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SCIENCE FUNDING UNDER AN AUTHORITARIAN REGIME: PORTUGAL'S
NATIONAL EDUCATION BOARD AND THE EUROPEAN 'ACADEMIC
LANDSCAPE' IN THE INTERWAR PERIOD

by

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This article enables an understanding of scientific practice and funding in a peripheral country ruled by a dictatorship in the interwar period, and thus provides the basis for comparison with studies of other non-democratic regimes. We examine the work of Portugal's Junta de Educação Nacional (National Education Board), which administered and provided funding for science from 1929 to 1936. Our findings show that this public body encouraged the participation of the Portuguese academic community in international science networks. This scenario contrasts with the dominant historiographical thesis that between the wars the Portuguese academic community did not play a role in international networks, and that it lacked state support. Also in contrast with the dominant historiography, whose ideological bias meant that a simplified picture was portrayed, whereas the reality is shown to be complex, this study demonstrates that the Portuguese dictatorial state sought to foster scientific progress through the Junta, but that resentment among academics and the resistance of universities to innovation meant that this objective was only partially achieved. Finally, the memory of a number of scientists has been rescued from oblivion, as we show how their political stance during the dictatorship led to their being ignored by historiographers when democracy prevailed.

Keywords: funding for science, international scientific networks, circulation of knowledge, resistance and resentment

INTRODUCTION

The study of scientific activity in the period between the two world wars has become an important field of research, allowing for the exploration of issues such as the circulation of knowledge and the internationalization of science in an era which was marked by

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nationalism, autarky and authoritarianism.¹ Other issues that have been explored are progress made in the field of science, the role that academic communities played in dictatorial and totalitarian regimes, public science policy and the funding of science.² In an attempt to resolve these issues, a number of studies analyse the work of institutions that planned and funded science. Such works, which have proliferated over the last two decades, enable an understanding of the role played by public and private bodies in certain European countries, the United States and Canada, tracing the effect of scientific funding on the creation of international networks, the development of specific areas of knowledge, and economic development. In view of the fact that these institutions were durable in nature, the scope of such studies has been limited to specific periods in the lives of these bodies on the one hand and the analysis of the funding of certain fields of knowledge on the other.³

The short period of existence of the Junta de Educação Nacional (JEN; National Education Board), the first institution in Portugal for the planning and funding of science, from 1929 to 1936, enabled a comprehensive analysis of its scientific policy and practice to be conducted.⁴ This involved the analysis of total funding provided by the board, and of funding by fields of

1 Among many other works which may be cited, see Brigitte Schroeder-Gudehus, 'International science from the Franco-Prussian War to World War Two: an era of organization', in *The Cambridge history of science: modern science in national, transnational, and global context*, vol. 8 (ed. Hugh Richard Slotten, Ronald L. Numbers and David N. Livingstone), pp. 43–59 (Cambridge University Press, Cambridge, 2020); A. G. Cock, 'Chauvinism and internationalism in science: the International Research Council, 1919–1926', *Notes Rec. R. Soc. Lond.* **37**, 249–288 (1983); Tiago Saraiva, *Fascist pigs: technoscientific organisms and the history of fascism* (MIT Press, Cambridge, MA, 2016); Martin Grandjean, 'Les réseaux de la coopération intellectuelle: la Société des Nations comme actrice des échanges scientifiques et culturels dans l'entre-deux-guerres', PhD thesis, Université de Lausanne (2018); Elisabeth Crawford, *Nationalism and internationalism in science, 1880–1939: four studies of the Nobel population* (Cambridge University Press, Cambridge, 1992).

2 For example, see Pnina Abir-Am, 'From multidisciplinary collaboration to transnational objectivity: international space as constitutive of molecular biology, 1930–1970', in *Denationalizing science: the contexts of international scientific practice* (ed. Elisabeth Crawford, Terry Shinn and Sverker Sörlin), pp. 153–186 (Kluwer Academic Publishers, Dordrecht, 1993); Claas Kirchhelle, 'The forgotten typers: the rise and fall of Weimar bacteriophage-typing (1921–1935)', *Notes Rec. R. Soc. Lond.* **74**, 539–565 (2020); John Connelly and Michael Grüttner (eds), *Universities under dictatorship* (Pennsylvania State University Press, University Park, 2005); Hans-Walter Schmuhl, *The Kaiser Wilhelm Institute for Anthropology, Human Heredity and Eugenics, 1927–1945: crossing boundaries* (Springer, Dordrecht, 2008); Robert F. Kohler, *Partners in science: foundations and natural scientists, 1900–1945* (University of Chicago Press, Chicago, 1991). For a distinction between dictatorial or authoritarian regimes and totalitarian regimes, see Hannah Arendt, *The origins of totalitarianism* (Harcourt, Brace and Co., New York, 1951).

