CHAPTER FOUR

Laboratory science, laissez-faire economics and modernity

The work of the CPRC to identify new uses for sugar was incorporated into Colonial Office plans to encourage industrial development in Britain's Caribbean colonies. Expanding on its role as a sponsor of research at British universities, the CPRC created a new laboratory for sugar research in Trinidad in 1951 with the goal of inspiring West Indian sugar producers to diversify their interests and establish chemical factories in the Caribbean. A second laboratory was created in Trinidad to carry out research into microbiological problems related to manufacturing, medicine and agriculture. The Colonial Microbiological Research Institute (CMRI) was the only institute for tropical microbiology in the British Colonial Empire. The two laboratories in Trinidad were intended to be a tangible, visible intervention to cultivate industrial development in the British Caribbean at a point when the Colonial Office mostly offered advice. The debates of the 1940s on the best way to encourage economic diversification revealed a tendency amongst British officials to discourage the adoption of measures that were too protectionist in nature or that might incur a financial burden for colonial consumers and British taxpayers. The state funding of scientific research to identify industrial uses for sugar, however, represented a resolution of the issue of how to take some action to encourage industry whilst still adhering to laissez-faire principles. The two laboratories created in Trinidad were described as places of fundamental research, and this designation worked to carefully distinguish actions undertaken by the state in the name of development from activities that were considered the business of the firm. State-funded fundamental research provided basic information about the chemistry of sugar. It was left up to business to exploit this information in order to develop products for the market. Thus, the Trinidad
laboratories were a contribution to a mode of industrial development that was essentially liberal in tenor.

The use of such careful distinctions between the role of the state and the remit of the firm shows that an emphasis on planning and information gathering, and the rise of experts, do not necessarily result in highly authoritarian, centralised and far-reaching systems of state-controlled development. The path to economic development envisaged by the CPRC and the Colonial Office had at its heart the preservation of freedom for both scientists and entrepreneurs to make their own decisions. This development vision for the British West Indies sits in contrast to development schemes where state experts oversaw an attempt at the wholesale remaking of African societies and their economic activities into something susceptible to control and supervision. This extreme reordering of nature and society by the state in the name of development was not a feature of British economic diversification plans for the British Caribbean. In this case, the links between scientific research and economic activity were loosely coordinated. It was a form of development where the initiative in establishing new industry ultimately lay with businessmen who would make judgements about compounds offered up by science.

While representing a more liberal version of development than the large-scale agricultural projects in Britain's African colonies, the interventions that occurred under the aegis of the CPRC were still intended to be highly visible representations of imperial power; concrete manifestations of Britain's commitment to modernising its colonial possessions. A vision of modernity for Trinidad was expressed through the construction of chemical and microbiological laboratories furnished with the most up-to-date equipment and, importantly, which functioned as world centres. The CMRI in particular was expected to be a symbol of nascent Trinidadian modernity as it endowed the island with the ability to participate in the international project of scientific advance, something that a study of strictly local problems would not have done. The general nature of fundamental research in Trinidad – the fact that it investigated basic underlying laws and processes that operated in all locations – was crucial in bestowing this greater prestige. The Colonial Office celebrated the ability of Trinidad's new laboratories to allow the island to participate in the global circulation of knowledge as evidence of Britain's sincerity of purpose in developing and modernising its colonies.

*Industrial development and research into colonial products*

At the very first meeting of the CPRC in January 1943 the committee were told that the Secretary of State sought the establishment of new
processing industries that were located in the colonies themselves as part of the drive towards economic diversification. This goal of encouraging colonial industry became part of the general policy of the CPRC, as stated in their first report:

The low standard of living for Colonial peoples is, at any rate in part, due to the fact that they are almost without exception primary producers and therefore do not enjoy the higher standards which can, generally speaking, be attained only by industrial activity. It must therefore be constantly alive to the possibility of developing techniques whereby Colonial peoples may not only produce primary products but also convert them into secondary products of greater value, both for internal consumption and for export.  

The Colonial Office made clear to the CPRC that government was not expecting to operate new factories itself. The vision of industrial development that was to be employed was one where scientists funded by the council might discover new products or processes and then business would take them up. In the case of the British West Indies, factories were sought that would produce secondary products for export, in contrast to the import-substitution industries that were anticipated for Britain's African colonies. The question for the CPRC was how to persuade manufacturers to take up new compounds discovered through scientific research and establish factories in the British Caribbean.

The relocation of industry producing industrial alcohol from Britain to the British West Indies seemed an obvious way to establish new colonial factories. Before the outbreak of the Second World War, molasses produced in the Caribbean was shipped to Britain by the United Molasses Company (UM) in its fleet of tankers, the Athel Line, before distillation into alcohol by the Distillers Company Ltd (DCL). The relationship between UM and DCL was a close one and they exchanged shares and directors in 1930. DCL controlled over 80 per cent of the supply of alcohol to industry in Britain and its customers converted industrial alcohol into an enormous range of chemical products, including synthetic plastics and fabrics. The large size of the market for industrial alcohol inspired the Director of Research of the CPRC, John Simonsen, to see if British firms such as DCL and ICI might move key processes in which sugar and molasses were converted into alcohol from Britain to the British West Indies.

Simonsen decided to try to persuade officials and economic advisors at the Colonial Office that it was in Britain's best interests to explore the establishment of industry that converted plant products into important chemical intermediates in the colonies. He argued that Britain, unlike the US, did not have access to a large supply of oil that
could be used as a raw material for synthetic manufacturing. The prospect of Britain trailing behind the US in terms of synthetic chemistry had been invoked by the CPRC on more than one occasion, and the idea that the CPRC had a vital function in enabling Britain to catch up provided an important rationale for the work of the committee. Simonsen informed the Colonial Office that in the absence of cheap oil, the British chemical industry would have to rely on plant products such as sugar and cellulose. He claimed that butylene glycol and rubber could be made more cheaply from sugar than from petroleum, and made the bold claim that ‘Most chemists thought that the future of these industries depended on using plant products.’ Government was needed to act ‘as a catalyst’, encouraging companies such as ICI, DCL, and Kemball and Bishop to collaborate in establishing overseas factories based on tropical products. Trinidad was the most likely location for new manufacturing as it had the only oil industry in the empire and therefore it had chemists, engineering facilities, tank storage for molasses, and ‘a certain industrial atmosphere’.

