

RESEARCH ARTICLE

Imperial entomology: Boris P. Uvarov and locusts, c. 1920–c. 1950

Michael Worboys*

Centre for the History of Science, Technology and Medicine, University of Manchester

*Corresponding author: Michael Worboys, Email: michael.worboys@manchester.ac.uk

Abstract

In this article, I explore how the twin forces of imperial and entomological power allowed Britain to shape locust research and control across Africa, the Middle East and South Asia from the 1920s to the early 1950s. Imperial power came from the size of the formal and informal empire, and alliances with other colonial powers to tackle a common threat to agriculture and trade. Entomological authority came primarily from the work of Boris Uvarov and his small team of museum and field-workers based at the Imperial Bureau of Entomology (IBE), later the Imperial Institute of Entomology (IIE). I begin by discussing how Uvarov's phase theory of the origin of swarming changed the prospects for the control of locust plagues. The imperial gaze and networks of the IBE and IIE were suited to a problem that was transnational and transcontinental. In the 1930s, Britain was drawn into plans for international cooperation on locust organizations that met the needs of science, to give better sharing of knowledge, and the needs for science, to secure the resources for research and control. However, such organizations were only created during the Second World War, when new plagues threatened military operations, as I show in relation to the measures taken to control the red locust and desert locust. In the final section, I follow the fate of the wartime cooperation in initiatives to establish permanent control organizations. It is a story of the decline of British political power in locust affairs as the United Nations Food and Agriculture Organization and regional agencies took over. My account of British locust research and control reveals a neglected aspect of histories of entomology and imperial/colonial science, especially their international relations and the continuing importance of metropolitan research centres.

In the spring of 2020, East Africa was affected by two plagues, one modern, one ancient. The modern plague was SARS-CoV-2 (COVID-19), the ancient was locusts. Had it not been for the COVID-19 pandemic dominating the news, the world would have heard and seen more of the devastation of crops and serious hardships caused by the desert locust (*Schistocerca gregaria*). The outbreak began after heavy rains in previous years, such that by early 2020 swarms were spreading across Ethiopia, Eritrea, Somalia and Kenya, with separate outbreaks in Arabia and Pakistan.¹ Control measures by national and regional agencies, overseen by the United Nations Food and Agriculture Organization (FAO) and aided by favourable weather, mitigated losses. In contrast, for the desert locust plague that began in the early 1940s, it was British agencies that led international cooperation

¹ *Desert Locust Bulletin* (5 March 2020) 497, pp. 1–10; *Desert Locust Bulletin* (1 October 2021) 516, pp. 1–9.

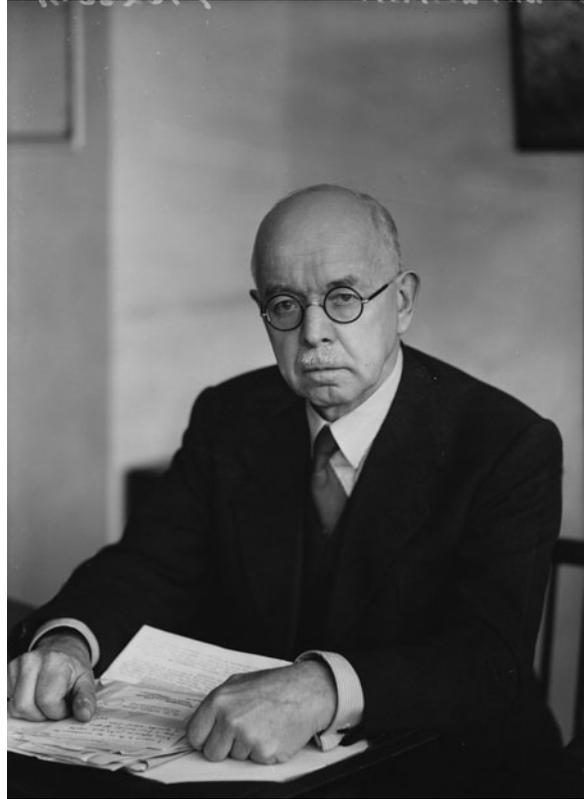


Figure 1. Sir Boris Petrovitch Uvarov.
© National Portrait Gallery, London.

in control measures. In this article, I explore how the desert locust threat was framed and acted upon by entomologists and government officials in London, informed by a network of scientists across empires in Africa and Asia. In other applied biological sciences, policy and innovation moved in the interwar period to the colonial periphery. Locust research and policy, however, remained centralized and were run from the Cabinet Office, not the Colonial Office. Geography, politics and scientific pre-eminence together saw the creation of an ‘imperial entomology’ of locust knowledge and power – geopolitically, because the areas most affected were contiguous British colonial territories where, in the 1940s, locusts threatened Allied military operations; scientifically, because of the dominant position in acridology (the study of grasshoppers and locusts) of the Natural History Museum in London and a team led by Boris P. Uvarov (Figure 1).²

British officials and Uvarov’s group were also influential in the study and control of two other locust species: the red locust (*Nomadacris septemfasciata*) and the African migratory locust (*Locusta migratoria migratorioides*). On the former they worked with the governments and scientists of Belgium and South Africa, and on the latter with their French equivalents. Locust plagues were transnational and everyone agreed that they required international cooperation to understand and collaboration to control. This framing anticipated Jean Jacques Salomon’s discussion of the *internationale* of science.³ He drew a distinction between: (1) cooperation due to the needs of science, where it was necessary for research to be international due to the nature of the subject, as with climate and

² Nora Waloff and George B. Popov. ‘Sir Boris Uvarov (1889–1970)’, *Annual Review of Entomology* (1990) 35, pp. 1–24.

³ Jean-Jacques Salomon, *Some Aspects of International Scientific Cooperation*, Paris: OECD, 1963; Salomon, ‘The *Internationale* of science’, *Science Studies* (1971) 1(1), pp. 23–42.

pandemics, and (2) cooperation due to the needs for science, where research required cooperation to be affordable, as with the Large Hadron particle accelerator at the Conseil européen pour la recherche nucléaire (CERN). Cooperation on locusts was both *of* and *for* science, with an *impériale* as much as an *internationale* of science.

Locust entomologists in the 1930s and 1940s spoke of their work as international, so is ‘imperial entomology’ an appropriate framing? And why not ‘colonial entomology’? First, the management of locust work through the Cabinet Office showed its political and strategic importance for the formal and informal empire, especially in the Middle East. It was separate from the ‘science-for-development’ initiatives in British colonial policy in the interwar years, that Hodge, Tilley and others have shown were characterized by innovation at the periphery.⁴ Second, Uvarov was based in the IBE, then the IIE, which adopted both an imperial gaze and a centre-periphery *modus operandi*. Its entomologists saw themselves as a ‘centre of intelligence’, receiving information from across the empire and beyond, analysing and synthesizing data, then issuing reports and advice. The institute’s advisory function developed into policy formulation control and, when a separate Anti-Locust Research Centre (ALRC) was created, to diplomatic and operational matters. Third, French locust science was similarly imperial, with its own gaze across West and North Africa, into the Mediterranean. The plagues in North America, Russia, Southern Europe and Australia were local and dealt with by national governments. The three species taken up by Britain were uniquely transnational and trans-imperial. Finally, it is important to understand that locust entomology was directly and actively engaged in directing anti-locust measures at the periphery. In this way, it was unlike other metropolitan imperial scientific institutions that lasted through my period, such as the schools of tropical medicine and the Imperial Forestry Institute, which were only centres of training and expertise.⁵

Except in studies of tropical diseases, entomology has been neglected in histories of science and empire, as in the history of science more widely. For example, the *Cambridge History of Science* volume on the *Modern Biological and Earth Sciences* has no index item for ‘insects’, the class estimated to make up 75 per cent of the known animal kingdom, and just three for ‘entomologists’, which refer to their role as amateur scientists in the nineteenth century and to tropical medicine.⁶ Studies of single insect species, particularly as disease vectors, are more common.⁷ Important exceptions are Edmund

⁴ Joseph M. Hodge, *Triumph of the Expert: Agrarian Doctrines of Development and the Legacies of British Colonialism*, Athens: Ohio University Press, 2007; Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870–1950*, Chicago: The University of Chicago Press, 2011; William Beinart, Karen Brown and Daniel Gilfoyle, ‘Experts and expertise in colonial Africa reconsidered: science and the interpenetration of knowledge’, *African Affairs* (2009) 108, pp. 413–33; Brett Bennett and Joseph M. Hodge (eds.), *Science and Empire: Knowledge and Networks of Science across the British Empire, 1800–1970*, Houndmills: Palgrave Macmillan, 2011; Sabine Clarke, *Science at the End of Empire: Experts and the Development of the British Caribbean, 1940–1965*, Manchester: Manchester University Press, 2018.

⁵ Lise Wilkinson and Anne Hardy, *Prevention and Cure: The London School of Hygiene & Tropical Medicine. A 20th Century Quest for Global Public Health*, London: Kegan Paul, 2001; Helen J. Power, *Tropical Medicine in the 20th Century: A History of the Liverpool School*, London: Kegan Paul, 1998; ‘Witness to history: a history of forestry at Oxford University’, *British Scholar* (2009) 1, 236–61.

⁶ Peter J. Bowler and John V. Pickstone (eds.), *The Cambridge History of Science: The Modern Biological and Earth Sciences*, Cambridge: Cambridge University Press, 2009, pp. 642, 647; Edward H. Smith and George G. Kennedy, ‘History of entomology’, in V.H. Resh and R.T. Cardé (eds.), *Encyclopaedia of Insects*, London: Academic Press, 2009, pp. 449–58, 449. Recent issues of this journal have begun to correct the neglect of insects and entomology. M. Wale, ‘Editing entomology: natural-history periodicals and the shaping of scientific communities in nineteenth-century Britain’, *BJHS* (2019) 52, pp. 405–23.

