enabled professors to undertake research, and he admitted that in other faculties of medicine full-time positions were already a reality. However, Munhoz promptly added that it was simply ‘premature to imagine professors being dedicated to full-time teaching’ in Curitiba.⁸²² The main disadvantage of the concept was that professors would then lose the right to have private practices, and that was unacceptable to Munhoz. He also argued against any sort of specialisation, which clearly included topic-specific research programmes. His advice was that the faculty should focus on training ‘general practitioners’ in Curitiba, and if students eventually wished to specialise, they could do so elsewhere.⁸²³

This ambiguity in Munhoz’ advice on how to keep up with the latest trends in medical education could also be perceived through his subsequent suggestion that the number of new student enrolments should be reduced. From the current intake of 120 new students per year, Munhoz suggested that no more than fifty should be admitted in the future. His suggestion was voiced despite the fact that it was common knowledge that nationalisation resulted in a sharp increase in the university’s resources. From a total income of four million *cruzeiros* in 1948, the university budget jumped to fourteen million *cruzeiros* in 1951 and to forty-six million *cruzeiros* in 1952; this represented more than a one thousand per cent increase.⁸²⁴ Munhoz did not believe the enhanced budget should be used to increase the number of places for new students. Moreover, he urged his colleagues to consider making the entry requirements more difficult for applicants. Instead of a general admissions test, Munhoz suggested that selection should be based on subjective qualities, such as ‘social sensibilities’ and ‘moral courage’.⁸²⁵

⁸²² *ibid.*

⁸²³ *ibid.*: p. 304. For the opinion of Carlos F. F. da Costa on medical teaching, see FAM, MDO, *Notas extraídas do diário de viagem do Dr. Carlos F. F. da Costa*, Carlos F. F. Costa, (Curitiba, 1959).

⁸²⁴ *Anuário da UPR 1951* (Curitiba, 1952): p. 18.

⁸²⁵ Munhoz, ‘O ensino médico’, p. 303.

According to Munhoz, recommendation letters and the professional evaluation of psychologists and psychiatrists should also be included as part of the admissions procedure.⁸²⁶ The ambiguity in Munhoz' arguments indicates that change would happen slowly in the Curitiba Faculty of Medicine and reflects the fact that Bettega's research centre and Freire-Maia's genetics laboratory were, to a great extent, out of line with major developments within the institution. One of the reasons behind Munhoz' ambiguity is that the notion of science existing in the 1940s could still be found in the late 1950s. When the third issue of the State of Paraná Phthisiology Society's journal was released in 1959, it was the result of collaboration with João Ernani Bettega, the Chair of Phthisiology, and was described as having 'great scientific value'. In other words, without carrying out research such as that which was undertaken by faculties of Medicine in Sao Paulo – something Munhoz abhorred – it was still socially acceptable to argue that the Faculty of Medicine in Curitiba produced work of high scientific value in the late 1950s. This was a clear indication that things could continue as they were. In fact, right before the 1968 reform, medical students in Curitiba were still protesting about issues that Munhoz had acknowledged in the previous decade as requiring immediate attention. They argued, for instance, that most of what they learned in the Faculty had no use in their profession.⁸²⁷ In addition, students complained that, in general, the knowledge they received from the Faculty of Medicine lacked objectivity. Chair holders were not only outdated but they also regularly did not teach, instead leaving the task to assistants.⁸²⁸ These persistent issues, however, suggest that influential individuals like Munhoz, who had a major role in the transition to the nationalised system, were aware of the latest developments in the medical field but had the power to adapt ideas only at their own convenience. Nationalisation

⁸²⁶ *ibid.*

⁸²⁷ Siqueira, *História do Diretório Acadêmico Nilo Cairo*, p.134.

⁸²⁸ *ibid.*: p. 138.

gave them more autonomy, and despite being part of a public institution, their traditional values still dictated the pace of change within their faculties.