Consultation between the Colonial Office and representatives of Kemball and Bishop and ICI revealed, however, that these two companies had no interest in setting up factories in Trinidad. ICI suggested instead that the Colonial Office might find colonial sugar manufacturers interested in producing industrial alcohol on a large scale in the British West Indies, a suggestion received with enthusiasm by officials. ICI alerted the Colonial Office to one factor that would be important in terms of cost – the duty currently paid on imports of alcohol. Domestically produced alcohol was subject to an inconvenience allowance that made alcohol manufactured from molasses in Britain cheaper than coal or oil as a raw material for firms such as ICI. In January 1945, however, Customs and Excise informed the Colonial Office in a confidential letter that the inconvenience allowance was going to be withdrawn later that year. Since the relative low cost of domestic alcohol had previously acted as a disincentive to colonial production, this was news that appeared to improve the prospects of an industry based in the British West Indies that produced alcohol for import to the UK.

The optimism of officials was suddenly punctured, however, with the revelation in December 1945 that ICI had developed a cheap process for producing synthetic alcohol from ethylene. Ethylene gases were a product of oil, and this new process signalled a move by ICI towards the use of oil as a starting compound for manufacturing its synthetic products. This news threatened to make the colonial production of alcohol by fermentation of molasses or sugar entirely redundant. Ethylene from oil was well established as a source of alcohol in the
US, produced by companies such as the Carbide & Carbon Chemicals Corporation, a subsidiary of Union Carbide. Ethylene had not been adopted by British chemical companies before the Second World War because the inconvenience allowance made alcohol from molasses a cheaper starting material.11

A meeting with Michael Kielberg, Chairman of UM, in January 1946 did not give much further encouragement to the idea that a Trinidad-based alcohol industry was feasible. Kielberg expressed the view that a colonial alcohol industry would struggle to be economic. The distilleries in the region would be small, and bringing molasses from other islands to Trinidad would be costly, even more so when losses due to evaporation were included. Kielberg told the Colonial Office that the cost of transporting molasses from other Caribbean colonies to Trinidad during the war had been as much as the freight from Trinidad to Britain. In addition, UM had found that alcohol shipped to Britain needed to be re-distilled on arrival, however clean the tanker. Sir William Rook, the Director of Sugar at the Ministry of Food, described Kielberg to the Colonial Office as trustworthy, discreet and reliable, and as far as many officials were concerned, his opinion on the unlikely future for colonial alcohol for export brought the matter to an end.12

Simonsen failed to persuade British chemical firms to create a fermentation industry based in the West Indies, and the fact that ICI was now seriously exploring oil as a starting material raised questions about the future prospects of existing companies that produced industrial alcohol from molasses. Simonsen was reluctant, however, to abandon the idea of new alcohol plant in the colonies altogether, criticising what he described as the ‘defeatist tone’ of the Colonial Office. He argued that establishment of an alcohol industry would create a nucleus for other chemical manufacturing, and that rather than assessing its value to UK chemical firms, industrial alcohol production needed to be valued in terms of its contribution to the establishment of a range of new colonial industries.13 Whilst conversations had been under way in London with British chemical companies, the CPRC had been exploring an alternative route to industrial diversification in the British West Indies that focused on new lines of production by Caribbean sugar manufacturers. In this vision of industrial development, the British West Indies sugar producers would collectively fund research into finding industrial uses for sugar cane and its by-products so they could diversify their products. The next step was to persuade sugar manufacturers that operated in the British West Indies to participate in such a scheme.
Simonsen and Robert Robinson went in person to a meeting of sugar manufacturers in Barbados in August 1944 in order to try to persuade them to invest in sugar research as the first step towards diversifying their activities. The meeting was part of a longer tour that included visits to Canada and the US as well as the Caribbean. Robinson wished to meet with Trinidad Leaseholds, the producers of oil in Trinidad, to discuss his proposed research into chemical products derived from petroleum. This was a field that Robinson claimed it was necessary for the CPRC to fund so Britain could keep up with work into petroleum products that was under way in the United States. Robinson also had reason to visit the US as he was engaged in the development of penicillin and the trip afforded him the opportunity to meet with American workers based at the Northern Regional Laboratory of the Bureau of Agriculture at Peoria, Illinois, who were working on the large-scale production of the drug. On their return, Simonsen and Robinson reported to the CPRC their admiration of the work at Peoria on large-scale fermentation processes, an area where yet again it was said Britain lagged behind the US.

The group also visited the Imperial College of Tropical Agriculture (ICTA), where a Department of Sugar Technology had operated since 1924. Scientists based at the ICTA in Trinidad were unable to return home during the war and the Colonial Office believed they would appreciate a visit from academic colleagues from Britain. The ICTA in central Trinidad was one of only two major research centres in agriculture in existence in the Colonial Empire before the Second World War (the other was Amani in Tanganyika). Apart from carrying out research into soils, pests and the improvement of banana and cocoa, from 1927 the college had the important function of training all cadets entering the Colonial Agricultural Service. The ICTA had suffered from a lack of funding during the Great Depression, and staffing levels and the quality of equipment had further declined during the war. Simonsen and Robinson were not impressed by conditions at the college when they arrived in 1944. They reported back to London that researchers were overburdened by teaching and the laboratories were so inadequate that pairs of students worked with less room ‘than would be given to a single boy in a British Secondary School’. The visitors noted in particular that the equipment of the model sugar factory in the Department of Sugar Technology was very old and needed renewal. This department trained most of the sugar chemists who worked in the firms that operated in the British West Indies.
On leaving Trinidad, Simonsen, Frank Stockdale and Robinson went to Barbados to meet with the British West Indies Sugar Association (BWISA) in order to try to persuade sugar manufacturers to make a financial contribution to scientific research into sugar. The BWISA was formed in 1942 by the directors of the associations of sugar producers in Antigua, Barbados, British Guiana, Jamaica, St Kitts, St Lucia and Trinidad. Its main purpose was to lobby the British government on issues such as price agreements and quotas. In his speech to the sugar manufacturers at the meeting in August 1944, Simonsen described how the CPRC had been formed under the 1940 CDW Act and how it currently supported research into tropical products in university laboratories in Britain. He told his audience that the CPRC intended ‘to raise the standard of living within the various colonies and to increase their prosperity’ through research into the use of sugar as a raw material for the chemical industry. Sugar, he said, was ‘the purest organic chemical known’. Robinson then suggested that BWISA could create a sugar research association on the lines of the research associations that had been created under the DSIR, with the British government providing 50 per cent of the funding for research from the Research Fund of the 1940 CDW Act.