⁷ Timothy C. Wineguard, *The Mosquito: A Human History of Our Deadliest Predator*, London: E.P. Dutton, 2019; Helen Tilley, ‘Ecologies of complexity: tropical environments, African trypanosomiasis, and the science of disease

Russell's studies of economic entomology in the United States and John Clark's *Bugs and the Victorians*.⁸ Significantly, when Clark's narrative moves into the twentieth century, the focus switches from natural history to economic entomology, tellingly with a chapter on 'Insects and empire', which ends where this article begins. Little has been written on locusts. For North America, Jeffrey Lockwood focuses on the puzzle of the extinction of the Rocky Mountain locust (*Melanoplus spretus*) in the late nineteenth century and whether it was due to natural or human forces.⁹ There is a popular history of the desert locust by Stanley Baron that looks at control campaigns from the 1940s to the 1960s, and a number of studies of plagues in particular territories.¹⁰ Uvarov wrote the first draft of the history I tell here in a report published in 1951, and new research is now under way on the wartime campaigns.¹¹

In the literature on the history of entomology, most useful for my study is Rohan Deb Roy's notion of 'entomo-politics', developed in his work on white ants (termites) in India.¹² The approach centres upon the relations between insects and power, though termites and locusts were, of course, problems on different scales: tiny, domestic vermin on the one hand, and large, swarming, transnational plagues on the other. In the popular imagination, locust plagues, the eighth that Moses identified in the Bible as threatening Egypt, were synonymous with apocalyptic devastation, hence useful politically for gaining attention if not always mobilizing action.¹³ For British officials and entomologists, 'thinking with locusts' encouraged a vision of migrating swarms, sweeping across contiguous colonies, causing economic and social problems for colonial governments. In response, locust movements were to be surveyed and analysed, identifying sites for intervention and plans for control. Outbreak and invasion areas were largely seen as physical/natural spaces, in which novel ideas and technologies could be tested and deployed; however, the promised benefits of understanding and control would be economic, political and social.

control in British colonial Africa, 1900–1940', *Osiris* (2004) 19, 21–38; Lyn White, 'Tsetse visions: narratives of blood and bugs in colonial Northern Rhodesia, 1931–9', *Journal of African History* (1995), 36, pp. 219–45; Lisa T. Sarasohn, *Getting under Our Skin: The Cultural and Social History of Vermin*, Baltimore: Johns Hopkins University Press, 2021.

⁸ Edmund P. Russell III, "'Speaking of annihilation": mobilizing for war against human and insect enemies', *Journal of American History* (1996) 82, pp. 1505–29; Russell, *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring*, Cambridge: Cambridge University Press, 2001; John F.M. Clark, *Bugs and the Victorians*, New Haven, CT: Yale University Press, 2009.

⁹ Jeffrey A. Lockwood, *Locust: The Devastating Rise and Mysterious Disappearance of the Insect That Shaped the American Frontier*, New York: Basic Books, 2004.

¹⁰ Stanley Baron, *The Desert Locust*, London: Eyre Methuen, 1972; Jeanine E. Dağyeli, 'The fight against heaven-sent insects: dealing with locust plagues in the Emirate of Bukhara', *Environment and History* (2020), 26, pp. 79–104; Peter Udeli and Godfrey Hove, 'A war of man against locust! Locust invasions and anti-locust campaigns in Salisbury, Southern Rhodesia, 1918–1940s', *South African Historical Journal* (2018) 70, pp. 689–707; Lize-Marie van der Watt, "'To kill the locusts, but not destroy the farmers": officials, farmers and the plagues of Pharaoh, c.1920–1935', *South African Historical Journal* (2010), 62, pp. 356–83; G. Oba, *African Environmental Crisis: A History of Science for Development*, London: Routledge, 2020, pp. 187–212. Also see Edward Deveson and Alajandro Martinez, 'Locusts in southern settler societies: Argentine and Australian experience and responses, 1880–1940', in Estelita Vaz et al. (eds.), *Environmental History in the Making*, vol. 6, Cham: Springer-Verlag, 2016, pp. 259–86.

¹¹ Boris P. Uvarov, *Locust Research and Control 1929–1950*, London: HMSO, 1951; Robert Fletcher, 'The locust, the empire and the museum', *evolve* (2017) 31, pp. 46–53.

¹² Rohan Deb Roy, 'White ants, empire and entomo-politics in South Asia', *Historical Journal* (2020) 63, pp. 411–36; Uli Beisel, Ann H. Kelly and Noémi Tousignant, 'Knowing insects: hosts, vectors and companions of science', *Science as Culture* (2013), 22, pp. 1–15.

¹³ In the 1930s, 'the locust years' was used by Winston Churchill for the wasted years when Britain failed to rearm in the face of rise of Nazism in Germany. Winston S. Churchill, *The Gathering Storm*, London: Houghton Mifflin, 1948, pp. 60–80.

Central to this history is Boris Uvarov, who enjoyed a position of unique authority with respect to the locust problem. His phase theory postulated that swarming locust species existed in two forms, solitary settled hoppers and gregarious migratory flying insects; previously they had been understood to be different species. The theory changed the prospects for the control of plagues through preventing their creation, by stopping the transition from hoppers to flying insects. I begin, therefore, by discussing Uvarov's early career and the emergence of locusts as a priority for the IBE through the conjunction of new plagues, the workings of elite entomological networks, and new policies for science in government. Continuing threats of locust swarms in the late 1920s had led European imperial powers to explore scientific cooperation, in which Britain assumed leadership. As I will show, control organizations were planned in the 1930s, but only created during the Second World War, when the risk of renewed invasions to military action saw temporary, regional agreements to suppress swarming. In the final section, I follow the post-war fate of wartime cooperation and the initiatives to make it permanent. These developments saw the decline of British influence and a growing role for the FAO and regional agencies.

Boris Uvarov and phase theory

Boris Uvarov was born in Uralsk in south-eastern Russia (now in Kazakhstan) in 1886.¹⁴ He studied at the School of Mining at Ekaterinoslav and then at the University of St Petersburg. His interest in insects developed through attending meetings of the Russian Entomological Society, where students mixed freely with senior figures. After graduation, he worked as an entomologist on a cotton estate in Transcaspia (now Turkmenistan and part of Uzbekistan), then moved to the Department of Agriculture in St Petersburg. From there, he was seconded to the northern Caucasus, which began his lifelong work on the Acrididea. At just twenty-three years of age, he was appointed founding director of the Entomological Bureau at Stavropol. His main task was to combat locust predation of cotton crops. In 1915 he moved to Transcaucasia (roughly modern Georgia, Armenia and Azerbaijan) to organize plant protection stations. His career changed direction four years later, when he switched from the field to the museum laboratory, taking posts in Tbilisi as keeper of entomology and zoology in the State Museum of Georgia and reader at the State University. A year later, Uvarov left to take a post at the IBE in London. Uvarov has been characterized as a White Russian; that is, those who left after the Revolution because of threats from, or hostility to, the Bolsheviks.¹⁵ However, it is more likely that his departure was prompted by Georgian nationalists' hostility to Russians. This view is supported by the fact that he continued to enjoy good relations with his former colleagues and continued to publish regularly in Russian journals. However, he was no supporter of the Revolution. His brother Nikolas, a lawyer who had connections to the tsarist regime, was executed by the Bolsheviks.¹⁶

¹⁴ Vincent B. Wigglesworth, 'Boris Petrovich Uvarov (1889–1970)', *Biographical Memoirs of Fellows of the Royal Society* (1971) 17, pp. 713–40; Vincent B. Wigglesworth and Vivienne M. Quirke, 'Uvarov, Sir Boris Petrovich (1889–1970), entomologist', *Oxford Dictionary of National Biography*, at www.oxforddnb.com/view/10.1093/ref:odnb/9780198614128.0001/odnb-9780198614128-e-36619 (accessed 28 February 2021). It has recently been claimed that Uvarov's true date of birth was 22 October 1886. See Anastasia A. Fedotova and A.V. Kouprianov, 'Archival research reveals the true date of birth of the father of locust phase theory, Sir Boris Uvarov, FRS', *Евразийский этнопол. Журнал* (2016) 15, pp. 321–7.

¹⁵ For White Russian emigrants to the United Kingdom see https://wikivisually.com/wiki/Category:White-Russian_emigrants_to_the_United_Kingdom (accessed 28 February 2021).

¹⁶ The fate of Nikolas's family is described in the DNB entry of his daughter Olga, Boris Uvarov's niece. 'The four children underwent a period of acute deprivation, witnessing untold horrors. Their uncle, the entomologist Boris Uvarov, who was working at the Imperial Bureau of Entomology in London, heard that the children were still

The IBE had been created in 1913, largely to aid the study of insect vectors of tropical diseases, but in the interwar period, its focus shifted to agricultural pests.¹⁷ Typical of early twentieth-century science for empire agencies, it was a central institution that received and collated information, and was to be funded by contributions from colonial governments.¹⁸ In return, the colonies received reports and advice, often tailored to local problems.¹⁹ The IBE was a small unit within the NHM, minuscule in size when set against the empire and its vast insect fauna. Nonetheless, its staff developed significant reputations for their work on systematics and taxonomy, which was valued across the empire and the wider world.²⁰

At the time of Uvarov's arrival, the head of the IBE was Guy Marshall. His appointment as the first head of the bureau illustrates the varied routes to a career in entomology at the time.²¹ After failing entry into the Indian civil service, Marshall went to South Africa and worked in farming and mining. He continued the family tradition of serious work in natural history, taking a particular interest in insects. It was not unusual then for amateurs to correspond with professionals, even on another continent. Marshall exemplified this in his collaborations, including joint publications on mimicry with Edward Poulton, then professor in the Hope Department of Entomology at Oxford.²² Marshall's role, and the location of the IBE in the NHM, enabled him to establish a network of entomologists across disciplines, institutions, settings and countries.

Uvarov was recommended to Marshall by Patrick Buxton, who was with the British Army in Georgia, where he was on secondment from his post as medical entomologist in Palestine. After the Revolution, Georgia, Armenia and Azerbaijan had formed the Transcaucasian Democratic Federative Republic, but Georgia soon broke away. Conflict with Armenia ensued, until a peace deal was brokered under British and French supervision. Georgian nationalism and hostility to Russians were strong throughout this period, hence Uvarov's escape to London was a welcome release.

alive, and the American Red Cross located them on his behalf. Such was the cost of getting people out of Russia that he could pay only for one passage. Thus, it was that Olga, identified only as "orphan no. 7", was taken back to Moscow and, after several months, escorted to Estonia and put on a ship for England. Disinfected, shaven-headed, undernourished, and suffering from malaria, she reached London in 1923. She never heard of her brothers again. Olga became a distinguished veterinarian.' Stella Crispin and Judy MacArthur Clark, 'Uvarov, Dame Olga Nikolaevna (1910–2001), veterinary scientist', *Oxford Dictionary of National Biography*, at www.oxforddnb.com/view/10.1093/refodnb/9780198614128.001.0001/odnb-9780198614128-e-76252 (accessed 28 February 2021).

¹⁷ The Imperial Bureau of Entomology (IBE) became the Imperial Institute of Entomology (IIE) in 1930, and the Commonwealth Institute of Entomology in 1947.

¹⁸ On science and British imperialism see Roy Macleod, 'Passages in imperial science: from Empire to Commonwealth', *Journal of World History* (1993), 4, pp. 117–50. Mark Harrison, 'Science and the British Empire', *Isis* (2005) 96, pp. 56–63. Bennett and Hodge, op. cit. (4), pp. 3–29; Pratik Chakrabarti and Michael Worboys, 'Science and imperialism since 1870', in Hugh R. Slotten, Ronald L. Numbers and David N. Livingstone (eds.), *The Cambridge History of Science*, vol. 8: *Modern Science in National, Transnational, and Global Context*, Cambridge: Cambridge University Press, pp. 9–31.

¹⁹ On centre and periphery in the history of science and imperialism see Roy M. MacLeod, 'On visiting the "moving metropolis": reflections on the architecture of imperial science', *Historical Records of Australian Science* (1982) 5, pp. 1–16; Warwick Anderson, 'Remembering the spread of Western science', *Historical Records of Australian Science* (2018) 29, pp. 73–81.