Conclusion

Professors like Milton Miro Vernalha, Oscar Palmquist, and Milton Erichsen Carneiro acquired prominent positions after the nationalisation of the University of Paraná in 1950. Their transfers to the ranks of federal government took place at the same time that important developments occurred in the areas in which they taught in their respective faculties. In Palmquist's field of veterinary medicine, there was a sharp increase in production of meat and milk in the state. That increase potentially represented a higher demand for the training of undergraduates to address current problems that still troubled researchers, such as brucellosis. In the agricultural activity, the area in which Vernalha had a direct interest, BHC became a major topic in research centres like the Biological Institute, and Paraná would soon become the largest user of that pesticide in the country. In the case of medical entomology, Carneiro's area, the outbreak of Chagas disease had increasingly become a concern for the medical community.

However, the evidence explored in this chapter suggests that the professors largely ignored these major developments. Their attitudes represented a move towards increasing insularity during the first years of the nationalised system. Even when research was effectively organised within the University, it had marked signs of tradition and conservatism. The Tuberculosis Research Centre created by Bettega focused mostly on surgical procedures, which specialists in tuberculosis elsewhere were largely abandoning. The large number of severely ill patients took priority over engaging peers about the scientific validity of the research programme. Even in the case of Freire-Maia's laboratory of human genetics, it may be said that there was a certain dimension of tradition. Eugenics was still openly discussed by the prominent researchers in the new field of human genetics, such as Theodosius Dobzhansky, and the Faculty of Medicine had many professors who, in the past, had been firm supporters of the tenets of eugenics.⁸²⁹

⁸²⁹ For a brief overview of Dobzhansky's perspective on eugenics, see Theodosius Dobzhansky, 'Changing Man', *Science*, 155 (1967), 409-15.

Therefore, beyond the outright neglect of opportunities to bring together teaching and research, the few initiatives that did take place in Curitiba during the early 1950s embodied traditional values.

When compared with the situation in Porto Alegre, it is clear that in Curitiba there was a core group of academics who had power and influence before 1950 and, to a great extent, organised and oversaw the transitions of their faculties to the nationalised system. After issues like infrastructure, salaries and administrative status had been settled, it was time to question the role of research in the new system. At that point, traditions that were already in place in the 1940s dictated the priority with which the research initiatives were implemented. Whereas Outubrino Correa initiated a vigorous research programme in the Faculty of Veterinary Medicine in Porto Alegre, the same disregard of systematic research on bovine diseases that was observed in Curitiba in the 1940s continued through the 1950s. At that point, it was the prevalent research cultures rather than specific research topics that made the difference. Brucellosis replaced bTB, and Chagas disease became more important than malaria, but the ability to perceive these changes and adapt to them was part of a research culture going back to the early 1940s. The insularity of the IBTR, which continued into the 1950s, is an example of the prevailing research culture. In the IBTR, topics such as bTB, brucellosis and leaf-cutter ants appear to have been approached in order to comply with the expected agenda of a public research institution rather than out of a legitimate determination to fulfil its institutional goals. The persistent concern with image over content was deeply embedded in the institution's former ethos, and it demonstrates the extent to which the traditions of the 1940s, in many ways, shaped the implementation of scientific programmes in the early phase of nationalisation.

Examples of new research centres, such as physiology in Porto Alegre and human genetics in Curitiba, demonstrated that nationalisation also effected a change in what professors expected from the higher education system. However, it is clear that an older generation of

chair holders acquiesced to these initiatives only if they did not interfere with their interests. Chair holders continued to personally select their assistants and determine the syllabuses for their areas. Research departments were then created in areas that had been little explored, such as physiology in Porto Alegre and human genetics in Curitiba. It is noteworthy, however, that these centres would form a sort of subculture of academic research that, in some cases, would later translate into postgraduate courses. However, initially they did not interfere with the core group of professors who were reluctant to accept the idea that research and teaching could coexist in an academic environment.