3 While there is a notable absence of studies that analyse the range of support provided by individual institutions during their period of operation, providing a comparative perspective with similar international institutions, the following works are relevant: Robert Halleux and Geneviève Xhayet, *La liberté de chercher. Histoire du Fonds National Belge de la Recherche Scientifique* (Éditions de l'Université de Liège, Liège, 2007); National Research Council Canada, *100 years of innovation for Canada* (National Research Council Canada, Ottawa, 2016); Michel Pinault, *La science au Parlement. Les débuts d'une politique des recherches scientifiques en France* (CNRS Éditions, Paris, 2006); Juan Luis Rubio Mayoral and Guadalupe Trigueros Gordillo, 'Science and educational models in Europe: from the disaster of 98 to the Weimar Republic (1898–1932)', in *Empires, post-coloniality and interculturality: new challenges for comparative education* (ed. Leoncio Vega), pp. 87–98 (Sense Publishers, Rotterdam, 2014); Raffaella Simili and Giovanni Paoloni, *Per una storia del Consiglio Nazionale delle Ricerche*, 2 vols (Editori Laterza, Rome, 2001); Miguel Ángel Puig-Samper Mulero (ed.), *Tiempos de investigación. JAE-CSIC, cien años de ciencia en España* (Consejo Superior de Investigaciones Científicas, Madrid, 2007); José Manuel Sánchez Ron and José García-Velasco (eds), *100 Años de la JAE. La Junta para Ampliación de Estudios e Investigaciones Científicas en su Centenario*, 2 vols (Publicaciones de la Residencia de Estudiantes, Madrid, 2010); Don Leggett and Charlotte Sleight (ed.), *Scientific governance in Britain, 1914–79* (Manchester University Press, Manchester, 2016); Andrew Hull, 'War of words: the public science of the British scientific community and the origins of the Department of Scientific and Industrial Research, 1914–16', *Brit. J. Hist. Sci.* **32**, 461–481 (1999); Reinhard Siegmund-Schultze, *Rockefeller and the internationalization of mathematics between the two world wars: documents and studies for the social history of mathematics in the 20th century* (Birkhauser Verlag, Basel, 2001); William H. Schneider (ed.), *Rockefeller philanthropy and modern biomedicine: international initiatives from World War I to the Cold War* (Indiana University Press, Bloomington, 2002).

4 On 10 April 1936, the National Education Board was abolished and replaced by the Institute for High Culture, an institution which was similar in nature to its predecessor, while it enjoyed a lesser degree of autonomy from the ruling regime. See Quintino Lopes, 'A Junta de Educação Nacional (1929–36): traços de europeização na investigação científica em Portugal', PhD thesis, Universidade de Évora (2017).

95 knowledge, including the identification of the study centres which received support, as well as
 96 scholarships granted and a profile of scholarship-holders. An attempt was made to ensure that
 97 analysis, for the entire period during which the JEN was operational, was carried out in
 98 accordance with a comparative, transnational perspective, in order to assess the relationship
 99 of a science-funding body which was an organ of an authoritarian, nationalist state, as is
 100 the case of the JEN in Portugal, with similar institutions in other countries.⁵

101 As the JEN was a science-funding institution, particular attention is paid to the ‘money
 102 trail’: the idea that the study of monetary transactions in documents such as state and
 103 institutional budgets, balance sheets, invoices and receipts, when conducted in a thorough
 104 and unprejudiced manner, can change, sometimes radically, our understanding of well-
 105 known episodes in the history of science.⁶ With regard to the study of the JEN’s
 106 operations, this methodology enables the dominant historiographic view—in which
 107 Portugal is portrayed as being scientifically backward while a scenario of the victimization
 108 of the academic community in authoritarian Portugal between the wars is traced—to be
 109 called into question.⁷

110 In this article we also show how the examination of some of the researchers funded by this
 111 Portuguese institution enables us to establish the important role they played in the production
 112 of knowledge, which has nevertheless been disregarded in the field of historiography: their
 113 political stance during the Portuguese dictatorship led to them being ignored by
 114 historiographers following the establishment of democracy on 25 April 1974.⁸

115 116 117 WORLD WAR I: NATIONAL SCIENCE PLANNING AND FUNDING INSTITUTIONS

118
119 The centenary of World War I led to a reassessment of the historiography of the war. It is
 120 widely accepted that, since the 1990s, new interdisciplinary, comparative and cultural
 121 approaches have provided new answers to five key established historiographical questions:
 122 why did war break out? Why did the Allies win? Were the generals to blame for high
 123 casualty rates? How did men endure trench warfare? And to what extent did civilian
 124 society accept and endorse the war effort?⁹ At the same time, it is recognized that these
 125 new perspectives have led to the emergence of new topics: in particular, military
 126
127

128 5 It should be noted that the military dictatorship ruled in Portugal from 1926 to 1933, being succeeded by the Estado Novo
 129 (New State) from 1933 to 1974. The latter, a fascist, nationalist, authoritarian, conservative regime, was overthrown by the military
 130 coup of 25 April 1974, when democracy was established in Portugal. See Fernando Rosas, *História de Portugal*, vol. 7: *O Estado*
Novo (1926–1974) (Editorial Estampa, Lisbon, 1994).

131 6 Casper Andersen, Jakob Bek-Thomsen and Peter C. Kjaergaard, ‘The money trail: a new historiography for networks,
 132 patronage, and scientific careers’, *Isis* **103**, 310–315 (2012); David Edgerton, ‘Time, money, and history’, *Isis* **103**, 316–327 (2012),
 at p. 316.