²⁰ Leland O. Howard, *A History of Applied Entomology (Somewhat Anecdotal)*, Washington, DC: Smithsonian Miscellaneous Collection, 1930.

²¹ William R. Thompson, 'Guy Anstruther Knox Marshall, 1871–1959', *Biographical Memoirs of Fellows of the Royal Society* (1960) 6, pp. 169–81.

²² Guy A.K. Marshall and Edward B. Poulton, 'Five years' observations and experiments (1896–1901) on the bio-nomics of South African insects, chiefly directed to the investigation of mimicry and warning colours', *Transactions of the Entomological Society of London*, 1902, pp. 287–584.

At the IBE Uvarov was employed primarily on identifying and classifying the myriad of specimens received from around the empire. He was unusual in also having field experience in economic entomology. Through the 1920s he published on average fourteen papers each year, revising classifications in many of the museum's collections. He was known for 'his broad zoogeographical treatment of many taxonomic problems'.²³ The paper in which phase theory was first expounded appeared a year after his arrival in London and was based on investigations in Russia on two closely related species – the swarming *Locusta migratoria* and the non-swarming *Locusta danica*. From anatomical, developmental and ecological evidence, he found that the two were different forms of the same species.²⁴ He termed these *migratoria* and *solitaria*, indicating the behavioural change that created swarming plagues (Figure 2). He suggested that phase changes were likely in other species, and in 1926 it was demonstrated in the widely distributed and economically important desert locust.²⁵ Phase theory had quickly become phase 'fact'.

In the paper Uvarov pointed to the practical implications of his finding:

The theory of phases suggests the theoretical possibility of the control of *migratoria* by some measures directed not against the insect itself, but against certain natural conditions existing in breeding regions which are the direct cause of the development of the swarming phase ... The first step, therefore, should be the most careful investigation of all existing, as well as extinct, breeding regions, together with parallel breeding experiments under laboratory conditions. From the results, a system of theoretically useful and practically possible measures for the conversion of breeding regions may be outlined.²⁶

In other words, it should be possible to develop preventive measures in geographically limited permanent outbreak areas that were far more practical and less costly than waiting to attack swarms in potentially huge invasion areas.²⁷

Economic entomology and empire

An Imperial Entomological Conference, first planned for 1914, eventually met in London in June 1920.²⁸ Its original aim had been to define the IBE's role with disease and pest problems, but by the end of the First World War the priority was to safeguard its future and secure funding from colonial governments. The conference delegates were mostly entomologists from agricultural departments based in the dominions, India and most of the colonial territories. There were few from medicine, and hence there was little discussion of disease vectors. Instead, the topics were primarily plant protection in the cultivation, storage and transportation of export crops.²⁹ Delegates passed resolutions calling for new grants for the IBE from both Britain and colonial governments, arguing that these offered good value for money. A substantial income for the bureau could be generated by

²³ Peter Haskell, *Sir Boris Uvarov, K.C.M.G., F.R.S., 1888–1970: In Memoriam*, London: Anti-Locust Research Centre, 1970, pp. 7–9; Hans-Joachim Pflüger and Peter Bräunig, 'One hundred years of phase polymorphism research in locusts', *Journal of Comparative Physiology A* (2021) 207, pp. 321–6.

²⁴ Boris P. Uvarov, 'A revision of the genus *Locusta* L. (tcyahP=, Fieb.), with periodicity and migrations of locusts', *Bulletin of Entomological Research* (1921) 12, pp. 135–63.

²⁵ H. Bennett Johnston, 'New facts regarding the phases of migratory locusts', *Nature* (1926) 118, pp. 10–11.

²⁶ Uvarov, op. cit. (24), p. 155. Also see Boris P. Uvarov, *Locusts and Grasshoppers: A Handbook for Their Study and Control*, London: Imperial Bureau of Entomology, 1928, pp. 147–67.

²⁷ Waloff and Popov, op. cit. (2), p. 20. Uvarov remained committed to preventive, biological control in outbreak areas, throughout his career, even when evidence emerged that the desert locust might not have such permanent areas.

²⁸ *Report on the Imperial Entomological Conference, June 1920*, Parliamentary Papers 1920, Cmd. 835. XVIII.1.

²⁹ Geoffrey B. Masefield, *A History of the Colonial Agricultural Service*, Oxford: Clarendon Press, 1972, pp. 53–9.

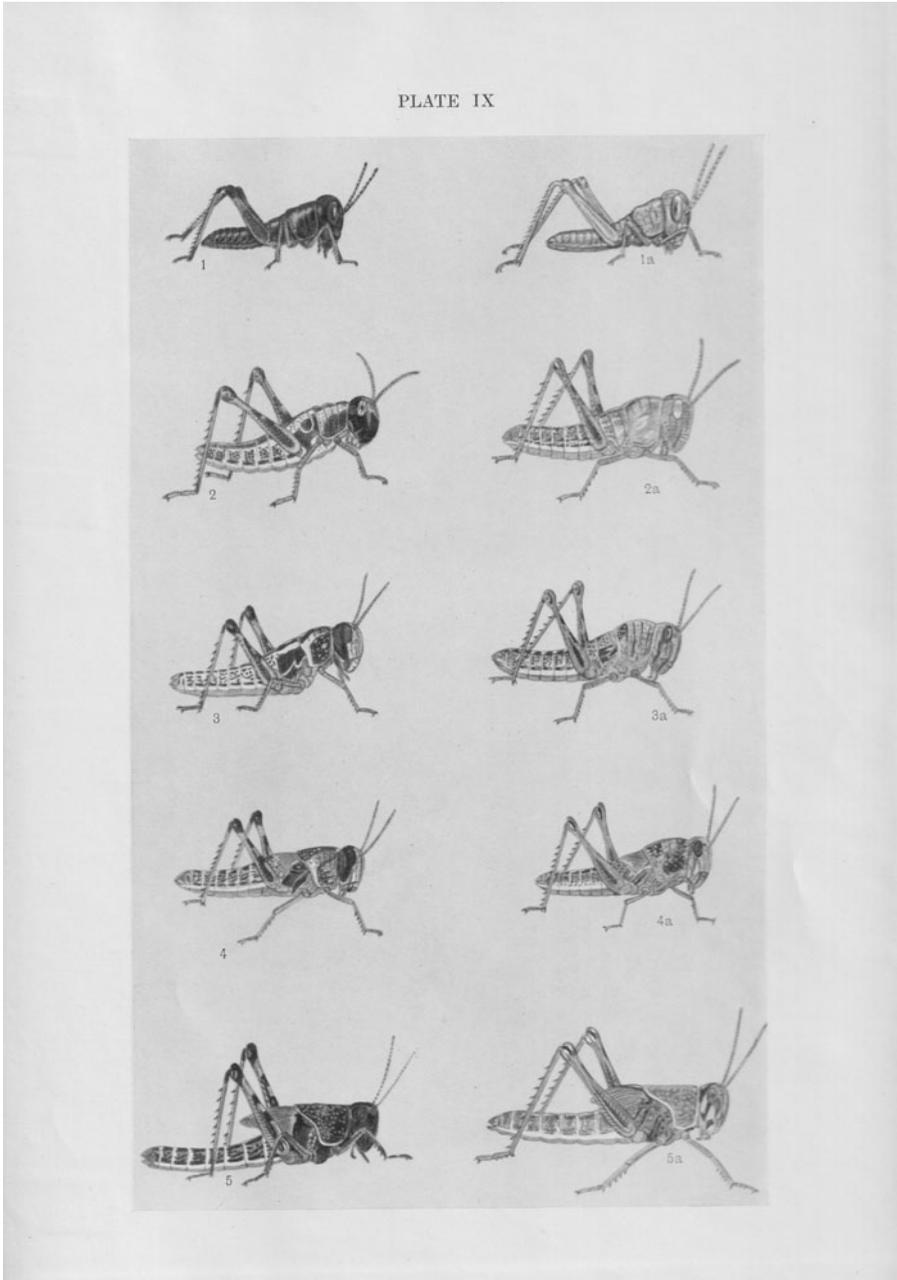


Figure 2. Hoppers of the desert locust: 1–5 swarming phase, 1a–5a solitary phase. Boris P. Uvarov, *Locusts and Grasshoppers: A Handbook for Their Study and Control*, London: Imperial Bureau of Entomology, 1928, Plate IX.

relatively small contributions from the many colonies. Prompted by the recently passed Rome Convention on phytosanitary measures, a subcommittee considered international cooperation but concluded that the empire had nothing to gain from contributing to the International Institute of Agriculture (IIA), which had been founded in Rome in

1905 as a clearing house for agricultural information.³⁰ The IBE was seen as a superior information and intelligence centre. It better served inter-imperial trade, alongside similar applied natural- and social-science agencies: the Imperial Bureau of Mycology, the Imperial Institute and the Imperial Economic Committee.³¹

A second Imperial Entomological Conference met in London five years later.³² By this time, the League of Nations had been established, with its own health organization, and there was an expectation that its role with regard to tropical diseases would lead it to develop entomological work.³³ In the event, the League did little directly with insects, nor did it do much with agriculture, for that matter. Imperial entomologists ignored international developments, producing an insular yet ambitious plan for expanding the work of the IBE and economic entomology across the empire. The conference report went to the Secretary of State for the Colonies, Leopold Amery, who passed it on to the East Africa Commission, which had just reported on the economic and social development of Kenya, Uganda and Tanganyika (Tanzania).³⁴ The commission had been led by William Ormsby Gore (later Lord Harlech), who was among a group of politicians, civil servants and scientists who wanted to bring scientific research into government policy and implementation. Amery shared their enthusiasm. The year previously, he had written that 'the development of the empire is not only a great political problem [but] a great scientific problem – a problem of applying scientific research to the practical task of making the most of their immense resources'.³⁵ The East Africa Commission provided further stimulus to this initiative, bearing fruit with the appointment of a Cabinet-level Committee of Civil Research (CCR) in 1925.

The CCR was charged with 'giving connected forethought from a central standpoint to the development of economic, scientific and statistical research in relation, more especially, to problems of an interdepartmental character, or in pursuit of knowledge not within the orbit of any single minister'.³⁶ It was one of a number of new types of state investment in science across government departments that had begun with the Department of Scientific and Industrial Research in the First World War.³⁷ The committee was active for five years, during which time it appointed eighteen subcommittees, most of which focused on innovations in technology and science. These included schemes for heavy industries, dyestuffs, minerals in pastures, the Severn barrage, the British

³⁰ *Actes de la conférence internationale pour l'organisation de la lutte contre les sauterelles, Rome 1920*, Rome: Institut international d'agriculture, 1921; Antonio Buj Buj, 'International experimentation and control of the locust plague: Africa in the first half of the 20th century', *Natur et environnement* (1995) 3, pp. 93–105.