The DSIR had started a research association scheme (referred to as the Million Scheme) in 1917 with the aim of encouraging firms in Britain to invest in scientific research. The expectation was that participation in the research association scheme would demonstrate to industry the value of scientific research, and firms would then independently support this work, maybe through the formation of their own laboratory. From the original Million Scheme twenty cooperative research associations were in operation by 1932, including the British Photographic Research Association, the British Portland Cement Research Association and the British Research Association for Cocoa, Chocolate, Sugar, Confectionery and Jam Trades, and the scheme was subsequently expanded so that forty associations were in existence by 1944. Firms in a research association pooled funds to support research in a university or institute and government contributed a pound for every pound from industry. The results of research were freely available to all the participating firms. Simonsen hoped that a British West Indies Sugar Research Association comprised of all the major sugar companies in the British Caribbean would be able to fund, on a 50:50 basis with the Colonial Office, a laboratory specially created to research industrial uses of sugar and located at the ICTA. It was put to the BWISA that scientific research into industrial uses of sugar and its by-products, ‘consumption research’, was a relatively neglected area in comparison to sugar cane breeding or the improvement of the milling process.
The BWISA rejected the suggestion that they collaborate for the funding of research into new uses for sugar on the basis that if they were seen to be allocating money for this purpose, this would prompt sugar workers on the estates to ask for higher wages. The unwillingness of the industry to make a new financial commitment was also due to uncertainty about the future. The British government had pledged to purchase the entire exportable surplus of sugar from the West Indies until 1946, but it was not clear what would happen after this. Quotas and prices had not been agreed and the International Sugar Agreement that had previously brought some stability to the price of sugar had been suspended with the outbreak of the war. The BWISA took the opportunity to argue that the price paid by Britain for colonial sugar was too low and made it impossible for the manufacturers to contemplate additional expenditure.

The Colonial Office persisted with their proposals and sent a detailed report to the BWISA in October 1945 that attempted to explain the commercial potential of the new substances that had been discovered in Haworth’s Birmingham laboratory. These included levulinic acid, which could be converted into an anti-freeze, and varnishes, plastics and sulphonamide drugs. The Colonial Office warned that as the researchers at Birmingham discovered new products, there was always the danger that the development of these would be taken up by foreign firms. The creation of a sugar research association would ensure that British industry would be the main beneficiaries from the discoveries of British science. In addition, if sugar manufacturers diversified the uses to which sugar could be put this would afford some protection from any future uncertainties in the world market. Eventually, the BWISA agreed to a cess of 4d per ton for research (approximately £10,000 a year), with another £10,000 coming from the Research Fund of the 1940 CDW Act. The money was used to establish a sugar research scheme under Leslie Wiggins, inaugurated on 1 September 1947. Research work began in July 1948 at Birmingham University before the scheme was transferred to Trinidad to work in new facilities that had been built at the ICTA.

The Sugar Technology Laboratory (STL) was formally opened at the Silver Jubilee celebrations of the ICTA on Saturday 17 March 1951. The Francis Watts Laboratory, named after the first principal of ICTA, comprised a single-storey building in the grounds of ICTA with several laboratories and housing that could accommodate around twenty-six staff. Attached to the laboratories was a miniature factory for pilot trials of new products: the Experimental Sugar Factory. The capital for the building of these facilities came from CDW funds. Over 500 guests were invited to attend the jubilee celebrations of the ICTA, including
previous principals of the college, the Governor of Trinidad, Sir Hubert Rance, Alan Burns of the Trusteeship Council of the UN, and the Bishop of Port-of-Spain. The Trinidad Guardian reported extensively on the celebrations, including coverage of the new sugar scheme.28

Simonsen read a message from Maurice Hankey, chair of the CPRC, at the opening ceremony that placed the new laboratory firmly in the context of wider aspirations for industrial development in the Caribbean. Hankey's text told the audience that the outcome of the work at the laboratory would be new industries in the West Indies that used sugar as their raw material so that 'based upon fundamental research and upon its application, and given reasonably stable political and economic conditions, we can anticipate an increase to prosperity in the West Indies.'29 In his own speech, Simonsen explained that the new laboratory was modelled on those administered through the Research Association Scheme of the DSIR in Britain. Like these laboratories, the Francis Watts Laboratory was not intended to displace the day-to-day testing and ad hoc investigations that sugar firms did for themselves in their works laboratories. Instead,
the Association’s laboratory will only investigate major problems of interest to the whole industry. I will venture to suggest that this new laboratory will have two main functions (a) to carry out fundamental research on the utilisation of sugar and the by-products of the sugar industry, and (b) when desirable to carry out such investigations through the pilot plant stage. If these investigations show that the manufacture is likely to be economic and that a market for the product can be found then it will be for the Sugar Industry itself to undertake large scale production.30

By describing the work of the new laboratory as restricted to the investigation of only ‘major problems of interest to the whole industry’, Simonsen carefully demarcated the nature of its research. It would examine general issues, common to all firms, and not the problems specific to any individual business. This general research into the chemical utilisation of sugar and its by-products was labelled ‘fundamental research’. By stating that the business of the research association was to sponsor fundamental research into major issues only, it was possible to avoid the suggestion that state funds for research would end up lining the pockets of a single firm. As fundamental research into sugar chemistry proceeded at ICTA, there would still be plenty of scope for investigations that dealt with issues specific to an individual company.