133 7 Fernando Rosas and other historians argue in favour of this dominant idea: see Fernando Rosas ‘Estado Novo, universidade e
 134 depuração política do corpo docente’, in *Maio de 1968. Trinta anos depois. Os movimentos estudantis em Portugal* (ed. Maria
 135 Cândida Proença), pp. 77–92 (Edições Colibri and Instituto de História Contemporânea da Faculdade de Ciências Sociais e Humanas
 136 da Universidade Nova de Lisboa, Lisbon, 1999); Maria Fernanda Rollo, Maria Inês Queiroz, Tiago Brandão and Ângela Salgueiro,
 137 *Ciência, cultura e língua em Portugal no século XX. Da Junta de Educação Nacional ao Instituto Camões* (Instituto Camões and
 Imprensa Nacional-Casa da Moeda, Lisbon, 2012), pp. 110–115; Jorge Ramos do Ó, *Os anos de Ferro. O dispositivo cultural durante*
a ‘Política do Espírito’ 1933–1949. Ideologia, instituições, agentes e práticas (Editorial Estampa, Lisbon, 1999).

138 8 On the importance of outsiders in history, see Richard Drayton and David Motadel, ‘Discussion: the futures of global history’,
 139 *J. Global Hist.* **13**, 1–21 (2018); Mark Thurner, ‘Historical theory through a Peruvian looking glass’, *Hist. Theory* **53**, 27–45 (2015);
 140 Mark Thurner, ‘An old new world for the history of historiography’, *Storia della Storiografia* **67**, 29–49 (2015).

141 9 Heather Jones, ‘As the centenary approaches: regeneration of the First World War historiography’, *Hist. J.* **56**, 857–878 (2013),
 at p. 857.

occupation, the radicalization of violence, race and the wartime body.¹⁰ A feature of innovative studies is the growing interest in history of science agenda projects. Wartime medical care, post-war rehabilitation of the body, shell-shock treatment and the role of female scientists and doctors during the war are all new topics that reflect an interest in the advancement of science and medicine during and after World War I.¹¹

By 2018, at the end of the series of events marking the centenary of the war, it was notable that, despite the capacity of historians for introducing new themes and interpretations, World War I historiography, though experiencing a regeneration, still did not have an established agenda. Geert Vanpaemel mentions how surprising it is that an institution like the Fonds National Belge de la Recherche Scientifique, which played such an important role in the development and internationalization of science in the post-World War I period, has been the subject of so few historical studies. It is vital that efforts are made to improve our understanding from a comparative and transnational perspective of the role of numerous bodies responsible for organizing and funding scientific research, whose creation, in the vast majority of cases, was bound up with the outbreak of the war (table 1).¹²

The important role that science played during the war and the consequent perception of its influence in redefining the position of states in the post-war period provided a boost for the creation of such bodies, particularly in Europe, the United States and Canada. Most of them were public organizations, although there was also some private funding, while their role was concerned with the planning and long-term funding of scientific research in their respective countries, coordinating research with economic development.¹³

In the case of Portugal, the First Republic (1910–1926) had sought to create such an institution since 1917, but it was not until 1929 that this was done. Although the JEN was set up by the military dictatorship (1926–1933), its main leaders—internationalized physicians such as Augusto Celestino da Costa, Luís Simões Raposo and Marck Athias—sought to maintain the autonomy of the institution vis-à-vis political power. As members of the so-called 1911 generation, these academics supported institutions for medical research, publicly stating that universities in Portugal should follow the example of the University of Berlin, created by Humboldt, an advocate of a combination of teaching and research. Regarding their management of the JEN in order to avoid the interference of regime politicians, it should be noted that in 1931 the president of the republic, General Óscar Carmona, sought to grant a scholarship to a particular candidate, but the JEN

10 *Ibid.*

11 Mark Harrison, *The medical war: British military medicine in the First World War* (Oxford University Press, Oxford, 2010); Heather R. Perry, 'Militarizing the disabled: medicine, industry and "total mobilization" in World War I Germany', in *Finding common ground: new directions in First World War studies* (ed. Jennifer D. Keene and Michael S. Neiberg), pp. 267–292 (Brill, Leiden, 2011); Paul Lerner, *Hysterical men: war, psychiatry and the politics of trauma in Germany, 1890–1930* (Cornell University Press, New York, 2003); Patricia Fara, 'Women, science and suffrage in World War I', *Notes Rec. R. Soc. Lond.* **69**, 11–24 (2015).

12 See note 3. This statement of opinion by Vanpaemel may be found in Geert Vanpaemel, 'To be or not to be: Belgian science policy in the interwar period', in *A Junta de Educação Nacional e a Investigação Científica em Portugal no Período entre Guerras* (ed. Augusto J. S. Fitas, João Príncipe, Maria de Fátima Nunes and Martha Cecília Bustamante), pp. 33–48 (Caleidoscópio, Casal de Cambra, 2013), at p. 36.

13 Roy Macleod, 'The chemists go to war: the mobilization of civilian chemists and the British war effort, 1914–1918', *Ann. Sci.* **50**, 455–481 (1993); David Edgerton, 'Science in the United Kingdom: a study in the nationalization of science', in *Companion to Science in the Twentieth Century* (ed. John Krige and Dominique Pestre), pp. 759–776 (Routledge, London, 2003); Vanpaemel, *op. cit.* (note 12); Stathis Arapostathis and Graeme Gooday, 'Electrical technoscience and physics in transition, 1880–1920', *Stud. Hist. Philos. Sci.* **44**, 202–211 (2013).