³¹ Edwin J. Butler, 'The Imperial Bureau of Mycology', *Transactions of the British Mycological Society* (1921) 7(3), pp. 168–72; Michael Worboys, 'The Imperial Institute, the state and the development of the natural resources of the colonial empire, 1887–1923', in John MacKenzie (ed.), *Imperialism and the Natural World*, Manchester: Manchester University Press, pp. 168–86.

³² *Report on the Second Imperial Entomological Conference, June 1925*, Parliamentary Papers 1924–25, Cmd. 2490, XIII.873.

³³ Iris Borowy, *Coming to Terms with World Health: The League of Nations Health Organisation 1921–1946*, Frankfurt am Main: Peter Lang Publishers, 2009. In the 1930s the League did report on agriculture, but only in terms of nutrition and health. See Josep L. Barona, 'Nutrition and health: the international context during the inter-war crisis', *Social History of Medicine* (2008) 21, 87–105.

³⁴ William G.A. Ormsby-Gore, 'The work of the East Africa Commission', *Journal of the Royal African Society* (1925) 24, pp. 165–77.

³⁵ Quoted in Roy MacLeod and E. Kay Andrews, 'The Committee of Civil Research, 1935–1930', *Minerva* (1969) 7, pp. 680–706, 683.

³⁶ MacLeod and Andrews, *op. cit.* (35), 681.

³⁷ David Edgerton, *Science, Technology and the British Industrial 'Decline', 1870–1970*, Cambridge: Cambridge University Press, 37–44; David E.H. Edgerton and John V. Pickstone, 'United Kingdom', in Slotten, Numbers and Livingstone, *op. cit.* (18), pp. 151–91.

Pharmacopeia, geophysical surveying, radium, fishing, irrigation and training biologists. The CCR's colonial initiatives were with regard to tsetse flies, dietetics in East Africa, quinine, agricultural training, rubber and, in 1929, locusts.

Swarms of the desert locust and African migratory locust had threatened across British East African colonies since 1926. But what inspired the CCR to act was not crop losses and their socio-economic consequences, but rather the enthusiasm of a celebrity surgeon for gas warfare. In February 1929, Sir Milsom Rees, laryngologist to the king and the Royal Opera House, where he once treated Dame Nellie Melba, was in Tanganyika, where he had financial interests in coffee plantations and salt mines.³⁸ He wrote to the CCR after a meeting with local administrators:

I expounded my ideas and I mean to take the matter up on my return to London, and with the permission of Mr Ormsby Gore, with Sir John Jarmay, the great chemist on gases and the Air Force. We have an ideal experimental position for research for chasing, tiring, and destroying locusts in the air and on the ground with gases of various specific gravities and liquids.³⁹

The CCR's secretary had doubts. In a memo he wrote, 'It seems entirely impractical to me ... his scheme consists of aeroplanes, airships, light gas, heavy ground gas, liquid fire, etc. ... but Sir Milson is a man of great scientific attainments.'⁴⁰

As a result, a Locust Subcommittee was appointed with two aims: to test means for the 'mass destruction of the Desert Locust' and 'to explore methods for ascertaining the reasons for the periodic swarming ... with a view to control', the latter based on phase theory.⁴¹ How had Uvarov achieved this influence over Cabinet-level policy? The answer lies in elite metropolitan entomological networks. The assistant secretary of the CCR was Ormsby-Gore's friend Francis Hemming, who was a keen amateur entomologist and knew Uvarov from his frequent visits to the NHM. In time, such was Hemming's passion for entomology that it took precedence over his civil service career. He was an expert on butterflies, publishing over a thousand papers and serving for two decades as secretary to the International Commission on Zoological Nomenclature.⁴² By this time, Uvarov's reputation had been enhanced by the publication of his authoritative *Locusts and Grasshoppers: A Handbook for Their Study and Control* in 1928.⁴³ The book set out new classifications of this group of the Orthoptera, plus more detail on the phase theory and its potential for the biological control of invasions. Interestingly, the *Handbook* was a translation. It had been published the previous year in Russian in the Soviet Union.⁴⁴

Before the subcommittee met, the CCR was reformed by the new Labour government into the Economic Advisory Council (EAC). The change signalled a move from the somewhat vague notion of 'forethought' to an applied orientation and advice to promote economic development. The Locust Committee kept its original terms of reference and secretariat, but initiatives were expected to be checked by the expenditure cuts that followed the Great Crash. At its first meeting, a twelve-point research plan was tabled,

³⁸ 'Obituary: Sir Milsom Rees', *British Medical Journal* (1952) 1, pp. 975–6.

³⁹ The National Archives (TNA), CAB/58/35 CR(L)3, Committee of Civil Research, Locust Subcommittee, papers for first meeting.

⁴⁰ CAB/58/35 CR(L), op. cit. (39).

⁴¹ TNA, CAB 58/35, CR(L)1, Locust Subcommittee, terms of reference.

⁴² Norman D. Riley, 'Arthur Francis Hemming', *Journal of the Lepidopterists Society* (1964) 18(4), pp. 237–9

⁴³ Leland O. Howard, 'Review', *Science* (1929) 69, pp. 224–5; G.H. Skaife, 'Review', *Nature* (1929) 124, pp. 471–3.

⁴⁴ Boris P. Uvarov, *Sarancha i kobuilki: Rukovodstvo k ikh izucheniyu i bor'be s nimi*, Moscow and Leningrad, 1927.

largely written by Uvarov.⁴⁵ This was developed into a five-year programme of research at an estimated annual cost of £5,500. Rather than seek full funding directly from colonies, the Empire Marketing Board (EMB) was approached. This was a new agency set up to promote inter-imperial trade, which offered financial support to research aimed at this end, if matched by equal contributions from colonies.⁴⁶ The EMB agreed in principle, but support from the colonies was disappointing. The ambition had to be halved. Colonial unwillingness to support research was in part due to a shortage of revenues, in part because locust invasions had abated, and in part due to distrust of the funding model, where there was no direct link between contributions and local benefits.

However, even on the reduced budget Uvarov was able to send entomologists on fieldwork to identify outbreak areas in which solitary hoppers could ‘phase-change’ into swarming plagues. He also began to collect and collate reports of locust movements from colonial officials and economic entomologists from across Africa and the Middle East. The results were widely distributed in Locust Committee reports.⁴⁷ A London-based programme on systematics and biogeography was funded by the Carnegie Corporation, while the aerial combat trials, involving Porton Down and the Royal Air Force, went ahead with ministries’ support.⁴⁸ Compared to other countries, not least the United States, economic entomology in Britain was underdeveloped, not least at the IBE, where the natural-history tradition was dominant. This Cabinet committee level of response to locusts began to change this.

International cooperation

The most useful activity of the Locust Committee turned out to be its annual reports. They had the authority of official publications along with Uvarov’s imprimatur, and were circulated internationally as well as imperially. All carried an invitation to collaborate informally by sending information to the IBE, which in 1930 changed its name to become the Imperial Institute of Entomology (IIE). As the imperial power with the most territories affected by invasions, the committee assumed that Britain would lead international cooperation. The empire had most to offer as well as to gain. However, before they had time to act, the Italian government revived an old plan for an International Organization of Locust Control based at the IIA in Rome, arguing that informal relations and good intentions in locust control were not enough. Permanent cooperation and coordination were essential. A similar proposal had been made in 1924 by the French entomologist Paul Vayssière, who had wanted the League of Nations to take up the locust problem.⁴⁹ The Italian move led the Locust Committee to propose a new international locust control conference in Rome. This began a series of biennial conferences that became the principal vehicle for international cooperation. These meetings were where Britain first exercised its imperial entomological power.

⁴⁵ TNA, CAB 58/55 CR(L), Locust Committee, Minutes of the First Meeting, Appendix A. Also see Committee of Civil Research, *Locust Sub-committee: First and second interim reports*, Parliamentary Papers, 1929–30, Cmd. 3367, VIII.521; Economic Advisory Council, Committee on Locust Control, *Fourth Report on Locust Investigations in 1931 and Programme of Work for 1932–33*, Parliamentary Papers, 1931–32, Cmd. 4124, XI.899.

⁴⁶ Walter Elliot, ‘The work of the Empire Marketing Board’, *Journal of the Royal Society of Arts* (1931) 79, pp. 736–48. Michael Worboys, ‘Science and British colonial imperialism, 1895–1940’, unpublished DPhil thesis, University of Sussex, 1980, pp. 244–80.

⁴⁷ Boris P. Uvarov, *The Locust Outbreak in Africa and Western Asia in 1932*, London: HMSO, 1933.

⁴⁸ TNA, CAB 58/55, EAC(L), minutes of the tenth meeting of the Locust Committee, 19 August 1932, Economic Advisory Council, Committee on Locust Control, *Fifth Report: Proposals for the Use of Aircraft against Locusts*, London: HMSO, Parliamentary Papers, 1931–32, Cmd.43213, XIV.335.

⁴⁹ Paul Vayssière, ‘Le problème acridien et sa solution internationale’, *Matériaux pour l’étude des calamités* (1924) 2, pp. 122–58.

The Rome conference in June 1931 was attended by representatives from Britain, France, Italy and many African colonies.⁵⁰ Needless to say, all agreed that international cooperation was essential to monitor and control invasions. However, delegates were not optimistic about progress, expecting political and funding issues to prevent formal agreements. Instead, they looked to the informal exchange of research findings and outbreak reports amongst entomologists and officials as the best way forward. Much to the delight of the British delegation, Paul Vayssière proposed that the IIE become an international anti-locust research centre. Its role would be the coordination and sharing of information, carrying on the work already under way. There was no formal agreement on this, but the endorsement of Uvarov and his group was welcomed.

Further international conferences were held in Paris in 1932, London in 1934, Cairo in 1936 and Brussels in 1938.⁵¹ British delegations were led by Marshall, Uvarov and Hemming, and the conferences in Paris and London had similar agendas and outcomes to that in Rome. There were reports on the outbreak and swarm positions in different areas, the expression of good intentions to continue informal cooperation, and approval of the IIE's work. Uvarov's personal reputation had grown. He continued to be prolific, averaging twelve publications each year through the 1930s, covering locust species on all continents.⁵²

At Cairo in 1936 there was a change of mood and intent.⁵³ New locust invasions spurred on moves to establish control organisations. Delegates agreed that these were practical because phase theory had shown that efforts could be concentrated in relatively small outbreak areas, which kept costs low and should avoid political issues with borders. However, they anticipated problems in persuading the territories and imperial governments affected to agree funding for remote and seemingly unaccountable organizations in a foreign country.⁵⁴ Also, there remained uncertainties about operations. Had outbreak areas been accurately determined and what methods would be used to kill hoppers? There were a range of possibilities: 'beating, trenching, burning, dusting with arsenic powder from pierced tins, spraying with arsenic solution from stirrup pumps, flinging baits and BHC [benzene hexachloride] suspensions on to the infested grass, and so on'.⁵⁵ All were labour-intensive, which begged the question of how easy it would be to recruit 'native' labour. The biogeographies and hence the political dimensions of the three species were different.⁵⁶ The range of the desert locust was transcontinental, while those of the red locust and the African migratory locust were regional. So were large international organizations necessary? Perhaps regional agencies would be more appropriate; certainly they would be easier to organize.⁵⁷

⁵⁰ *Rapport de la réunion internationale convoquée par le Ministère des colonies d'Italie pour l'étude du problème des acridiens migrateur*, Rome: Instituto Poligrafico dello Stato. R.L, 1931.