Simonsen’s description of the function of the Francis Watts Laboratory closely resembled the words used by the DSIR when describing its own research associations that operated in Britain. In its early annual reports the DSIR had explained that there was more than one type of scientific activity that a firm could be involved in. While a business might need to undertake investigations of certain everyday problems in its works laboratory, there was also a need for study of the more general underlying issues that were common to all the businesses in the sector. The DSIR stated that this latter species of problem could be addressed by ‘fundamental research’.31 It was appropriate for government to make a contribution to general investigations or fundamental research as this would potentially benefit an entire sector of industry. The investigation of issues that were not broad or basic enough to be termed ‘fundamental research’ but were specific to the processes or output of one firm should not benefit from public funds. Government needed to avoid the implication that it favoured any individual company.

In the first half of the 1940s, officials in the Economics Department and members of CEAC such as W. Arthur Lewis had been engaged in fierce debate about the extent and the manner in which government should intervene to stimulate industrial development. For officials at the Colonial Office, using government funds for fundamental research
into the chemistry of sugar provided an acceptable route for state intervention. In the public declarations that described the work of the sugar laboratory, the use of the term ‘fundamental research’ provided a rationale for state contributions to industrial research as a way of encouraging industrial progress. This rationale carefully delineated government funding of industrial research so that the involvement of the state in manufacturing did not compromise the tenets of liberal political economy.

Wiggins and his team pursued a number of lines of enquiry at the new laboratory in the grounds of the ICTA. These included the first in-depth study to identify the chemical constituents of cane juice and the production of itaconic acid by cultures of a fungus, *Aspergillus terreus*, grown on a sugar medium. Itaconic acid could be used to make a Perspex-like plastic material, and investigations were done to find an economically viable method of large-scale production using the submerged culture methods that had yielded penicillin at Peoria in the USA. In addition, the team of scientists in Trinidad explored production methods for compounds first developed at Birmingham University, such as furfural and levulinic acid. These compounds were versatile chemical intermediates that could be turned into a very large number of different products and therefore had the potential to be highly profitable. Furfural was used in the manufacture of nylon. Levulinic acid could be used to manufacture an effective anti-freeze and made a good carrier of calcium for use in medicine. In 1955 Wiggins reported that the laboratory was building a pilot plant with funds from an American chemical company involved in the plastics industry. The Argus Chemical Corporation was looking to produce levulinic acid on a commercial scale using a process developed by Wiggins and his team at the laboratory. The firm came to an agreement with the sugar laboratory that on payment it would have the right to work the patent taken out by the BWISA in the USA while the BWISA retained the rights for the sterling area.

Much of the work done by the STL had a clear commercial orientation and Wiggins’ team took out a number of patents, receiving advice on these from the National Research and Development Corporation during a visit to Britain in 1951. The STL investigated by-products of sugar processing such as sugar cane wax, molasses-based cattle feed, and the manufacturing of paper from bagasse, the fibrous part of the cane that was left after crushing had squeezed out the sugar-containing cane juice. Traditionally this waste product was used as a fuel in the estate factories for boiling sugar cane juice. The product that seemed to have the greatest commercial potential was sugar cane wax. Sugar cane wax could be used as a polish and was able to compete with
carnauba wax in terms of price. The first commercial factory producing wax from cane had been established in Durban, South Africa, in 1916, and a factory making wax also operated in Australia. Interest in the development of sugar cane wax had been high in the US during the war because of shortages of other waxes, and research had been done in the Southern Regional Research Laboratory using Louisiana canes. The laboratory in Trinidad surveyed the yield of wax from sugar cane from across the British West Indies and found that Barbados cane had the highest wax content. By 1953, a factory had been established in Barbados producing sugar cane wax that received government support under the Pioneer Industries Legislation of Barbados, which gave tax relief to new business. The reports of the STL told how the wax was being sold locally in Trinidad and was used on floors and furniture at the San Fernando Hospital.

The focus on the development of compounds ready for the market shows clearly that the emphasis on ‘fundamental research’ in the original discussions of the CPRC and at the opening of the Trinidad laboratory did not mean that applied science and practical issues were to be neglected. Describing the work of the laboratory as ‘fundamental research’ allowed Wiggins the autonomy to pursue long-term and in-depth studies in organic chemistry if he wished. It did not restrict him to this work; it gave him the freedom to choose the sort of research his team would undertake with scope for more exploratory study if necessary, and in practice, the work of the Francis Watts Laboratory ranged from investigation of general phenomena to the resolution of manufacturing issues using pilot plant trials.

Apart from research, Wiggins and his team ran a three-year Diploma (DICTA) and a two-year postgraduate Associateship in Sugar Technology (AICTA). The Diploma recruited four or five students each year from sugar companies such as Booker Brothers Ltd. The AICTA attracted students from further afield, including two from Burma in 1956. It is not at all clear that these courses at the ICTA attracted any students born in the Caribbean. W. Arthur Lewis showed a great deal of disdain for the college, saying that ICTA had gone out of its way to avoid appointing British Caribbean scientists to senior posts and that students from the British West Indian colonies avoided going there as it had a reputation for racial prejudice. In his words, it was ‘a little piece of England in Trinidad’ whose primary function was to train colonial officers.34 In the case of sugar research, Wiggins’ department was mainly involved in training technical staff for the European-owned sugar companies.