Table 1. National science-funding institutions in different countries

Country	Year created	Institution
Belgium	1920	Fondation Universitaire
	1928	Fonds National de la Recherche Scientifique
	1932	Fondation Francqui
Canada	1916	National Research Council
France	1930	Caisse Nationale des Sciences
	1933	Conseil Supérieur de la Recherche Scientifique
	1935	Caisse Nationale de la Recherche Scientifique
	1939	Centre National de la Recherche Scientifique
Germany	1911	Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften
	1920	Notgemeinschaft der Deutschen Wissenschaft
Italy	1923	Consiglio Nazionale delle Ricerche
Portugal	1929	Junta de Educação Nacional
Spain	1907	Junta para Ampliación de Estudios e Investigaciones Científicas
United Kingdom	1915	Department of Scientific and Industrial Research
United States	1916	National Research Council

Source: Adapted from Augusto J. S. Fitas, 'The Junta de Educação Nacional and the organization of scientific research in Portugal between the two world wars', in *A Atividade da Junta de Educação Nacional* (ed. Augusto J. S. Fitas, João Príncipe, Maria de Fátima Nunes and Martha Cecília Bustamante), pp. 13–36 (Caleidoscópio, Casal de Cambra, 2012), at p. 30.

refused to approve the scholarship as the study plan proposed did not meet the requirements of the JEN's scientific policy.¹⁴

Influenced by the Junta para Ampliación de Estudios e Investigaciones Científicas (JAE), the Fonds National Belge de la Recherche Scientifique and the Rockefeller Foundation, each of whose *modus operandi* was known to its leaders, JEN policy established priority for the pure sciences, followed by studies in applied sciences, by the appreciation of the merits of candidates, by support for work plans that could be continued in Portugal following studies begun abroad, by promoting the acquisition of knowledge for the economic benefit of the country and by granting increased support in fields of knowledge which were either underdeveloped or new in Portugal.¹⁵ As we shall see, this led, for example, to considerable support being provided by the JEN to the phoneticist Armando de Lacerda, with the aim of the establishment of experimental phonetics in Portugal.

From 1934, to the dismay of JEN leaders, politicians began to interfere in its affairs, the minister of public education suspending scholarships, while information held by the political police on candidates for scholarships influenced the process of their granting and renewal.¹⁶ The consequent decrease in meritocracy represented the greatest restriction on

14 The leaders of the Junta de Educação Nacional refused to grant this scholarship because they held that the candidate did not explain how the studies she proposed to undertake in philology, literature and classical archaeology at the Sorbonne would be applied later in Portugal (caixa 0398, pasta 11; caixa 1260, pasta 18; caixa 1364, pasta 8, all Arquivo Camões, I.P., Lisbon). On the 1911 generation, see Isabel Amaral, 'A nova face da medicina portuguesa: a geração de 1911 e a escola de investigação de Marck Athias', *Acta Medica Port.* 24, 155–162 (2011).

15 Livro de Actas da Comissão Executiva da Junta de Educação Nacional 1929–35, Arquivo Camões. See also Augusto J. S. Fitas, 'A Junta de Educação Nacional e o lançamento das primeiras iniciativas de um plano para investigação científica no país', in Fitas et al., *op. cit.* (note 12), pp. 49–72.

16 The kind of political limitations imposed on funding by the JEN can be gauged, for example, in 1935 and 1936, when the awarding of new scholarship grants and the renewal of existing grants depended, in addition to the merit of the candidate, on

the JEN's autonomy but, despite its domestic character, the institution, like its counterparts in other countries, contributed towards the establishment and strengthening of international scientific communication networks, characterized by the circulation of people, knowledge, objects and scientific practices and policies between different continents and countries in which different types of political regime held sway. For example, in the 1930s, two politically antagonistic regimes, the Spanish Second Republic (1931–1936) and the fascist Portuguese Estado Novo (1933–74), whose diplomatic relations were severed on 23 October 1936, funded through the JAE and the JEN, respectively, placements for Spanish researchers in Portugal and specialist training for Portuguese researchers in Spain.¹⁷

This was part of a wider movement for cooperation, and the two juntas also collaborated with international bodies such as the Rockefeller Foundation and the *Notgemeinschaft der Deutschen Wissenschaft* on projects of common interest. It should be noted that the influence of the Spanish junta on the policy of its Portuguese counterpart in the matter of awarding scholarships abroad led to the establishment of patterns of geographical distribution of scholarship-holders which showed marked similarities: while chemists and physicists from the two Iberian nations attended the Imperial College of Science and Technology in London and the Institut du Radium in Paris, educators from both countries were likely to meet at the Institut Jean-Jacques Rousseau in Geneva, and Portuguese and Spanish philologists and phoneticists crossed paths at the Fritz Krüger Seminary and the Giulio Panconcelli-Calzia Experimental Phonetics Laboratory in Hamburg.¹⁸

A notable case among physicists is that of the Portuguese Herculano Amorim Ferreira and the Spaniard Blas Cabrera. In the early thirties, as a JEN scholarship-holder, the former carried out research at Imperial College London, publishing an article entitled 'The double refraction of quartz along the optic axis' in the *Proceedings of the Royal Society* in 1932.¹⁹ At Imperial he met Blas Cabrera, who invited him to visit the Laboratorio de Investigaciones Físicas of the JAE in Madrid, of which Cabrera was head. On the occasion of his visit, in June 1932, when the laboratory had already been replaced by the Instituto Nacional de Física y Química, Ferreira requested that the institute should accept one or two Portuguese scientists as researchers. The institute agreed, and as a result the JEN awarded a PhD scholarship to the Portuguese researcher Manuel Teles Antunes, who distinguished himself at the spectroscopy unit of the institute as the most outstanding collaborator of Miguel A. Catalán before the Spanish Civil War, completing his PhD at the Universidad Central de Madrid in January 1936.²⁰

information provided by the secret police. On this point, see the case of the scholarship-holder António de Sousa Pereira, in *Boletim* 89203, 4, Arquivo da PIDE/DGS (Arquivo Nacional da Torre do Tombo), Lisbon.