⁵¹ *Procès-verbal des séances de la Deuxième conférence internationale pour les recherches antiacridiennes*, Paris: Ministère des affaires étrangères, Editions de la Société entomologique de France, 1932; *Proceedings of the Third International Locust Conference*, London, 18 September 1934, Parliamentary Papers, 1933–4, Cmd. 4725, XIII.639; *Proceedings of the Fourth International Locust Conference*, Cairo, 1936, Bulâq: Government Press, 1937; *Comptes rendus de la Vme conférence internationale pour les recherches antiacridiennes*, Bruxelles, 1938, Brussels: Ministère des colonies, Royaume de Belgique, 1938.

⁵² Wigglesworth, op. cit. (14), pp. 727–30.

⁵³ Giving permission for Hemming to attend the meeting in Cairo, Prime Minister Stanley Baldwin noted, 'Let him have this most enjoyable holiday.'

⁵⁴ Boris P. Uvarov, 'The locust problem and the key to its solution', *African Observer* (1935) 2(3), pp. 11–14.

⁵⁵ Donald L. Gunn, 'The red locust', *Journal of the Royal Society of Arts* (1952) 100, pp. 261–84, 270.

⁵⁶ Boris P. Uvarov, 'The Locust problem', *Crown Colonist*, 1933, pp. 9–12; Uvarov, 'La lutte contre les locusts', *Bulletin agricole du Congo belge* (1936), 27, pp. 106–11.

⁵⁷ The equivalentents in 2021 would be over £5 billion and £850,000.

After the 1936 meeting, moves to establish a control organization for the red locust began.⁵⁸ Political progress seemed possible, because the outbreak and invasion areas were mostly in British colonies, extending at the margin to the Belgian Congo and South Africa.⁵⁹ However, the Locust Committee was concerned that Afrikaner nationalism would be a problem with South Africa, which had only been a sovereign, independent state since 1931. There were immediate differences on the location of the headquarters – London or Pretoria – and on how to share costs. Also, the South African government wanted to achieve economies of effort by adding the brown locust to the remit of the organization. London rejected the proposal, arguing that the brown locust was not an ‘international’ problem as its breeding and outbreak areas were restricted to Southern African territories. Nothing was agreed. The two parties tried again in 1938, but again negotiations foundered.⁶⁰ If governments within the British Empire could not find agreement, the prospects for international cooperation with other locust species did not look good. The Locust Committee had moved to the idea of different organizations of the three main pest species, though their ideal remained a single international organization, which would give synergies and efficiencies.⁶¹

On one of the first Locust Committee surveys, the outbreak areas of the African migratory locust had been identified by the British entomologist Owen B. Lean.⁶² These were mainly in French North and West African colonies, which led the 1936 conference to ask French colonial authorities to develop a control scheme.⁶³ In London, the proposals were monitored by the Locust Committee.⁶⁴ Members were unimpressed by the plans, which were for a largely French organization overseen by a committee in Paris. There was no progress at Brussels two years later, with Britain continuing to press for a more collaborative approach, including recognition for the IIE as the leading international source of expertise and information exchange. Their reasoning was that if control organizations were to be regional, it was all the more important to have research and intelligence fully international.

While control plans for the red locust and the African migratory locust stalled, planning for the desert locust never started. The issues were legion and not only geopolitical. Surveys by Reginald Maxwell-Darling suggested that delimited, permanent outbreak areas were few. Indeed, it was possible that there were none, rather outbreaks developed in variable and transitory locations.⁶⁵ Surveys had proved difficult because of the vast area to be covered and the low incidence of outbreaks and invasions. At Brussels in 1938, Uvarov tabled proposals that split control into eastern and western regions: Egypt, East Africa, the Middle East and Asia on the one hand, where Britain had most interest, and North Africa, where matters could be left to France and Italy. He still envisaged the IIE as the

⁵⁸ Gunn, op. cit. (55), p. 265; Uledi and Hove, op. cit. (10), pp. 698–704.

⁵⁹ Economic Advisory Council Committee on Locusts, *Sixth Report: Review of the Present Locust Outbreak in Africa and Western Asia and of the Investigations Carried Out since 1929, and a Note on the General Programme of Further Investigations*, Parliamentary Papers, 1933–4, Cmd. 4692, XIII.583.

⁶⁰ TNA, CAB 58/55, minutes of the Red Locust Committee, 1938–9. Also see TNA, AY 11/124, inception and constitution of the International Red Locust Control Service; TNA, CO323/1528/14, locust control: implementation of recommendations of the Fourth International Locust Conference, Cairo 1936, information and action, report of negotiations with the South African government.

⁶¹ Boris P. Uvarov, ‘Locusts and a rational anti-locust policy’, *Empire Cotton Growers Review* (1935) 12, pp. 193–98; Uvarov, ‘Locusts as an international problem’, *Current Science* (1936) 5, pp. 191–3.

⁶² Owen B. Lean, ‘*Locusta migratoria migratorioides*, R. & F.: ecological reconnaissance of the suspected middle Niger outbreak area’, *Bulletin of Entomological Research* (1936) 27(1), pp. 105–84.

⁶³ Boris P. Uvarov, ‘Fourth International Locust Conference’, *Nature* (1938) 142, pp. 174–5

⁶⁴ TNA, AY 11/53, Red Locust Committee: meetings between representatives of the UK and the Union of South Africa.

⁶⁵ Reginald Maxwell-Darling, ‘The outbreak areas of the desert locust (*Schistocerca gregaria*, Forsk.) in Arabia’, *Bulletin of Entomological Research* (1937) 28(4), pp. 605–18.

central research and intelligence agency. Egyptian delegates rejected the idea, arguing that they experienced invasions from both directions.⁶⁶ No progress was made, despite the new evidence discussed in Brussels regarding the economic cost of locust invasion. Between 1925 and 1934, across forty-one countries, crop losses had totalled £83 million (equivalent to £6 billion in 2020) and a further £13 million (equivalent to £900 million in 2020) had been spent on controlling hoppers and swarms.⁶⁷

The British delegation had one final ambition for the Brussels meeting: continued endorsement of the IIE as an international anti-locust centre. Grants from the British government and colonial territories were due to end in March 1939, so the hope was that international support could secure its future. Uvarov told delegates that ‘collaboration will not be enough’, while Guy Marshall was blunter. ‘We have no more money ... This central organisation will go unless the governments concerned are prepared to contribute towards its cost.’⁶⁸ Their pleas were unsuccessful.

After Brussels, the crisis in Europe meant that colonial affairs were not a priority for the British government. At what turned out to be the final peacetime meeting of the Locust Committee in January 1939, there was a valedictory mood. Sir Edward Poulton pointed to the value of entomological investigations: ‘the scheme for the control of outbreak areas illustrates the practical advantages of scientific research when carried out on the right lines’.⁶⁹ Guy Marshall observed, ‘As a result of the investigations carried out under the committee’s auspices during the last nine years, it was possible to say there now existed a feasible theoretical method for the control of Locust swarms.’⁷⁰ There had been huge progress in research, but not in control. Where outbreaks had occurred, they had been managed by single colonies or countries, with ad hoc measures that had limited effectiveness. There were many accusations that invasions came from negligent neighbours, which highlighted entomologists’ point that an international approach was essential. In 1939, the prospects for this approach looked increasingly bleak.

The Second World War

The invasions of the red locust and desert locust that began in 1940 brought renewed government interest in locusts, as supplies and military actions were jeopardized across many theatres. Control measures were imperative. Uvarov became a key figure in planning responses and had the effective position of locust adviser to the War Cabinet, prompting his naturalization as a British citizen.⁷¹ He travelled widely across Africa, the Middle East and South Asia during the war, mostly in military aircraft. The anti-locust centre at the IIE became a strategic asset, as international channels of scientific communication had remained open since the start of the war.⁷²

In 1941, an ‘unofficial Anglo-Belgian effort’ for control of the red locust began.⁷³ In practice, this consisted of two entomologists working from a base in Abercorn in

⁶⁶ *Comptes rendus*, op. cit. (51), pp. 42–5, 67.

⁶⁷ Boris P. Uvarov and B.N. Bowman. ‘The economic importance of the locust and grasshopper problem throughout the world’, in *Proceeding of the Fifth International Locust Conference*, Brussels, 1938, pp. 190–236.

⁶⁸ TNA, CAB 58/55 EAC(L), minutes of 18th meeting, 17 January 1939.

⁶⁹ CAB 58/55 EAC(L), op. cit. (68).

⁷⁰ CAB 58/55 EAC(L), op. cit. (68).

⁷¹ Waloff and Popov, op. cit. (2), p. 5. In the same year, Uvarov was naturalized as British.

⁷² For details of all the wartime campaigns see Uvarov, op. cit. (11), pp. 20–33. The National Archives in London has a large map that charts Uvarov’s travels, which in fact extended to Australia and the western United States. TNA, AY 20/8/9, map ... showing journeys made by Sir Boris Uvarov, undated, 1947?

⁷³ Jane Rosenberg, ‘The development of regional control of the red locust, *Nomadacris septemfasciata* (Serville), in the first half of the 20th century’, *International Journal of Tropical Insect Science* (1999) 19, pp. 283–9.

Northern Rhodesia (now Zambia), styled the International Red Locust Control Service (IRLCS).⁷⁴ The two were Hans Bredo, a Belgian who had worked on locusts in the Belgian Congo for a decade, and Alfred P.G. Michelmore, previously employed on surveys in the early 1930s, who was recalled from army service.⁷⁵ Their first task was to confirm the outbreak areas. They identified two, totalling a thousand square miles (2,600 square kilometres). One was near Lake Mwera, spanning the border of Northern Rhodesia and the Belgian Congo; the other was in the Rukwa Rift Valley in Tanganyika (Figure 3). Their next and continuing task was to monitor incipient outbreaks: Bredo in Mwera na Ntipa and Michelmore in Rutka.⁷⁶ If and when swarming threatened, they were expected to organize the killing of hoppers, by recruiting labour and sourcing equipment and chemicals. This was difficult in the remote, often flooded, areas, where communications were poor. Both men were in constant contact with Uvarov, who was the effective director of operations, advising on actions and using his government connections to muster assistance when needed.