Conclusions

It is time to summarise both the similarities and the differences between the case studies presented in this thesis. The objective of this final section is to highlight the relevance of the similarities to the analysis of Brazilian academic science as a whole and to suggest ways in which the assessment of the differences opens up new paths for future work. The fact that common characteristics were found both in Porto Alegre and Curitiba immediately suggests that they may have arisen under similar circumstances. Indeed, the commonalities between Porto Alegre and Curitiba presented in this thesis offer new insights into regional Brazilian science and emphasize constitutive characteristics of a national scientific culture and infrastructure that exist to this day.

Chief among these mutual characteristics is the fact that at the time when the current system of federal universities began to take form academic life went well beyond university campuses. That professors undertook other activities alongside their academic duties is well known in the literature. Indeed, scholars have claimed that part-time positions were one of the major obstacles to the emergence of academic science.⁸³⁰ This conclusion is derived from the assumption that full-time positions and job stability were preconditions that allowed scholars to have the time and peace of mind to pursue their scientific interests alongside their teaching duties. Such an assumption, however, is based on a present-day understanding of the ideal configuration of a research oriented higher-education institution; as such, they call for critical evaluation. The ways in which this tradition of part-time employment affected academic cultures before 1950, for example, has not been given the attention it deserves. In particular, it is important to enquire whether *extra moenia* activities undertaken by professors over several years might have helped to solidify the idea that universities were not supposed to undertake

⁸³⁰ Simon Schwartzman, 'Pesquisa universitária e inovação no Brasil', *Unpublished Seminar Paper*, (2007). , p. 29.

research. Several examples have shown how the collaboration of part-time professors with external institutions occurred and illustrated the effect these relationships had on the academic setting. What emerged was a marked separation between universities and independent research centres, a feature common to Curitiba and Porto Alegre. For several chair holders studied here, their activities outside the university were as important as those inside: they were part of an institutional context from which scholars profited. It was part, in other words, of a reality everybody understood, within and outside academia. Physicians, for example, advertised their status of professors as a way of gaining credibility and attracting wealthy customers in their private practices. Nationalisation did not close the gap between universities and external research centres overnight but enabled the establishment of different arrangements which represented a viable compromise with respect to pre-existing research cultures. The ways in which individual chair holders decided whether or not it would be beneficial to close the gap between academia and other professional opportunities depended on the conditions already in place when nationalisation was set in motion. At times, adjustments differed radically even within the same university. In Curitiba, for example, Oscar Palmquist was a member of the board that decided not to seek collaboration between the Faculty of Agronomy and Veterinary Medicine of Curitiba and the IBTR. The Professor of Phthisiology João Bettega, who taught in the same university, did exactly the opposite. As soon as the nationalisation process was complete, he strove to align the research programme he ran at the hospital, where he worked part-time, with his position as Chair. In Porto Alegre, the contrasts were not so stark. For different reasons, chair holders from the Faculties of Medicine, Agronomy and Veterinary Medicine kept their work in independent institutions separate from their academic duties. Only by investigating the interests that moved these individuals outside their academic environments is it possible to better understand their decisions. When historians posit the importance of chair holders for the introduction of academic science in Brazil and they exclusively take into

account the time they spent inside universities and their academic achievements, they miss a fundamental part of the story.

This thesis also revealed that scientific communities associated with the universities had access to expertise, funding and personnel. Traditionally, peripheral communities of Brazilian researchers have been neglected in the historiography, on the assumption that since they did not have access to the above mentioned structural facilitators, at the level Sao Paulo and Rio de Janeiro did, science could not have existed there. This thesis has demonstrated that this rationale is too simplistic and may have contributed to a short-sighted narrative about the history of Brazilian science. While expertise may not have existed in these communities at the level present in Sao Paulo and Rio e Janeiro, it was usually available from specialists in neighbouring states. The circulation of foreign researchers with no links to Rio de Janeiro and Sao Paulo also enabled the introduction of new research techniques and the creation of high-quality research programmes in peripheral states. There is little evidence that research projects failed due to lack of local expertise. In addition, a further source of expertise was actually represented by the chair holders who also functioned as active researchers. Their very existence contradicts generalisations about the negative effect of chair holders over academic science. Many were active researchers even under conditions that a researcher from central regions would consider adverse. João Bettega in Curitiba and Outubrino Correa in Porto Alegre are just two examples of academics who not only had been doing research since the 1940s but also helped to create post-graduate courses in 1968. Funding had been made available to these and other researchers from state projects or from national programmes. The considerable attention given to the increase of research funds as a result of the creation of the National Council of Research in 1950 is remarkable when considering that the much higher, previously available amount of funds for mosquito control campaigns and against the tuberculosis epidemic has been neglected. Finally, qualified manpower was available in the medical field, agronomy and