17 Leoncio López-Ocón, 'The international prominence of the Junta para Ampliación de Estudios e Investigaciones Científicas: the case of grant holders in Portugal', in Fitas et al., *op. cit.* (note 12), pp. 11–32; Lopes, *op. cit.* (note 4). On the severing of diplomatic relations between the Estado Novo and the Spanish republic, see João Medina, 'Salazar e a ruptura de relações diplomáticas com a República Espanhola', in *História de Portugal. O Estado Novo I* (ed. João Medina), pp. 321–342 (Clube Internacional do Livro, Amadora, 1995).

18 Lopes, *op. cit.* (note 4), pp. 53–88. See also Hannah Gay, *The history of Imperial College London, 1907–2007: higher education and research in science, technology and medicine* (Imperial College Press, London, 2007); Soraya Boudia, *Marie Curie et son laboratoire. Sciences et industrie de la radioactivité en France* (Éditions des Archives Contemporaines, Paris, 2001).

19 H. A. Ferreira, 'The double refraction of quartz along the optic axis', *Proc. R. Soc. A* **135**, 214–223 (1932).

20 Caixa 0531, pasta 13, and caixa 0538, pasta 16, Arquivo Camões. The assertion that Manuel Teles Antunes was Miguel Catalán's most prominent collaborator before the Spanish Civil War is made by Rosario E. Fernández Terán, 'El profesorado del "Instituto Nacional de Física y Química" ante la Guerra Civil: el proceso de depuración y el drama del exilio', PhD thesis, Universidad Complutense de Madrid (2014), pp. 800–801.

283 Considering their potential impact, revelations of this nature result in the perception that
 284 greater attention devoted to comparative and transnational studies of the institutions that
 285 organized scientific research between the wars would increase our knowledge about
 286 scientific networks which, by anticipating and supporting the efforts of post-World War II
 287 European movements for cooperation, appear to provide evidence of a process of ‘hidden
 288 integration’ at work in Europe.²¹

291 THE SCIENCE POLICY AND SCIENTIFIC PRACTICE OF THE JEN: A HISTORIOGRAPHICAL
 292 REINTERPRETATION OF WORK IN THE FIELD OF SCIENCE IN PORTUGAL BETWEEN THE WARS
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294 Like any other institution, the JEN produced thousands of documents. The analysis of a
 295 combination of reports, official documents, legislation, receipts and invoices resulting from
 296 the JEN’s work and the content of personal letters, diaries and memoirs enables a
 297 thorough historiographical reassessment of the stance of the Portuguese dictatorial regime,
 298 specifically that of the military dictatorship and the Estado Novo, with regard to scientific
 299 research.²²

300 According to the dominant historiographical perspective, such regimes, traditionally
 301 understood as having devalued science, are blamed for: a lack of investment in research;
 302 the lack of a science policy; and the persecution of the academic community, whose
 303 members are exclusively portrayed as the victims of political repression while being
 304 excluded from international networks. The fact that during the dictatorship Portugal was a
 305 country with an Atlantic outlook, in which relations with the colonies in Africa were
 306 favoured and which pursued a foreign policy which was little concerned with European
 307 affairs, would seem to support this.²³

308 Conversely, by comparison, the first third of the twentieth century in Spain is understood in
 309 scientific and educational terms as an *edad de plata*, or silver age. The JAE had an essential
 310 role to play in this connection, and in 1931–1932 the Fundación Nacional para
 311 Investigaciones Científicas y Ensayos de Reformas was founded to complement its
 312 operations. The importance of the JAE is evidenced by the considerable investment it
 313 made in science, with such funding doubling during the Second Republic.²⁴ In the words
 314 of the historian José María López Sánchez,
 315

317 21 The importance of understanding European and Euro-Atlantic scientific research networks as part of the history of European
 318 integration is highlighted by Giuliana Gemelli, ‘Europe–U.S.A.: American foundations and European scientific integration: actors and
 319 networks (1920’s–1970’s)’, *Mélanges de l’École Française de Rome* **114**, 411–422 (2002). On the concept of the ‘hidden integration’
 320 of Europe, and its association with infrastructure development, transnational networks and technical systems, with roots as far back as
 321 at least the nineteenth century, see Christian Kleinschmidt, ‘Infrastructure, networks, (large) technical systems: the “hidden
 322 integration” of Europe’, *Contemp. Eur. Hist.* **19**, 275–284 (2010); Wolfram Kaiser and Johan Schot, *Writing the rules for Europe: experts, cartels, and international organizations* (Palgrave Macmillan, Basingstoke, 2014).

323 22 On the importance of bureaucracy in the History of Science, see Irina Podgorny, ‘The reliability of the ruins’, *Journal of*
 324 *Spanish Cultural Studies*, **8**, 213–233 (2007); Irina Podgorny, ‘Portable antiquities: transportation, ruins, and communications in
 nineteenth-century archeology’, *História, Ciências, Saúde - Manguinhos*, **15**, 577–595 (2008).