Relations between Bredo and Michelmore were cordial to begin with, but tensions grew. Bredo kept up a more regular correspondence with Uvarov, sharing his frustrations about Michelmore's priorities and extended periods of leave.⁷⁷ Matters worsened in 1943, when Bredo was appointed local director of operations. It was a pragmatic decision; the Belgian was more effective on all fronts. One issue was how to kill hoppers. Bredo favoured poisoning by baiting, whereas Michelmore favoured labour-intensive beatings and trenching. The former proved more effective. At the end of 1944, swarms from the Rukwa valley had spread, pointing to Michelmore's failures. On his way to a conference in Lusaka in August 1945, Uvarov was diverted to Abercorn to sort things out.⁷⁸ He found Michelmore was 'negative' with 'personal grievances' and recommended his transfer, which soon followed.⁷⁹ By contrast, Bredo's positivity and willingness to work across borders had not only suppressed swarming, but also allowed phase theory to pass its first test in the field.

In 1940–1 swarms of the desert locust spread from Pakistan into the Middle East and threatened East Africa, while there was a smaller outbreak in North Africa.⁸⁰ Military operations and supplies were in peril. In 1942, coincident with the start of Operation Torch to defeat German and Italian forces, the pre-war Locust Committee was revived as the Interdepartmental Committee on Locust Control (IDCLC).⁸¹ At the start of the following year, Uvarov wrote in *Nature* of his enthusiasm for 'the planned application of

⁷⁴ Jean-Paul Harroy, *La lutte anti-acridienne et Hans Bredo*, Brussels: Académie royale des sciences Outre-mer, Classe des sciences naturelles et médicales, 1985, p. 48.

⁷⁵ Alfred Philip Galabin Michelmore (1906–98). Before his appointment to Abercorn, Michelmore published on the ecology of grasslands, receiving a rebuff from A.G. Tansley when he challenged his ideas on succession. Peder Anker, *Imperial Ecology: Environmental Order in the British Empire, 1895–1945*, Cambridge, MA: Harvard University Press, pp. 149–50. In 1957 Michelmore was appointed director of the Paignton Zoological and Botanical Garden and became an expert on zoo design, being awarded the MBE in for services to the conservation of plant and animal wildlife in Devon.

⁷⁶ V. Morant, *Migrations and Breeding of the Red Locust in Africa 1927–1945*, London: Anti-Locust Research Centre, 1947.

⁷⁷ Harroy, op. cit. (74), p. 63.

⁷⁸ TNA, AY 20/7. Eight diaries covering travels in Middle East, East Africa and French West Africa, 1943–1946, Diary 5. Uvarov records that Michelmore was 'negative' and 'somewhat offensively defensive' when discussing how the operation of the centre could be improved.

⁷⁹ TNA, CO 852/544/5, report by Dr Uvarov of visit to East Africa and the Middle East, 9 August 1945 to 13 October 1945.

⁸⁰ Uvarov, op. cit. (11), pp. 20–32.

⁸¹ Ian S.O. Playfair, C.J.C. Molony and Sir William G.F. Jackson, *The Mediterranean and Middle East: The Destruction of the Axis Forces in Africa*, London: HMSO, 1966.

scientific knowledge on a scale unrestricted by national considerations'.⁸² He continued to promote his ideas for more local technical cooperation, giving up 'attempting to introduce a rigid central direction ... [instead] offering the cooperating countries a definite practical plan on a sound scientific foundation'. Echoing his 1938 regional scheme, he envisaged Britain leading in the Middle East and East Africa, while the threat in North Africa was to be taken up by the French government in exile.⁸³ The imperial entomological ambitions of the 1930s were, for the time being at least, being tempered.

To organize surveillance and control, the British government established a Middle East Anti-Locust Unit (MEALU), within its Middle East Supply Centre (MESC).⁸⁴ Planning for operations took place at meetings in Cairo and Teheran.⁸⁵ The Cairo conference in July 1943 was attended by entomologists and officials from Britain (led by Uvarov), India, Egypt, Syria, Lebanon, Palestine, Eritrea and Tripolitania Libya). The deputy resident minister of state for the Middle East, Walter Guinness, told delegates that 'in the locust we have an enemy as ruthless as Genghis Khan or Hitler with the same indifference to human rights, equally willing to bring the horrors of famine to men, women and children. Like Hitler, the locust respects no rules of warfare and observes no national frontier'.⁸⁶ The campaign was military-style in conception and operation. Entomological fieldwork, organized by the IDCLC, was in the hands of stalwarts from the 1930s, Reginald Maxwell-Darling and Owen Lean, along with Desmond Vesey Fitzgerald, who was recruited from the Federated Malay States.

Operations began in January 1944 and involved the armed forces of Britain, India and Persia, with the Soviet Union also committing troops. The first task was to determine what was possible, finding not just outbreak areas, but also ways of moving people and supplies to mount attacks in remote desert locations. Guided by maps drawn up in London, two convoys were sent out, one across the Sinai desert and the other across Persia. International cooperation of a scale and type previously unthinkable was under way. Uvarov noted, 'paradoxically, war conditions have removed many difficulties and have made it possible to organise ... a single plan embracing all the countries involved and assuming the character of offensive operations'.⁸⁷ Needless to say, the fact that Britain footed most of the costs of the operation also facilitated cooperation.

MEALU provided 105 personnel and twenty-nine vehicles, while the British Army sent twenty-four officers and eight hundred other ranks and recruited seventy Sudanese labourers.⁸⁸ They travelled in 329 vehicles, with lorries carrying bran, arsenical poison, and the gallons of water needed for baiting and drinking. At the insistence of Arab leaders, the soldiers bore no arms, but did take specially minted gold sovereigns to barter for supplies and to hire labour. Beyond MEALU's remit in the east, on Persia's border with India (now Pakistan), the situation was monitored by an entomologist working for the Indian Combined Provinces, but he had little to do. The Soviet Union contributed aircraft for surveillance and transport, especially around Teheran.⁸⁹ Late in the campaign,

⁸² Boris P. Uvarov, 'An international anti-locust campaign', *Nature* (1943) 151, p. 41.

⁸³ A correspondent, 'War on the locust: a far-flung battle line on two fronts: an immemorial enemy', *The Times*, 9 January 1943, p. 5.

⁸⁴ E.D.P., 'The Middle East Supply Centre: I. Organization and functions', *Bulletin of International News* (1944) 21(16), pp. 619–25.

⁸⁵ Uvarov, op. cit. (11), pp. 21–30.

⁸⁶ Quoted in Athol Yates, 'The British military and the anti-locust campaign across the Arabian Peninsula, including the Emirates, 1942–1945', *Tribulus: The Journal of the Emirates Natural History Group* (2019) 27, pp. 22–7, 24.

⁸⁷ Boris P. Uvarov, 'The locust plague', in *Smithsonian Report for 1944*, Washington, DC: Smithsonian Institution, 1944, pp. 331–46, 342–3.

⁸⁸ Baron, op. cit. (10), pp. 19–21.

⁸⁹ Etienne Forestier-Peyrat, 'Fighting locusts together: pest control and the birth of Soviet Development Aid, 1920–1939', *Global Environment* (2014) 7(2), pp. 536–71.

the RAF also helped with transport and trialled innovative methods of spraying the new synthetic insecticides, such as Gammexane (known as 666). Post-war assessments were that the campaigns were successful on three levels: (1) there were no significant outbreaks and military operations were unaffected, (2) established control methods had been effective and new ones trialled promised to be more so and (3) British-led international collaboration had ‘worked’.⁹⁰ However, favourable weather and environmental conditions had also contributed to outbreak suppression.⁹¹

Anti-locust measures in East Africa began earlier. After the Middle East planning meeting in Cairo, Uvarov travelled on to Nairobi, where he ‘presided’ over another planning meeting.⁹² The result was the formation of an East African Anti-Locust Directorate, which was to organize surveys and run campaigns. It was to build on the success of operations earlier in the year, when troops that had ended the Italian occupation of Ethiopia were switched to defeating locusts. The report in *The Times* on their offensive stated,

Nearly 4,000 African troops, with 80 European officers and non-commissioned officers, together with a large force of civilian African labourers, were employed in East Africa’s toughest country, and they destroyed untold millions of locusts in the hopper stage. The campaign required at least 300 motor vehicles and hundreds of camels ... Forty thousand bags of poison bait were carried for an average of 200 miles before they were used and as each bag requires 8 gallons of water, more than 300,000 gallons had to be transported over long distances for this purpose alone.⁹³

The report ended quoting that ‘Dr Uvarov declared that the campaign had undoubtedly saved East African crops.’ No new invasions threatened, so to maintain momentum, an ancillary, preventive agency was created – the Desert Locust Survey. Its role was to identify and monitor outbreak areas, of which there were many (see [Figure 4](#)).⁹⁴

In the desert locust’s eastern African invasion area, initiatives were led by the Comité français de libération nationale (CFLN), formed from the merger of France libre (Free France) in London with the North Africa-based Commandement civil et militaire d’Algerauthoritie.⁹⁵ An international meeting was held in Rabat in Morocco in December 1943, that also considered the African migratory locust, though that was not a threat at this time. Claude Peloquin has argued that the drive for locust control exploited a particular conjunction of interests: it ‘called for precisely the type of international, federal, and techno-political apparatus that was necessary to legitimize the role of Free France at the head of the remaining French empire, and as the node linking the colonies with the other Allied countries’.⁹⁶ Uvarov represented Britain. He was critical of the response in French colonies and urged the adoption of a more ‘generalised fight’, using military personnel and poisons.⁹⁷ He cited British, MEALU-led operations as a model. After some hesitance, the French delegates, keen to have British support, agreed

⁹⁰ Uvarov, op. cit. (11), pp. 31–3.

⁹¹ Zena Waloff, *The Upsurges and Recessions of the Desert Locust Plague: An Historical Survey*, London: Anti-Locust Research Centre, 1966. Uvarov, op. cit. (11), pp. 31–3.

⁹² Our correspondent, ‘Campaign that saved East African crops: successful war on locusts’, *The Times*, 24 August 1943, p. 3.

⁹³ Our correspondent, op. cit. (92).

⁹⁴ Uvarov, op. cit. (11), pp. 41–4.

⁹⁵ Claude Peloquin, ‘Locust swarms and the spatial techno-politics of the French Resistance in World War II’, *Geoforum* (2019) 49, p. 103–13.

⁹⁶ Peloquin, op. cit. (95), p. 107.

⁹⁷ TNA, CO 852/544/4, report by Dr Uvarov of the Anti-Locust Conference at Rabat, 28–30 December 1943.