The annual reports of the STL celebrated the incorporation of the work of the institute into an international network of researchers and
organisations concerned with the future utilisation of sugar. Wiggins had the task of advertising and promoting the work done by his team. In addition to his research work, he wrote articles on sugar cane as an alternative to coal and oil in journals such as Chemistry and Industry, and delivered lectures in Britain, including a talk to the Chemical Society at the University of Birmingham on ‘Recent Advances in Carbohydrate Chemistry’ in 1949. The Sugar Foundation of New York, a trade association for American sugar manufacturers, awarded a grant of $15,000 to Wiggins and his team after a visit to the ICTA by 150 members of the International Society of Sugar Cane Technologists. The Foundation went on to provide funds for a fellowship to study the reaction of molasses with ammonia with the aim of producing animal feed. A second grant to appoint a Research Fellow came from the Hawaiian Sugar Planters Association. This evidence of the international status of the laboratory was frequently emphasised in its annual reports. Wiggins wrote in 1953, ‘It is gratifying to note that the sugar industry in other parts of the world has looked upon our efforts with favour and there is little doubt that the BWI Sugar Research Scheme has won a
place in the forefront of the Sugar Research Institutes of the World.\(^{57}\)

What was missing was any mention of the place of the laboratory with regard to the future of Trinidad. As with many of the forty other colonial research institutions that were created using funds from the 1940 and 1945 CDW Acts, the STL did not report to the colonial government in Trinidad but liaised directly with the Colonial Office, who oversaw appointments, grants and the research programme of the institute. Accordingly, the reports of the laboratory do not note any meetings between Wiggins and officers based in Trinidad who worked as part of the colonial administration, either in the central secretariat or officers from the agricultural or medical departments. The sugar laboratory was not expected to deal with issues that arose merely at the level of the individual colony, but instead its reach was regional and international. In the early 1940s the creation of new research bodies that had such a wide remit was considered essential to raise the quality of scientific research that occurred across the Colonial Empire. The STL afforded its scientists the chance to contribute to scientific understandings of the chemistry of sugar at the international level. This raised the prestige of the laboratory and was said to be important for recruiting the highest calibre scientists. In addition, the fact that the Colonial Office could describe Britain as a recognised world leader in the field of carbohydrate research was considered evidence of the extent of Britain’s commitment to improving colonial conditions through technical interventions after 1940.

The first beneficiaries of the work done by Wiggins and his team were intended to be British or American firms. It fell to Wiggins to publicise the results of the research done at the laboratory to industry. This was a major task for a scientist who oversaw a research team of around twenty-six scientists and a programme of teaching. The annual reports published by the STL show that apart from giving lectures in Britain and writing articles, Wiggins met with representatives of British Caribbean sugar firms every year. He visited sugar estates, touring every factory in Trinidad during the 1953 crop, for example, and senior staff from companies such as Tate & Lyle visited the laboratory in turn.\(^{38}\) Wiggins also spoke at meetings of sugar technologists beyond the British territories, going to Puerto Rico in November 1951 for a meeting with engineers, chemists and factory managers employed by Caribbean sugar manufacturers. In addition, the sugar companies Henckell du Buisson & Co Ltd and Booker Brothers seconded chemical engineers to work at the laboratory in 1954 and 1955. The staff of the Francis Watts Laboratory also had contacts with British chemical firms by virtue of the fact that some of its researchers had come to work there from industry – a physical chemist, W. S. Wise, joined
from DCL in 1952. Beyond this, the Caribbean Commission helped to publicise the industrial applications of the work at ICTA, producing a lengthy document on the potential to create new Caribbean industry based on sugar products, *The Industrial Utilisation of Sugar-Cane By-Products*. This was an extensive and detailed guide to all the possible products that could be manufactured from sugar cane, prepared by a British consultant sugar technologist, Walter Scott. Scott celebrated the encouraging results coming out of Wiggins’ laboratory in his introduction and recommended that any industrialist seeking to set up a business in the Caribbean would benefit from consulting the laboratory at ICTA. Scott’s conclusion was there was a great deal of potential for establishing new factories in the Caribbean that used its raw materials to produce manufactured goods for export.39

If the arrangements created after 1940 were introduced because they were good for research and Britain’s reputation, the mechanisms by which they were good for development were not well elaborated. A comment on research into levulinic acid described the anticipated relationship between research and industrial development as being one where ‘There can be no doubt ... that when projects reach such a stage as this and reasonable profits can be foreseen from their pursuit the sugar industry, either alone or in collaboration with other industries, will come forward to finance them’.40 In other words, if Wiggins ensured that information was available on new products, then business would take over. The responsibility for decisions around establishing new industry did not lie with the scientific staff at ICTA, or the colonial government. There was only one case in which direct government support for new sugar-based industry was forthcoming: the sugar cane wax factory that received modest support through the Barbados Pioneer Industries Legislation of 1951. The provision of such encouragement was entirely at the discretion of individual British Caribbean governments, and neither the Colonial Office nor members of the BWISA appear to have lobbied for any support for new factories. There is no evidence that Wiggins ever met with members of the legislature in Trinidad to discuss the provision of incentives for sugar-based industry.

In its mode of operation, the STL in Trinidad conformed to the principles set out in the early 1940s by the new research committees at the Colonial Office. The laboratory operated autonomously from the Trinidian legislature and communicated directly with the CPRC in London on its research programme. Research was under the control of the scientists who worked in the laboratory, who were free to pursue their investigations along their preferred lines. Once results were publicised, it was left to business to decide if it would exploit any new
discoveries. What was absent was any formal dialogue with the government of Trinidad or any other British Caribbean legislature about the place of sugar research in the development plans that governments in the region conceived after 1945. This was no mere oversight but was the outcome of decisions that had been made during the early 1940s at the Colonial Office in which great importance was attached to the idea that the quality of scientific research in the colonies could only be raised if scientific investigators were able to operate independently from colonial administrations. This arrangement, in which autonomy and therefore professional status was guaranteed, was said to be the only way to engage a scientist of the calibre of Wiggins, who had come to Trinidad from the University of Birmingham. The key value that informed the work of the new STL and its place in colonial development was ‘freedom’: the need to protect both the autonomy of scientists and also the operation of a free market without excessive government interference.