325 23 Among many other studies, see Filipe Ribeiro de Meneses, *Salazar: a political biography* (Enigma Books, New York, 2009);
 326 Rollo, Queiroz, Brandão and Salgueiro, *op. cit.* (note 7), pp. 18, 110–115; Márcia Gonçalves, ‘Of peasants and settlers: ideals of
 327 Portuguese-ness, imperial nationalism and European settlement in Africa, c.1930–c.1945’, *Eur. Rev. Hist.* **25**, 166–186 (2018). From a
 328 different perspective, the assertion that the Estado Novo fostered scientific research, created study centres and pursued an active
 science policy is made by Ana Simões and Maria Paula Diogo, ‘Portugal’, in Sloten et al., *op. cit.* (note 1), pp. 390–401.

329 24 Luis Enrique Otero Carvajal, *La ciencia en España, 1814–2015. Exilios, retornos, recortes* (Catarata, Madrid, 2017), pp. 55–113;
 Juan Lerma and Juan A. de Carlos, ‘Epilog: Cajal’s unique and legitimated school’, *Front. Neuroanat.* **8**, 1–6 (2014). On the Fundación

The board [JAE] was a *privileged* institution, for it not only enjoyed a high degree of administrative autonomy but was also amply provided for in terms of financing while it was given wide-ranging freedom in the allocation of funding. The budget of the JAE was not great, but was indeed generous as compared with the amount allocated in the state budget to university education. ... The coming of the Republic only improved the situation, especially in the economic sphere. At a time when budget cuts were being made, funding provided to the board increased markedly: in fact it doubled.²⁵

In order to test these ideas underlying Portuguese and Spanish historiography we compared the size of the budgets of the Portuguese JEN and the Spanish JAE as a proportion of overall spending of the two nations. As can be seen in [figure 1](#), such detailed analysis creates a greater level of complexity, showing that the notion of the Portuguese dictatorship's sparse investment in scientific research as compared with the high level of such investment made by the Spanish state, particularly during the Second Republic, is misguided. On average, from 1907 to 1933, funding for the JAE accounted for 0.05% of the Spanish government budget, whereas, on average, from 1929 to 1936, spending on the JEN accounted for 0.07% of the Portuguese state budget.

In the light of our analysis, we find that, in the first stage of the Second Spanish Republic, JAE budgets accounted for as much as 0.08% of the total budget of the Spanish state, while during the initial years of the Estado Novo, from 1934 to 1936, JEN budgets consistently accounted for 0.09% of the overall budget of the Portuguese state—such high figures never having been recorded previously for either of the two institutions. This significant level of investment by the Portuguese dictatorial regime—hitherto unheard-of—resulted in the JEN funding 353 long-term scholarships abroad, involving a total of 148 researchers.²⁶ [Table 2](#) shows the results of an analysis of scholarships awarded by the JEN by fields of knowledge and the countries where the scholarships were held.

In contrast with the dominant theory, originating in the field of political historiography and international relations, that the foreign policy of the dictatorial regime was characterized by a lack of interest in European cosmopolitan life and affairs on the one hand, and by mistrust towards them on the other, the present study shows that Portuguese researchers funded by the JEN were to be found at the most prestigious European scientific institutions, and to a lesser extent those in the United States. Seizing the opportunity to play an active role in international science networks, these researchers studied for doctorates at universities in Europe and the USA (a total of 14 individuals attended the universities of Paris, Manchester, Cambridge, London, Liverpool, Geneva and Hamburg, the Technical University of Berlin, the Central University of Madrid and Johns Hopkins University); published books as part of some of the most prestigious collections (such as *Actualités scientifiques et industrielles*, which published works by Albert Einstein, Marie Curie and

Nacional para Investigaciones Científicas y Ensayos de Reformas, see Justo Formentín Ibáñez and Esther Rodríguez Fraile, *La Fundación Nacional para Investigaciones Científicas (1931–1939)* (Consejo Superior de Investigaciones Científicas, Madrid, 2001).

²⁵ José María López Sánchez, 'El Centro de Estudios Históricos y los orígenes de un moderno sistema científico español', in Puig-Samper Mulero, *op. cit.* (note 3), pp. 121–128, at p. 121, emphasis in original. (Translation from the Spanish by Michael Lewis.)

²⁶ *Processos individuais dos bolsseiros*; Livro de Actas da Comissão Executiva da Junta de Educação Nacional 1929–35; Livro de Actas da Comissão Executiva da Junta de Educação Nacional e da Direcção do Instituto para a Alta Cultura 1935–42; all in Arquivo Camões. Records are for both new and renewed scholarships, and include long-term scholarship-holders abroad who either received a new grant or whose grant was renewed up to 10 April 1936, when the JEN was dissolved and replaced by the Instituto para a Alta Cultura. It should be noted that in the little more than seven years during which the JEN was operational most of its budget was used to fund long-term scholarships abroad. In 1931, 57% of its budget was used for this purpose.