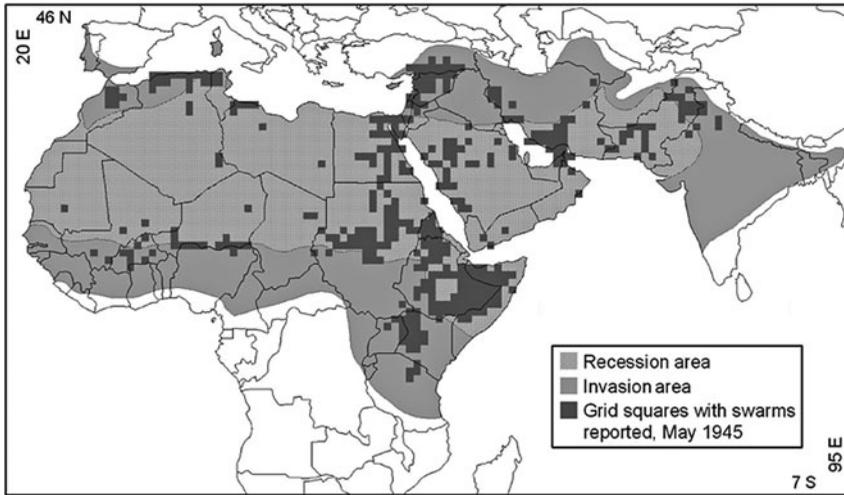


Figure 4. *Schistocerca gregaria*. Desert locust invasion and recession areas, showing data on 1° grid squares reported as infested with swarms for the month of peak abundance in May 1945. Jamie A. Tratalos, Robert A. Cheke, Richard G. Healey and Nils Chr. Stenseth, 'Desert locust populations, rainfall, and climate change: insights from phenomenological models using gridded monthly data', *Climate Science* (2010) 43, pp. 222–38, 230.

to adopt stronger measures and establish an Office national anti-acridien (ONAA). Peloquin argues that the CFLN compromised because they wanted not just Allied practical support, but recognition of their political legitimacy, which was 'best achieved by approval of the entomologist representing Great-Britain, at this instance, Boris Uvarov'.⁹⁸

The war had, against expectations, facilitated international cooperation, albeit with regional organizations and operations not on the scale envisaged in the 1930s. Nonetheless, the two-colony red locust control organisation had been effective in suppressing outbreaks. Also, many nations had cooperated on desert locust control and the absence of plagues allowed the ad hoc measures taken to be seen as successful. For the British Empire, Uvarov and his group had been able to strengthen their position. The IIE remained a hub of information exchange and its staff developed operational experience in anti-locust control methods and politics.

After the war

After the war, one of the first acts of the IDCLC was to create and fund, through the Colonial Office, an Anti-Locust Research Centre in London, separate from the IIE, with Uvarov as director.⁹⁹ Formally, it retained its imperial remit, but the IDCLC hoped it would continue to enjoy its place as the hub of international locust entomology networks. The war had, if anything, increased the quantity and quality of reports received, and its entomologists now had recent experience of the new methods and materials for hopper control and swarm suppression.¹⁰⁰ Also, on the agenda of the IDCLC was to try and make wartime international cooperation permanent, recognizing how difficult it might be to

⁹⁸ Peloquin, op. cit. (95), p. 111.

⁹⁹ Guy Marshall resisted the separation of the ALRC from the IIC. TNA, CO852/547/3. Also see J. Roffey, *The Anti-Locust Research Centre: A Concise History to 1970*, London: Anti-Locust Research Centre, 1970.

¹⁰⁰ Peter Haskell, 'International locust research and control', *Journal of the Royal Society of Arts* (1971) 119, pp. 249–63.

start anew if services were broken up. There were different issues in achieving cooperation, be that international, regional or local, with the three locust species, which I take in turn.

Red locust

The consolidation of cooperation seemed most straightforward with the red locust, as the IRLCS was already in place. Hans Bredo had remained in charge and led the successful management of swarms in 1946 and 1947. Control was easier with the new insecticides, such as dinitro-ortho-cresol, and mobile spraying machines, which allowed hoppers to be attacked on vegetation as well as on the ground.¹⁰¹ Also, military personnel and monies were available from the British government, as outbreak areas were near its ambitious and politically important groundnuts scheme in Tanganyika.¹⁰² In June 1947 a swarm reached the Malagarasi swamp, next to one of the groundnut sites in western Tanganyika. It was another problem for an already troubled scheme but the IRLCS succeeded in keeping the swarm at bay.¹⁰³

The IDCLC called a meeting in Lusaka in 1947 to discuss permanent status for the IRLCS. A telegram from the Secretary of State for the Colonies urged that the highest priority be given to this, and South Africa now agreed to participate. Its minister of agriculture stated that progress would cement white racial ascendancy:

The Union was the pioneer of white civilisation in Africa and ... one way to maintain this civilisation would be to make the African continent safe from diseases and pests. The eradication of the Locust was an important step in this direction.¹⁰⁴

There was no recorded criticism of the comment, but is likely other delegates would have attributed progress differently to 'Western science'; however, this then also had racial connotations as there so few African scientists. In September 1949, officials from Belgium, the United Kingdom, South Africa and Southern Rhodesia (Zimbabwe) met in London and signed a convention to support the IRLCS for ten years.¹⁰⁵ Portugal joined in 1950. It was the first formally constituted international locust control organisation.¹⁰⁶

African migratory locust

In 1946 the French government called a meeting to consider a permanent organization to control the African migratory locust. Nothing was agreed, but events moved quickly when swarms developed on the river Niger in the following year. At a hastily convened meeting, significantly in London, British, French and Belgian officials proposed emergency control

¹⁰¹ Gunn, op. cit. (55), pp. 82–6, 106–8.

¹⁰² Michael Havinden and David Meredith, *Colonialism and Development: Britain and Its Tropical Colonies, 1850–1960*, London: Routledge, 1993. On British cooperation with other colonial powers on development see Charlotte Lydia Riley, "'Tropical Allsorts': the transnational flavor of British development policies in Africa", *Journal of World History* (2015) 26(4), 839–64.

¹⁰³ Nichols Westcott, *Imperialism and Development: The East African Groundnut Scheme and Its Legacy*, Woodbridge: James Currey, 2020, pp. 99–113.

¹⁰⁴ IRLCS, Pretoria, December 1947, North Rhodesia Appendix A, p. 9.

¹⁰⁵ Gunn, op. cit. (55), pp. 87–90. *Treaty Series No. 53, International Convention for the Permanent Control of Outbreak Areas of the Red Locust*, Parliamentary Papers, 1948–9, Cmd.7883, XXXVI.11.

¹⁰⁶ Rosenberg, op. cit. (73), pp. 287–8; J.A. Whellan, 'The problems of locust plague prevention organisations as exemplified by the International Red Locust Control Service', *Proceedings of the International Study Conference on the Current and Future Problems of Acridology* (London, 1970), London: Centre for Overseas Pest Research, 1972, pp. 491–8.

measures, jointly funded by all three countries, but run by local colonial administrations. Uvarov was unhappy, considering 'the present French organisation ... incapable of fulfilling adequately the functions of a locust control service', and urged a more international approach.¹⁰⁷ When the scheme for a control service was proposed, there was still unease amongst British officials, who were reluctant to sanction payments into a service run by the French. Negotiations dragged on, but in the face of new invasions, a provisional agreement on technical cooperation was made under a *Comité international provisoire de prévention acridienne au Soudan français (CIPPAS)*.¹⁰⁸ Reservations about governance remained, especially with racial discrimination in the exclusion of colonial subjects from posts. Despite these misgivings, the British government supported the service as the priority was to prevent swarms and economic losses.

Desert locust

In 1944, prompted by rumours of Soviet plans to set up a permanent desert locust control organisation in the eastern region, British locust field officers had met to discuss post-war possibilities.¹⁰⁹ They hoped that the wartime *internationale* of science and the willingness to allow entomologists to cross national boundaries would continue in peacetime. To this end, they said it was important to avoid any return to national anti-locust measures, which would lead to temporary reactive measures and 'fatalism'. However, there was disagreement on the best way forward between the officers and Uvarov. Field officers argued that because the desert locust did not have permanent outbreak areas, a large, preventive and offensive multinational organization, with headquarters in the Middle East, was needed. Uvarov had previously backed such ideas, having drafted plans for an International Desert Locust Board and International Desert Locust Security Service, but he was now more pragmatic.¹¹⁰ He favoured technical cooperation, looking for agreements between countries to have mobile survey units that could find incipient outbreaks and then organize control operations. Such an approach would be cheaper, offer immediate results and therefore be more likely to attract government support. Nonetheless, he still clung to the belief in permanent swarm suppression by ecological management, rather than relying on insecticides.¹¹¹

Post-war planning was next considered at a meeting in January 1945 in Cairo, where, as head of the British delegation, Uvarov enjoyed a private audience with King Farouk.¹¹² Representatives from Egypt, Britain, Persia, India and the Soviet Union first looked at proposals for an International Desert Locust Security Service. Subsequently, the Egyptian government took the lead, much to the concern of British officials and scientists. Political relations between the countries were strained over the future of the Anglo-Egyptian Sudan and the approaching creation of Israel. There was also talk that the new FAO might be an appropriate home for such a body. Politically, Egypt, India, Persia and other countries were looking to assert their national independence. They

¹⁰⁷ IDCLC 3(47), March 1947.

¹⁰⁸ B. Zolotarevsky, 'History of the International Organisation for the Control of the African Migratory Locust', *Locusta* (1954) 1, pp. 1–32, 32.

¹⁰⁹ TNA, CO 852/545/4, meeting of the IDCLC and locust control officers, 26, 27, 29, 30 June 1944. Also see shorthand notes of meeting held on 30 June 1944.

¹¹⁰ TNA, CO852/544/4, draft scheme for a permanent international organisation for the prevention of outbreaks of the desert locust in East Africa and the Middle East.

¹¹¹ Haskell, *op. cit.* (23), p. 17.

¹¹² TNA, CO 852/544/4, Middle East Anti-Locust Conference, Cairo, 1945, report by B.P. Uvarov and W.B.L. Monson.

were reluctant to allow ‘foreign scientists’ from colonial powers, possibly acting as spies, to roam their country and cross borders. It was against these uncertainties and with new swarms appearing that the British government took the lead and extended support for MEALU. But British policy was divided. It wanted to maintain its influence over any international organization, but it also wanted financial responsibility to be shared more equally, with affected countries in the region bearing more of the burden.

Over the years from 1944 to 1946, the number and threat of swarm invasions reduced.¹¹³ However, with Owen Lean still at the helm, MEALU continued to monitor and attack hoppers when, where and how it could. In certain locations there was resistance from the local population, particularly fears about the poisonous baits and British ‘spying’.¹¹⁴ New insecticides and greater use of aircraft meant that fewer locally recruited staff were needed and operations could be shorter. Such was MEALU’s success in the eyes of the British government that its funding was extended for one last time in 1947. Lean employed the famous explorer William Thesiger to traverse ‘the Empty Lands’ of Arabia to record locust populations, rainfall and vegetation.¹¹⁵ In his memoirs Thesiger admitted to having had little interest in locusts, though his team did the surveying. He spent his time recording local peoples and their customs, which he wrote up later in his book *Arabian Sands*.¹¹⁶

By this time, desert locust invasions across the Middle East were in retreat, largely due to drought, though aided by targeted hopper suppression and the more effective insecticides. Nonetheless, the IDCLC, as part of their efforts to ensure that British entomologists retained some influence, proposed to ‘demilitarize’ MEALU, creating a British Middle East Entomological Bureau. Uvarov supported the proposal, which was probably his idea.¹¹⁷ Apart from separation from the armed services, its selling points were that, as just a ‘bureau’, it would only be concerned with information exchanges, not control measures, plus it would report on pests other than locusts.¹¹⁸ Nothing came of the plan. The same outcome followed discussions about the ALRC becoming an agency of the FAO. The IDCLC withdrew the idea when no monies were forthcoming.¹¹⁹ John Boyd Orr, the first head of the FAO, wrote in his autobiography that at this time the Colonial Office was not interested in international cooperation, even in schemes that would benefit its territories, as with the control of rinderpest and locusts.¹²⁰ This assessment also applied to health, where colonial administrations worried that United Nations agencies ‘would act as agents of ... anti-colonialism as well [as] ... that by placing Africa into a broader global discussion

¹¹³ Uvarov, op. cit. (11), pp. 54–5.