veterinary medicine. Faculties related to these areas worked as invisible colleges that trained a great number of pupils. They might not have existed in the vast numbers found in Rio de Janeiro and Sao Paulo, but they met the demands of peripheral states. Nationalisation directly affected the availability of expertise, funding and personnel. Faculties of Medicine, for example, greatly benefited from the higher volume of funds brought by nationalisation. Other faculties benefited from the creation of the National Council of Research, although this must be studied alongside other funding alternatives. Moreover, the number of students grew exponentially, thus increasing the pool of recruits for new research programmes. However, the existence of previous regional schemes that secured access to expertise, funding and personnel suggests that centre-based categorisations fall short of explaining the arrangements found in peripheral communities.

It is noteworthy that although elements such as funding, expertise and personnel existed both in central and peripheral Brazilian states before nationalisation, there was a fundamental difference in the ways in which the meaning of science was interpreted in both regions. As discussed in the introduction, nationalisation occurred at a time when the meaning of science was in flux. However, in peripheral states like Paraná, science as knowledge rather than research was still the accepted view in many circles. Until the early 1950s, influential groups accepted the idea that science had nothing to do with research, and this situation changed very slowly. The most remarkable case was the Faculty of Medicine of Curitiba where, as discussed in Chapter Five, paucity of research was presented as evidence of high-quality medical science. Another example that clearly revealed the meaning of science in peripheral communities was the quality standard used to assess research techniques. Commentators usually assess the history of Brazilian science from the perspective of European research, which values originality, social and economic impact, and innovation. The evidence presented here, however, demonstrated that replication of experiments was the gold standard for several

research communities, including those active in Curitiba and Porto Alegre. The highly praised works of both Oscar Palmquist in Curitiba and Outubrino Correa in Porto Alegre were essentially replications of experiments carried out by foreign scientists.

Nationalisation coincided with a cultural shift concerning what was expected from science, but at the same time it enabled a change in the status of academic careers. Scholars, both in Porto Alegre and Curitiba, were aware that some universities were adopting scientific research as part of their programmes, and they wondered how that change would impact their syllabuses and their faculty. One of the important signs of change they observed, both in Brazil and abroad, was the still informal – but effective – availability of full-time positions for academics.⁸³¹ Until 1950 full-time positions were uncommon because universities had been managed either by state governments or private initiatives. Two examples in this thesis reveal the shortcomings of these arrangements. In the case of the Faculty of Agronomy and Veterinary Medicine of Curitiba, run by the state of Paraná, political interference was common and professors worked in an environment marred by constant instability. In Porto Alegre the situation was the opposite; the Faculty of Agronomy and Veterinary Medicine of Porto Alegre existed thanks to private initiative. However, professors there were also encouraged to take on external duties because this would complement their expertise in the areas in which they lectured. Outubrino Correa did so in the IVRDF, whereas Ramiro Gomes da Costa followed suit in the Bureau of Plant Industry. The possibility of a respected full-time academic position encouraged scholars to pursue the advantages of nationalisation and to incorporate research practices into their academic disciplines.