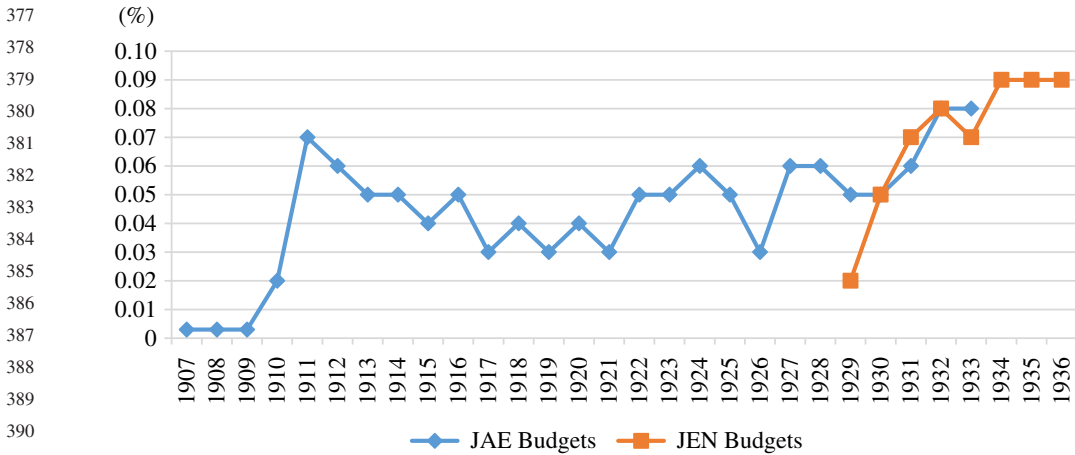


Figure 1. Budgets of the Portuguese JEN (1929–1936) and the Spanish JAE (1907–1939) as compared with Portuguese and Spanish state budgets, respectively. Although the JAE operated from 1907 to 1939, budgetary figures are only available up to 1933. Figures for the JEN and the JAE cover only financing provided for in Portuguese and Spanish state budgets, meaning that private donations by individuals and bodies to the Spanish JAE are not included. (Based on information from the following sources: Repositório da Secretaria-Geral do Ministério das Finanças (orçamentos), available at <http://purl.sgmf.pt/repositorio/orcamentos/index.html>; Orçamentos anuais da JEN and Memórias de la Junta para Ampliación de Estudios e Investigaciones Científicas, Arquivo Camões, available at http://edaddeplata.org/tierra firme_jae/memoriasJAE/index.html; Francisco Comín and Daniel Díaz, ‘Sector público administrativo y estado del bienestar’, in *Estadísticas históricas de España: siglos XIX–XX*, 2nd edn (ed. Albert Carreras and Xavier Tafunell), pp. 873–964 (Fundación BBVA, Bilbao, 2005).

Niels Bohr, as well as the physicist Manuel Valadares and physician the Dr João Maia de Loureiro); published articles in prestigious scientific journals, such as *Nature*, *Comptes Rendus de l’Académie des Sciences de Paris*, *Proceedings of the Royal Society* and *Planta*, *Archiv für wissenschaftliche Botanik*; and delivered papers at conferences at the invitation of some of the most famous scientists of the era (for example, the conference paper presented at the invitation of Marie Curie by the chemist Branca Marques at the Institut du Radium in Paris in 1933).²⁷

This study also shows that, with an average length of 13 months, long-term scholarships abroad funded by the JEN were usually followed by grants being awarded for domestic scholarships, which were on average 29 months long. With a total of 250 domestic grants awarded to 71 individuals, the funding of domestic scholarships, according to researchers,

27 Pièces 1695, 1747, 1750, 1816, 1819, 1821, 1822, 1911, 1915, 1923, 1929, 2056, 2095, 2123, 2125, 3360, 3368, 3373, 3378 and 3380, Laboratoire Curie, Archives de l’Institut du Radium de l’Université de Paris, Paris. Programme des cours, 1931–1934, 1934–1937, 410f226, CH UNIGE Archives de l’Université de Genève, Geneva. Student record 36-37-38, transcript; Student photographs and brief biographical sketch, 1937–1946, 507941; and cat. no. 1937–1938, 1938–1939; all in Alan Mason Chesney Medical Archives, School of Public Hygiene, Johns Hopkins University, Baltimore. Loureiro, J.A., Individual correspondence I/2415/1, Adolf Meyer Archive, Johns Hopkins University. Dr. João Avelar Maia de Loureiro, RG. 10.2 Fellowship recorder cards, G. 2; RF Fellowship cards, D. 9; MNS, box D. 3, folder C; all in Rockefeller Foundation Collection, Rockefeller Archive Center, New York. I. P., Lisbon. Caixa 0397, pastas 11 and 12; caixa 0399, pasta 9; caixa 0401, pasta 27; caixa 0454, pasta 4; caixa 0488, pasta 13; caixa 0530, pasta 23; caixa 1209, pasta 1; caixa 1256, pasta 9; caixa 1262, pasta 9; caixa 1363, pastas 9 and 25; all in Arquivo Camões.