The Colonial Microbiological Research Institute

The CPRC was responsible for the creation of a second laboratory in Trinidad named the Colonial Microbiological Research Institute (CMRI). This institute was established to deal with the problem of finding profitable uses for surplus sugar in fermentation and to aid colonial industrialisation through work in microbiology. The CMRI developed food yeast, surveyed the microbes in tropical soils for antibiotic effects, looked for a way to tackle Panama Disease in bananas and worked to improve the industrial processes of cocoa fermentation and rum distillation. The significance of the creation of the first microbiological research centre in the tropical British Empire was exhorted by Hankey in his speech at the opening of the CMRI on 5 July 1948, in articles in the Trinidad Guardian and also by Simonsen in a BBC broadcast in the spring of 1948. Three main points were made in the publicity surrounding the opening of the new laboratory. One was the vital role that microbiology had come to play in health, and reference was almost always made to the discovery of penicillin. Secondly, there was emphasis on the importance of microbiology to industry, especially the brewing industries, but also agricultural industries, since microbiology could both tackle pests and improve fermentation processes.41 The third point was that research into microbiology was an area where Britain had some ground to make up. Simonsen commented on the radio, ‘the recent discovery of the antibiotics has indicated only too clearly this gap in our educational system’.42 Hankey told guests at the opening of the institute that ‘we are striking out in a new line, in which
British scientific research has lagged behind the needs of our time’ and the laboratory ‘fills a gap in the national equipment’. Britain’s capacity to undertake microbiological research was of significance to Hankey as he was also chair of the Biological Research Advisory Board that oversaw the new programme of microbiological work at Porton Down, the site of Britain’s biological warfare research programme.

To an even greater extent than the Francis Watts Laboratory, the CMRI was actively fashioned as an important symbol of the progressive and modernising temper of British colonial policy after 1940. As well as being described as a unique venture for Britain, filling a gap in British science, the CMRI was also said to place Trinidad firmly ‘on the scientific map’. This elevation of Trinidad to an international centre for science was possible as the CMRI was said to undertake fundamental research into general issues that went beyond the needs of Trinidad to those of the Colonial Empire more widely; it was research into universal phenomena and problems. If the CMRI signalled Britain’s commitment to developing and modernising Trinidad then the island’s nascent modernity rested on the ability of the laboratory’s work to transcend its locality and participate in the global circulation of knowledge.

The idea of funding research into microbiology had arisen on a number of occasions before it was discussed at the 7th meeting of the CPRC in 1944. At this meeting, members of the CPRC were given a list of new factory enterprises in the colonies for manufacturing soap, margarine and food yeast. Food yeast was derived from a specially selected variety of yeast grown on molasses and then processed into a pale yellow powder that could be incorporated into various foodstuffs. The British government had high hopes for food yeast in the Caribbean as it provided a source of protein rich in vitamin B that could be effective in tackling the nutritional problems of the region. A government-run Colonial Food Yeast Company operated in Jamaica based on a culture that originated at the DSIR’s Chemical Research Laboratory at Teddington, through the work of the microbiologist Dr A. C. Thaysen. Similar factories based on samples of the Teddington culture were expected for Barbados, British Guiana and Trinidad.

Thaysen responded positively to a proposal from the CPRC that he pursue his research into food yeast in a new Caribbean institute built using CDW funds. Between April and July 1945 Thaysen was sent out to visit the West Indies, the US and Canada to consider the best location for the laboratory and to contact American scientists working on fermentation and microbiological problems. Thaysen visited Peoria and saw the equipment that had been developed there for the large-scale
production of penicillin. He noted in his report how the laboratory was using *aspergillus terreus* to make itaconic acid as a basis for colourless plastics, something that Wiggins and his team took up as a research problem. After Peoria, Thaysen went to St Louis and met with the directors of the brewing firm Anhauser-Busch. The company was at the forefront of explorations into food yeast in the US and expressed much interest in the Jamaica food yeast factory. Thaysen reported back to the CPRC that the work at Anhauser-Busch was less advanced than it was in Jamaica but noted the popularity of the yeast amongst workers at the brewing firm’s plant.

In a well organised domestic science laboratory, Messrs Anhauser-Busch are studying the incorporation of their yeast preparation into typical American dishes which are made available to the staff of the breweries. The writer was told that such dishes are in great demand.  

Thaysen also went to Rutgers University and met with Selman Waksman, who showed him a preparation of the antibiotic streptomycin derived from the actinomyces genus of soil bacteria. Thaysen speculated on the possibilities of surveying tropical soils to find antibacterial agents that could be used to tackle economically important agricultural diseases such as Panama Disease that blighted bananas.

Thaysen’s report on his visit to Trinidad is interesting in revealing his concern that the projected CMRI should be located in a prominent place. As Simonsen and Robinson had before him, Thaysen expressed misgivings about the ICTA and was not prepared to see his institute located in its grounds at St Augustine in central Trinidad. The agriculturist A. J. Wakefield wrote to Sir Kenneth Blackburne, Secretary of the CDW Org, on Thaysen’s rejection of ICTA as a suitable site for the CMRI, ‘This causes me no surprise. In this connection you are aware of all that I have done to try to get the authorities to see how shockingly bad things are at the college.’ Thaysen’s preference was for the CMRI to be in the capital, Port-of-Spain. Sir Rupert Briercliffe, Medical Advisor to CDW Org, reported to the Colonial Office after a meeting with Thaysen, ‘he wished to have his laboratory sited centrally and conspicuously so as to show people that colonial research means something’. Thaysen engaged the services of the Bristol-based firm of architects W. H. Watkins and Partners, who had offices in Trinidad, and commissioned them to design his laboratory in the St Clair district of Port-of-Spain. The modernist building they designed was subsequently featured in *The Builder* magazine. The laboratory was formally opened in 1948 but Thaysen arrived in Trinidad in January 1947 with his family and assistant, Muriel Morris, to begin work in temporary accommodation.
The CPRC reported that Trinidad had been chosen as the location for a new laboratory that would investigate microbiology and fermentation in a tropical environment as it provided a good supply of raw materials in the form of sugar and it was relatively close to Peoria, where similar work was done, and so exchange of findings with scientists in the US could occur. There was some debate, however, as to the extent to which the government of Trinidad would have oversight of the laboratory. Simonsen informed Thaysen in 1947 that whilst a grant from the Research Fund of the 1945 CDW Act would fund the CMRI, it might be sensible to devolve administration of the money to the Trinidadian government so they paid the salaries of Thaysen and his staff. The advantage of this arrangement was that the workers of the CMRI would pay local Trinidadian rates of income tax rather than UK rates. In this arrangement a member of the Trinidadian legislature would be nominated to attend meetings of the CMRI.