This thesis has also touched upon the issue of weak critical mass, which, traditionally, has been identified by historians as one of the reasons for the slow development of scientific

⁸³¹ Ibid.

research in Brazil during the early twentieth century. Scholars have pointed out that critical mass legitimises knowledge, enables the consolidation of scientific disciplines, and is a precondition for thriving scientific communities and research schools.⁸³² This thesis has demonstrated that although some academics from Porto Alegre were highly active and made their work available for peer scrutiny more frequently than did their counterparts in Curitiba, the absence of productive conflict within both scholarly communities is remarkable. Peers rarely criticised each other in public, and few of the researchers allowed their work to be scrutinised by outsiders. As they were not challenged, professors did not feel compelled to keep up-to-date or to engage with mainstream scientific research. On the contrary, they could create their own local standards of expertise; for example, as indicated above, replication was taken as a sign of expertise. However, this thesis has revealed that academics took advantage of the weak critical mass to maintain their power and influence. While they functioned as both gatekeepers and local experts, above all they protected each other's reputations and controlled the politics of science both inside and outside the universities. Outubrino Correa, for example, could declare that he was using the American Method when, in fact, he had adapted it to local conditions by supressing key features. No one attempted to show the inconsistencies of his interpretation. The establishment of a peer-review culture did not occur overnight. Chair holders continued to select assistants who had to agree with their leader, and conflict within this arrangement was rare during the first five years of nationalisation. Although weak critical mass has been identified as a factor hindering scientific development, it continued to be used for the advantage of individual professors after 1950.

The existence of these similarities confirm the suggestion made in the introduction that nationalisation has been overlooked in the historiography. Scholars would profit from taking

⁸³² Christopher R. Henke and Thomas F. Gieryn, 'Sites of Scientific Practice', in Edward J Hackett et al. (eds.), *The Handbook of Science and Technology Studies* (London, 2008), pp. 353-76. : p. 357. Joseph Ben-David, 'Report on Visit to Brazil', *Ciência Hoje*, 7 (1987), 68-73.

the time to probe more fully into the effects and peculiarities of this important event in the history of higher education in Brazil. In addition, the example of Porto Alegre and Curitiba suggests that peripheral academic science operated somewhat differently from what has been observed in central regions, and this fact may promote a greater geographical awareness in future narratives about the history of Brazilian academic science.

This thesis has also discussed considerable differences between many aspects of research practices identified in Porto Alegre and Curitiba. These differences are important as they raise questions that may be addressed in future studies. For example, solid evidence has suggested that tutors defined research styles that ultimately led to originality and innovation in Porto Alegre. Where a strong influence of external tutors could not be found – which was often the case in Curitiba – original and innovative examples of research programmes are also hard to find. Most of the trainees analysed in Porto Alegre displayed a broader range of interests than those in Curitiba. The case of Sylvio Torres, who influenced a generation of veterinarians in the IVRDF, as explained in Chapter One, is just one of several examples presented in this thesis. However, further explorations of these networks to uncover tutoring cultures is still necessary, and nationalisation is an interesting watershed for studying this aspect. Indeed, after 1950 the circulation of experts at a national level improved with an increase of funds in faculties' budgets. The example of Curitiba is illustrative in this case. The arrival of the geneticist Newton Freire-Maia was only possible because the Faculty of Medicine could afford to hire him, even though the research that Freire-Maia would undertake was completely alien to the main core the Faculty. It is possible to prove that Freire-Maia was linked to researchers from Sao Paulo, but further studies are necessary to map out his and other tutoring connections in more detail. This is, in fact, particularly relevant in the case of the USP. The attention accorded to the creation of the USP by scholars who interpret it as the beginning of a culture of academic science in Brazil has been discussed in the introduction. Genetics research in

Curitiba had indeed been influenced by former students and professors at USP. However, the importance of institutions active in Rio de Janeiro cannot be overlooked. The career of Sylvio Torres in Porto Alegre is a case in point. Most of his links were with researchers in Rio de Janeiro rather than Sao Paulo, and he inaugurated a long-lasting research tradition in Rio Grande do Sul. Studies of these tutoring styles and the networks they were part of would also benefit from paying attention to generational shifts, in particular the influence of the 1940s professors in the reforms carried out in the 1960s, as detailed in Chapters Three and Six.