¹¹⁴ Jama Mohamed, ‘“The evils of locust bait”: popular nationalism during the 1945 anti-locust control rebellion in colonial Somaliland’, *Past & Present* (2002) 174, pp. 184–216; Edward D. Melillo, ‘Global entomologies: insects, empire, and the “synthetic age” in world history’, *Past & Present* (2014) 214, pp. 233–70.

¹¹⁵ ‘Middle East field biology’, *Nature* (1945) 156, p. 53.

¹¹⁶ Wilfred Thesiger, ‘A new journey in Southern Arabia’, *Geographical Journal* (1946) 108(4–6), pp. 129–45. In 1948, Uvarov spoke after a talk Thesiger gave on his journey in across the ‘Empty Quarter’. He stated that Thesiger had brought back good information on the biogeography of the area, adding, perhaps through gritted teeth, ‘I am very glad to hear that in addition he found time to investigate many other problems and to bring back other data which have increased very materially our knowledge of this part of Arabia’. Lord Rennell of Rodd, Boris P. Uvarov and Wilfred Thesiger, ‘Across the empty quarter: discussion’, *Geographical Journal* (1948) 111, p. 20. Also see Wilfred Thesiger, *Arabian Sands*, London: Longmans, Green & Co., 1960; Thesiger, *The Life of My Choice*, London: Collins, 1987.

¹¹⁷ TNA, CO 852/544/6, IDCLC minutes of meeting held on 6 January 1946.

¹¹⁸ TNA, AY 11/135, establishment of an international organisation for control of desert locust: preparations for Cairo Desert Locust Conference 1947.

¹¹⁹ IDCLC (47) and 6(47), minutes of meetings held on March 1947 and April 1947.

¹²⁰ John Boyd Orr, *As I Recall*, London: MacGibbon and Kee, 1960, pp. 198–200.

about development ... the historical link between colony and metropole would be obliterated'.¹²¹

Britain's political power in the region was waning, both in the formal empire, with independence in India and Pakistan, and in the informal empire in the Middle East. This context changed the dynamics of international cooperation with the desert locust. Countries affected looked to the FAO to lead, which it did after some hesitation. However, British influence remained in personnel and through the position of the ALRC in world locust science. Any formal British role ended in 1952 with the appointment of an FAO Technical Advisory Committee on the Desert Locust. However, with Owen Lean the lead entomologist some influence remained. Lean was sanguine about the new arrangements, later observing that there was marked improvement in survey and control capabilities – 'once we had the money, everything was easy'.¹²²

In East Africa, where colonial independence came in the 1960s, British influence remained, aided by the creation of the East African High Commission (EAHC), which had cross-colony powers.¹²³ A conference was held in Nairobi in 1948 at which it was agreed to set up a Desert Locust Survey (DLS) to monitor outbreaks and undertake research.¹²⁴ The initiative was part of new British policies for its colonies, seen in the Colonial Development and Welfare Act and, in East Africa, the groundnuts scheme. The British government and EAHC agreed to fund the DLS for five years, with contributions from Eritrea, Somaliland, Somalia and Tripolitania (now Libya). The survey began in October 1948, working closely with the ALRC, which trained many of its staff. When swarms threatened in 1950, a separate Desert Locust Control Organisation was created, with a budget of £3 million over three years. A military-style offensive was mounted, with a racially divided force of '4,000 native troops and 80 European officers', moving tons of bait, water and insecticide on camels and trucks. The cost in the first two years of the campaign was £2.25 million.¹²⁵ Both organizations continued though the 1950s, but in 1962, with independence in East African colonies, becoming the Desert Locust Control Organization for Eastern Africa (DLCOEA).¹²⁶ British influence was now only through the international standing of the ALRC.

Conclusion

Britain's 'imperial entomology' of locusts functioned in research and control from the late 1920s to the early 1960s. It was unique in imperial and colonial science in its persistence as a centrally managed endeavour of research, planning and policy implementation. It was sustained, first, by the close correspondence between locust invasion areas in Africa and South Asia and the territories of the empire, and, second, by the scientific pre-eminence

¹²¹ Jessica Pearson-Patel, 'Promoting health, protecting empire: inter-colonial medical cooperation in post-war Africa', *Monde*, 2015, pp. 213–14. Mark Mazower has argued that one impulse for the creation of the United Nations was the preservation of the British Empire. Mark Mazower, *No Enchanted Palace: The End of Empire and the Ideological Origins of the United Nations*, Princeton, NY: Princeton University Press, 2013. Also see John Kent, *The Internationalization of Colonialism: Britain, France, and Black Africa, 1939–1956*, Oxford: Clarendon Press, 1992.

¹²² Owen B. Lean, *FAO's Contribution to the Evolution of International Control of the Desert Locust, 1951–1963*, Rome: Food and Agriculture Organization of the United Nations, 1965. Uvarov served on the committee, attended annual reviews, and subsequently had many consultancy roles in the FAO. *Summary Report of the First Session of the Technical Advisory Committee on Desert Locust Control*, Rome: FAO, 1952; Waloff and Popov, *op. cit.* (2), p. 7.

¹²³ Gufu Oba, 'Locust invasion and control in East Africa', in Oba, *African Environmental Crisis: A History of Science for Development*, London: Routledge, 2020, pp. 198–9.

¹²⁴ Uvarov, *op. cit.* (11), pp. 41–3.

¹²⁵ East African Commission, *Report of the Desert Locust Survey and Control, 1st October 1950–31st December 1952*, Nairobi, 1953.

¹²⁶ John Hewitt, 'George Popov, MBE', *Asian Affairs* (1990) 30, p. 253.

of experts at the IIE in London, led by Boris Uvarov. From 1929, the imperial gaze of the IIE, along with the networks it fostered, allowed its entomologists to map outbreak areas and monitor plagues, and to prepare plans for control. Indeed, there were immediate benefits in halting incipient swarms of the red locust, plus in the longer term the promise of cheap and effective biological control to suppress plagues altogether.

Work on locusts began as part of the new 'science-for-development' initiatives pursued by the British government for dependent colonies. In the 1930s, these were centred in colonial territories, where distance from Britain and the relative autonomy of sites and personnel enabled innovative, interdisciplinary research and development across the applied biological, agricultural and social sciences. Entomology was no exception, as in the example of tsetse fly investigations.¹²⁷ In contrast, the entomopolitics of locusts was centralized because locust plagues were framed as international problems, requiring centrally coordinated cooperation. Initiatives were developed through a series of conferences in the 1930s, which focused on encouraging the cooperation of science and scientists to bolster information flows in systematics and biogeography. After 1936, this continued, but was supplemented by attempts at cooperation for science, towards creating organizations that would monitor outbreaks and coordinate control measures. Britain led on both fronts in the hope that the IIE would secure a position as the world's leading centre for locust research, acting as a directorate for control operations in affected regions of Africa and South Asia.

It took the exigencies of the Second World War for formal agreements to be made, but these were on a species-specific regional basis, not the ambitious transcontinental, international organizations envisaged previously.¹²⁸ Nonetheless, Britain's military involvement across North and East Africa, the Middle East and South Asia, especially with the desert locust, kept Uvarov and his team at the centre of research, intelligence, policy and operations. The strategic potential of maintaining this position was recognized by the British government in 1945, when it agreed to long-term support for an Anti-Locust Research Centre. It was a small operation by the standards of post-war 'big science', but it was large for a dedicated entomological centre and established a vast geopolitical reach which it maintained for over two decades. However, moves by newly independent colonial territories to end scientific dependency, the growth of FAO involvement and the retirement of key individuals all gradually eroded its influence. In 1971 the ALRC was absorbed into an agency with a larger remit – the Centre for Overseas Pest Research.¹²⁹

How important was Uvarov in locust science in Britain and internationally? His obituaries were eulogies, setting out the breadth and depth of his achievements in acridology, control policy and international cooperation. Is it hagiographic to put Uvarov at the centre of this narrative of imperial entomology? I cannot see how it could be any other way. He was the composer and conductor of imperial and international locust science and policy. Circumstances, ability and energy put him in these positions. His studies on locust anatomy, classification and phase changes found application through the imperial gaze and reach of the IBE.¹³⁰ From the 1920s, he was at the hub of imperial, then world, acridology. Once the British government took up the problem of locust control, Uvarov's personal networks, the support of IIE colleagues and information from field entomologists

¹²⁷ Tilley, op. cit. (7), *passim*.

¹²⁸ Oba, op. cit. (123), pp. 195–6.

¹²⁹ The staff of the centre were still led by veterans from the 1930s and 1940s: George Popov, Owen Lean, Donald Gunn, Desmond Vesey Fitzgerald, Nadia Waloff and Zena Waloff, plus Christopher Hemming, the son of Uvarov's long-time ally Francis Hemming.

¹³⁰ EAC Committee, *Sixth Report*, op. cit. (59), paras. 162–4

meant that he became a significant policy maker. He served on Cabinet-level committees and represented the country at international conferences. When wartime conditions facilitated the establishment of control organizations, he was Britain's leading locust diplomat and planner, a role that continued after the war. One can speculate that one factor in his successes in international dealings was that he was not a typical 'British colonial official.' Biographers agree that he remained 'very Russian', keeping his accent. After one tough meeting of the Advisory Committee of the ALRC, the chair remarked, 'Uvarov will never learn to understand our English ways.'¹³¹ His background, biogeographical research orientation and policy outlook made him the embodiment of the *international* of science, which he adroitly and energetically pursued, aided by the networks and power of Britain's imperial entomology of locusts.

Acknowledgements. I would like to thank Professor Harry Rothman, then at the University of Manchester, for suggesting the research topic. I am also very grateful to entomologists from the former Anti-Locust Research Centre whom I interviewed and corresponded with. I also wish to thank the the centre's library, and staff at The National Archives at Kew. I received valuable comments and advice from reviewers, and am especially grateful to Trish Hatton and Amanda Rees for their comments and editorial assistance.

¹³¹ Sir Geoffrey Evans, quoted in Wigglesworth, op. cit. (14), 725.

Cite this article: Worboys M (2022). Imperial entomology: Boris P. Uvarov and locusts, c.1920–c.1950. *The British Journal for the History of Science* 55, 27–51. <https://doi.org/10.1017/S0007087421000807>