The suggestion that administration of the CMRI might be done by the Trinidadian government prompted a furious response from Thaysen, who described it as ‘a grave mistake that no amount of immediate saving could compensate for’. Thaysen continued in his response to Simonsen:

in your address to the Chemical section of the British Association, you referred to the plans for the future of our institute and very aptly pointed out that ‘it is intended that this research institute should be a centre for microbiological research not only for the Colonies but for the Commonwealth as a whole’.

Thaysen argued that this greater international standing of the CMRI would be compromised if the laboratory was attached to the Trinidadian government. So far, he said,

I have been recognised as an outsider, working, not under instructions from the local authorities, but on behalf of the Colonial Office which in starting our institute has had the interest at heart, not only of Trinidad or the West Indies, but the whole Tropical Empire.

Aside from compromising the imperial standing of the CMRI by bringing it under local control, Thaysen also had little confidence in the competence of the Trinidad authorities, stating that administration by the government might mean the laboratory became the victim of ‘inertia in official quarters’, including slow or absent communications. It seems likely that Thaysen feared his freedom of action in setting out the research agenda of the CMRI would be compromised if the Trinidadian government was allowed to have a say. As with the Francis Watts Laboratory headed by Wiggins, the scientific
independence of Thaysen was something that the Colonial Office believed it was important to protect. Charles Carstairs, Head of the Research Department of the Colonial Office, advised that it was wise to keep the CMRI ‘a centrally administered show’. He made a comparison with the East African Agricultural Research Institute at Amani in Tanganyika, one of Britain’s oldest research institutions. Carstairs claimed that Amani had been unable to achieve its intended stature as a regional centre for agricultural research after it became attached to the Tanganyikan government.51

After 1940, officials were particularly concerned with the status and meanings afforded to research work in the colonies. New, high-profile laboratories, staffed by world-leading investigators, were intended to be evidence of Britain’s commitment to solving colonial problems, a rebuke to those who might criticise Britain’s colonial record. Questions were raised, however, about how laboratories created along the lines of the CMRI might be perceived by the inhabitants of Britain’s colonies. Harold Tempany, the Colonial Office’s Agricultural Advisor, worried whether ‘the public in the colonies themselves would not feel that same sense of ownership and responsibility for what was going on, even though the quality of research was somewhat higher’.52 The utility and relevance of research work for the colony that hosted a new institution was considered less important, however, than the creation of stature. This demonstrates the extent of official concern with the public perception of British government actions after 1945, confirming the point made by historians that the CDW Acts were considered to have an important propaganda purpose in improving Britain’s reputation as a colonial power. Highly visible British interventions to modernise and improve economic conditions were particularly necessary in the British West Indies, which had been the site of riots in the 1930s and a region where British imperialism was most open to scrutiny by America. Aside from a desire to see new laboratories sited in a prominent location, concern with image is also apparent in a comment made by Gerald Clauson of the Colonial Office at a meeting of the CPRC in 1946. Each year, the CPRC provided an annual report of its activities, published by HMSO and available for purchase. Clauson was recorded as asking for the forthcoming CPRC report to be rewritten: ‘Sir Gerald Clauson was of the opinion that the language in which the report was drafted was that of a well-educated English man and would not be intelligible to the average colonial reader; he asked that it might be rewritten in a simpler style.’53 One function of the annual report, then, was to promote the value and achievements of scientific research to readers in the colonies themselves.
Thaysen and the CPRC worked hard to shape the image of the CMRI through the Trinidadian press. The institute was the subject of numerous articles and reports during the 1940s and 1950s in Trinidad’s daily newspaper, the *Trinidad Guardian*. In the publicity surrounding the formation and opening of the CMRI, the international standing of the institute was emphasised over and over again. On his arrival in 1947, Thaysen informed the *Trinidad Guardian* that the CMRI was not purely a Trinidadian institute but would be serving the empire. In 1948 Simonsen informed the newspaper that no individual colonial government was paying for the institute, but it ‘was a completely British Government venture’ as a way of signalling that the reach of the laboratory went beyond Trinidad. In one of a number of articles to mark the opening of the CMRI titled ‘Micro institute to be world centre’, readers were told how the CMRI would ‘put Trinidad on the scientific map’ and Thaysen was quoted as saying, ‘No effort has been spared, in fact, to make the Institute worthy of British science and of its position as a world research centre.’ The writer of the article then followed this point with the declaration

> The Trinidad Institute is we believe the only one of its kind in the British Commonwealth and one of the few such institutions to be found anywhere in the world. Its importance is attested by the number of distinguished scientists and other guests who have assembled for the opening and this Colony is fortunate to have been chosen as its home.

The message was clear – the function of the laboratory was to tackle microbiological problems of international importance and the institute was therefore of great prestige. The benefits accruing to Trinidad might not be the direct ones, of a laboratory that undertook work intimately tied to the development of the island, instead they would come from being host to a world centre for scientific research.