The study of tutoring styles and network configurations will enable more careful consideration of the question of independence. As explained in different parts of this thesis, the attempt to follow independent research programmes led to original approaches. This was the case of the BCG vaccine replication programme that took place in Porto Alegre, the only setting outside Rio de Janeiro to undertake such a procedure. In Curitiba the opposite occurred. The constant desire to get closer to Sao Paulo led, to a great extent, to low productivity. The noteworthy exception was the tuberculosis specialists who adopted an independent stance and succeeded in establishing a local research programme. In Porto Alegre the desire to be independent had to do with the self-awareness of veterinarians and agronomists as much as with a positivist tradition that encouraged a diligent independence from central government. It is noteworthy that although after 1950 universities were nationalised they continued to enjoy complete autonomy from central government. Although Dutra's 1950 nationalisation programme stated that the president himself would pick the deans of each university, the selection of chair holders was still in the hands of other chair holders. The importance of this arrangement was that a congregation of chair holders decided virtually everything concerning the daily lives of universities. In addition, although there were broad outlines for the curricula, individual chair holders could decide on the content of curricula, reading lists, and so on. Therefore, the same autonomy that fostered scientific research in a place like Porto Alegre

might have continued to exist after 1950. The possibility that this independence was really a vector of scientific development should be studied not only in other faculties but also in other Brazilian states, both before and after nationalisation.

Despite the autonomy of some regions, a more detailed study of intraregional exchanges is necessary. Axes of influence between central regions have been studied, but further analyses are necessary, especially with respect to peripheral states.⁸³³ Interaction with external communities was crucial for defining research approaches in both Curitiba and Porto Alegre. The main particularity of Porto Alegre was that almost all the research programmes studied here were initiated by outsiders who tutored locals on the basics and who, in turn, continued to pursue and expand the original research programmes. In Curitiba, locals usually received training outside the state but, following their return, they failed to maintain an active exchange with the communities in which they trained. Further studies might confirm whether patterns in place before 1950 continued to foster research in peripheral areas of Brazil. Intraregional exchanges may also be studied in terms of literature circulation. A breath-taking amount of work remains to be done to uncover the topics and individuals who stood out in this literature. Such a study may reveal the real geographical reach of research schools in this period. It would be interesting to investigate ways in which styles varied and ideas circulated in different regions.

A focus on external networks could also contribute a more in depth appreciation of their local ramifications. One promising area is the interaction between researchers and the local community. In Porto Alegre, for example, there was a system of accountability not found in Curitiba. This had a clear effect on research programmes: one example of such an effect is found in the case of Ramiro Gomes da Costa and the Department of Entomology, attested in

⁸³³ A. F. C. Silva, 'Ciência nos Cafezais', (unpublished Fiocruz M.Phil. Dissertation 2006), Graciela De Souza Oliver, 'O Papel das escolas superiores de Agricultura na Institucionalização das ciências agrícolas no Brasil, 1930-1950', (unpublished Unicamp Univ. Ph.D. thesis, 2005). : p. 198.

the aftermath of the locust outbreaks. The same approach, however, should be followed for other areas. For example, the ways in which ranchers influenced the research agenda of veterinarians at the Bureau of Animal Industry in Rio Grande do Sul remains unclear. Similarly, the opinion of ranchers in Paraná concerning the IBTR would improve our knowledge of the effective reach of Marcos Enrietti's veterinary policies. In the case of the medical field, a similar situation prevailed. Both in Porto Alegre and Curitiba the patients' voices are rarely heard in historical studies. Further research should investigate the reactions and opinions of the population regarding the research programmes studied here to determine the extent that they may have been interconnected. The ways in which nationalisation affected these systems of accountability are still unclear and deserve more attention. There is ground to argue that in the decades after nationalisation Brazilian higher education was characterised by great insularity. This characteristic suggests that while personnel engaged in public research programmes were under constant public scrutiny, universities offered academics a comfortable shelter. How this relative isolation affected the development of academic science remains unclear. It is also unclear whether this situation of isolation was an accident or the result of a previous configuration where scholars were exposed to constant public scrutiny. This thesis has demonstrated examples of the latter, but further evidence is necessary.