Apart from the source of its funding, evidence that the CMRI was a world centre for tropical microbiology was supposedly found in the eminent scientists that came to work at the laboratory from overseas. Thaysen was described in the *Trinidad Guardian* as a ‘scientist of the top rank’, and the arrival of new colleagues W. C. Forsyth from the Macaulay Soil Research Institute in Aberdeen and J. E. Rombouts from the Netherlands both received coverage in the Trinidadian press. Whilst describing such individuals as ‘top-grade staff’, the newspaper also raised the question of whether there would room for West Indian staff at the institute on the basis that ‘the chance to share in work of such an important nature should not be missed by talented and suitably equipped young men and women in the Caribbean’.

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Thaysen’s response to the enquiry about employing local staff was, ‘you must remember that the institute to be formed is not purely a Trinidadian, but an Imperial affair. West Indians will be as welcome as anyone else.’ In other words, there might be room for Caribbean staff but since the CMRI was a world centre, scientists from the West Indies would not be prioritised over workers from elsewhere. Yet again, the CMRI was not primarily engaged with the development of Trinidad or other British Caribbean colonies. The focus was on the symbolic value of the research institution as an emblem of Britain’s modernising agenda.

While the CMRI was celebrated as a laboratory that aimed to undertake ‘fundamental research in microbiology’, it was also concerned with improving industrial processes. As with the work of the STL, the public emphasis on fundamental research did not preclude more practical enquiries. The programme of work determined by Thaysen began with research into cocoa bean fermentation, the disposal of rum distillery waste and the identification of antibiotics from soil organisms. In a note of November 1951, Thaysen wrote that there had previously been investigations into the microflora of temperate regions but not those of tropical ones, except the pathogenic ones. Referring to streptomycin, Thaysen noted the need for the systematic study of tropical soil micro-organisms, and he discovered one organism early on that was found to produce an antifungal substance that the CMRI subsequently patented under the name of comirin. In addition to this work, Thaysen continued his research into food yeast for which he attempted to secure funds from the Colonial Food Yeast Company Ltd. The CMRI was also chosen to be a tropical centre for the housing of a reference set of non-pathogenic bacterial cultures available to industry and academia, named the Hankey collection. Samples of the cultures held in the collection were sent out on request to researchers around the world. As with the STL, the early years of the work of the CMRI were optimistic ones. In his role as President of the Royal Society, Robert Robinson said of the institute that

it is destined, not only to play an important part in the development of Trinidad and the Caribbean, but also to give an example to the rest of the world. It will surely make a significant contribution to science and we hope to also to human happiness and prosperity.

Conclusion

One goal of the CPRC was to see research into tropical commodities lead to the creation of new industry in the colonies themselves. When
it became clear that ICI and other British chemical firms were unlikely to set up new factories in the British Caribbean, the CPRC turned to sugar manufacturers. The CPRC believed that diversification into new products based on sugar was most likely to be encouraged through the formation of a research association of the sugar firms that operated in the British West Indies. They hoped, as the DSIR had hoped previously, that if state funds were used to encourage firms to collectively invest in scientific research, members of the BWISA would then most likely take up the production of new sugar-based products. The industrial development of the British West Indies would result from the discovery of industrial uses for sugar and their by-products ‘on the spot’ in laboratories in Trinidad. Since these laboratories would undertake fundamental research, of general application, state funds were not being used to further the interests of one business over another. The actions of the CPRC were intended to carefully negotiate the need for some form of government intervention in order to stimulate industrial development without giving excessive aid to one single firm or otherwise interfering in the freedom of action that should exist for businessmen.

The CPRC made one of the Colonial Office’s most direct attempts to stimulate the industrialisation of the British West Indies after 1945. Generally, the Colonial Office offered advisors and guidelines and rejected central authorities to plan and coordinate industrial development, tariffs or a Caribbean development bank. The absence of conspicuous British government agencies or a comprehensive policy for industrial development may well have contributed to the invisibility of Britain’s industrialisation approach, both at the time and subsequently. The two laboratories created in Trinidad as part of a strategy to support industrial development were intended to be highly visible demonstrations of Britain’s commitment to colonial modernisation. The fact that the sugar laboratory and the CMRI were intended to transcend a Trinidadian identity may well have produced a problem in the long run, however. It is not clear if the people of Trinidad ever felt ownership of these bodies, and their subsequent invisibility in histories of the Caribbean may come from the fact that they were not perceived as working for the Caribbean at the time. It is possible that whilst choosing the route of state-funded research as a means of economic intervention in preference to tariffs or government corporations might have had the benefit of avoiding political controversy, it might have also meant that these institutions were placed at the margins of the concerns of Caribbean politicians and intellectuals and the wider public.
Notes

2 Colonial Research, 1943–1944, Cmd 6529.
3 TNA, CO 852/482/11.
4 Butler, Industrialisation.
6 TNA, CO 852/579/4.
7 TNA, CO 852/579/4.
8 TNA, CO 852/579/4.
9 TNA, CO 852/579/4.
10 TNA, CO 852/579/5.
12 TNA, CO 852/579/5.
13 TNA, CO 852/579/6.
14 TNA, CO 899/1.
15 Ibid.
16 Ibid.
17 Another institution funded by the sugar industry carried out research into sugar cane breeding in Barbados. The BWI Central Sugar Cane Breeding Station was established in November 1932.
18 BWISA (Inc), Reports on Research Work 1943 (Barbados: Advocate Co, Ltd, 1943).
19 TNA, CO 927/203/3.
20 TNA, CO 899/1.
22 TNA, CO 899/1.
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24 TNA, CO 899/1.
25 TNA, CO 927/13/9.
26 TNA, CO 899/1.
27 TNA, CO 899/2.
28 Trinidad Guardian, Saturday, 17 March 1951.
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33 UWE, “Annual Report to the Advisory Committee for the British West Indies Sugar Research Scheme, 1954/1955”.
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“Chemist from Scotland to Join ‘Micro’ Staff”, 2 July 1948.
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“Microbiological Institute to get top grade staff”, 12 January 1947.
TNA, CO 927/202/7.