Finally, a better understanding of the configuration of state and private research may further our understanding of developments in academic science. As explored here, particular institutional arrangements led to different research programmes. In Porto Alegre, institutions were more decentralised and had broader agendas, whereas in Curitiba the opposite was true. This created different opportunities for research in some places and hindered its development in others. The case of the IBTR in Curitiba is illustrative in this sense. A massive institution, for local standards, the control of which was centralised in the hands of its director, Marcos Enrietti, survived in spite of the low creativity and poor initiative of some of his staff.

In Rio Grande do Sul the opposite occurred. Torres, the IVRDF's founder, created a research environment where several fronts were tackled simultaneously. It is noteworthy that these research centres were set up to serve markedly different agrarian configurations. In Paraná there were predominantly two staples: coffee and timber. However, this characteristic has never been used by the IBTR as an excuse to concentrate on specific topics. In fact, on several occasions, Enrietti declared that his research centre would tackle issues such as bovine tuberculosis when, in fact, it never did. By selecting different research programmes further studies might reach different conclusions. The IBTR programme on microbiology, for example, was highly successful as opposed to some of the works studied here.⁸³⁴ In terms of institutional configuration it would also be interesting to investigate the ways in which nationalisation redistributed funds. Previous studies have suggested that it drained resources from independent research centres towards nationalised universities. It remains unclear whether this was a local problem or part of a broader pattern.

Although we have tried to highlight future research that the work so far undertaken may suggest, an even more important point must be made concerning the preservation of archives and materials relevant to this period. As explained in the introduction, the initial selection of researchers and professors studied here has been constrained by the scarce availability of primary sources. One point that needs to be strongly emphasised is that the research we have undertaken plays a role in the wider issue of the preservation of records. It is hoped that the narratives about institutions, individuals and scientific programmes we have patiently pieced together will help to highlight the importance of preserving the material evidence on which we based our research. We are convinced that these often-neglected archives have much more to tell us. It is of considerable importance to preserve them for future generations.

⁸³⁴ Maria Elizabeth Lunardi, 'O IBPT: Reprodução e Esgotamento de um Modelo Organizacional de Pesquisa', in Fabiano Ardigó (ed.), *Histórias de Uma Ciência Regional* (Curitiba, 2011), pp. 27-1000.

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The number of pages or folios indicated below refers to the quantity digitised and analysed, which are not necessarily the original quantity of the file or volume.

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(MAC) Minutes of Academic Concils

(Three handwritten notebooks, in chronological order, with numbered pages, titled *Atas das Sessões do Conselho Universitário da Universidade do Paraná followed by the respective initial year*. They appear in the thesis with the followin titles.)

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Atas 1956 : Minutes of the meetings of the academic concil, 1956 to 1962, 404 folios.

Atas 1964 : Minutes of the meetings of the academic concil, 1964 to 1967, 342 folios.

(MDO) Miscelaneous Documents

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Notas Extraídas do diário de viagem do Dr. Carlos F.F. da Costa, (1959).

(FAV-PR) Archives of the Faculty ff Agronomy and Veterinary Medicine of the Federal University of Paraná, Curitiba, Paraná

(DIM) Division of Institutional Memory

(ADM)Administrative Documents

(Report written by Lycio Grein de Castro Velloso, Dean of the Faculty, in 1959, 48 pages)

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Relatório 1946: Report of the Chairs' Activities during the year 1946, 123 folios.

(LDA) Library of the Department of Agriculture and Food Supply, Curitiba, Paraná

(MDO) Miscellaneous Documents

(1 bound volumes of typescript report on agricultural activity in Paraná)

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(PAP) Public Archives of Paraná, Curitiba, Paraná.

(DSA) Division of the Secretary of Agriculture, Industry and Commerce

(IAR) IBTR Annual Reports

(Nine bound volumes titled as follows, typewritten, and in chronological order. Each volume contains the report of each IBTR division regarding the respective year. Not all pages are numbered.)

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(MCM) Minutes of Control Meetings

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Interview

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