Table 2. Long-term scholarships by country of destination (JEN, 1929–1936)

	Austria	Belgium	Denmark	England	France	Germany	Italy	Netherlands	Poland	Scotland	Spain	Sweden	Switzerland	USA	Yugoslavia
Agricultural science	0	0	0	11	6	4	2	0	0	2	2	2	0	3	0
Education	0	16	1	2	5	0	2	2	0	0	3	3	8	0	0
Engineering	0	1	0	3	14	11	0	0	0	0	0	0	2	0	0
Humanities	4	4	0	6	23	27	4	0	0	0	18	0	2	0	0
Law	0	1	0	2	2	2	0	0	0	0	0	0	6	0	0
Medicine	8	10	0	9	38	35	13	0	1	0	5	0	5	2	5
Pharmacy	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Science	1	2	0	25	41	24	1	0	0	0	8	0	2	0	0
Total	13	34	1	58	130	104	22	2	1	2	36	5	25	5	5

Sources: Arquivo Camões, I. P., Lisbon. Processos individuais dos bolseiros; Livro de Actas da Comissão Executiva da Junta de Educação Nacional 1929-35; Livro de Actas da Comissão Executiva da Junta de Educação Nacional e da Direcção do Instituto para a Alta Cultura 1935-42. For 1936 there are records for new scholarships awarded and scholarships renewed up to 10th April. The total of 443 exceeds the total of 353 scholarships referred to above because some were awarded for study in more than one country and the data in the table takes account of this.

Table 3. Relationship between scholarship-holders, study centres and publications funded by the JEN, 1929–1936

Academic fields	Scholarship-holders abroad	Scholarship-holders in Portugal	Study centres and publications	Funding for study centres and publications (escudos)	Funding for study centres and publications (euros, 2020)
Agricultural science	13	2	6	31,652.00	31,593.27
Education	14	0	5	30,500.00	30,440.53
Engineering	10	3	4	95,000.00	94,814.75
Humanities	33	18	22	458,396.00	457,502.13
Law	5	2	0	0	0
Medicine	44	19	25	502,900.00	501,919.35
Pharmacy	2	1	1	1,500.00	1,497.08
Science	27	26	29	531,718.00	530,681.15
Total	148	71	92	1,651,666.00	1,648,448.26

Records exist for scholarships and funding granted up to 10 April 1936. The column headed ‘Scholarship-holders abroad’ shows data for long-term scholarship-holders only. The final column provides the present-day equivalent for the funding figures.

Sources: Arquivo Camões, I. P., Lisbon. Processos individuais dos bolseiros e processos referentes aos centros de estudo e publicações científicas financiadas, Livro de Actas da Comissão Executiva da Junta de Educação Nacional 1929–35 and Livro de Actas da Comissão Executiva da Junta de Educação Nacional e da Direcção do Instituto para a Alta Cultura 1935–42, all in Arquivo Camões; Núcleo de Estatísticas de Preços no Consumidor, Instituto Nacional de Estatística.

enabled them to devote themselves to research in work time, rather than conducting it in their free time, which they regarded as evidence of their status as professional researchers.²⁸

As can be seen in table 3, on analysing the relationship between scholarship-holders abroad and in Portugal, and study centres and publications funded, the conclusion may be drawn that the aim of JEN funding for domestic scholarships and Portuguese scientific institutions was to enable scholarship-holders to continue in Portugal research they had previously begun abroad and to promote the internationalization of findings. The funding of Portuguese science institutions by the JEN allowed them to purchase the latest equipment, enabling former JEN scholarship-holders abroad, now research fellows in Portugal, to continue at home studies begun abroad. As can also be seen in table 3, the fields of knowledge with the largest number of scholarship-holders, whose study centres received the greatest funding, were science, medicine and humanities. It should be remembered that the leaders of the JEN were aware of the operations of the Fonds National Belge de la Recherche Scientifique, whose creation is closely associated with the speech of King Albert I on 1 October 1927, in which he stressed that pure science is indispensable for applied science to be carried out—hence, the importance assigned by the JEN to the fields of both science and applied science.

²⁸ Processos individuais dos bolseiros; Livro de Actas da Comissão Executiva da Junta de Educação Nacional 1929–35; Livro de Actas da Comissão Executiva da Junta de Educação Nacional e da Direcção do Instituto para a Alta Cultura 1935–42; all in Arquivo Camões. It should be noted that both new and renewed grants are included, as well as domestic scholarship-holders who either received a new grant or whose grant was renewed, up to 10 April 1936. On relations between amateur and professional producers of scientific knowledge, see Morgan Meyer, ‘On the boundaries and partial connections between amateurs and professionals’, *Museum Soc.* 6, 38–53 (2008); Robert A. Stebbins, ‘The Amateur: two sociological definitions’, *Pac. Sociol. Rev.* 20, 582–606 (1977).

In addition, thanks to the influence of the Fonds National Belge de la Recherche Scientifique, funding was provided to scientific publications. Among such publications were Portuguese periodicals published in French, English or German; owing to the high international profile that these journals provided for articles, they received significantly higher levels of funding in comparison with journals which were published in Portuguese. Furthermore, funding was provided for Portuguese researchers to present papers at international scientific conferences and for the holding of such events in Portugal.²⁹

From the above it can be seen how the methodology adopted, when used in the study of the operations of a body like the JEN, can lead to the dominant thinking on science in a given country being called into question. Our thesis is that, from 1929 to 1936, the Portuguese scientific community enjoyed institutional support from the JEN that enabled individuals to take advantage of specialized training at major international research centres and produce and disseminate knowledge, rather than, as traditional historiographers argue, scientists being unable to take part in international scientific networks and being denied access to funding provided by the state.

THE UNIVERSITIES AND POLITICAL POWER: THE CASE OF PORTUGAL AS A CONTRIBUTION TOWARDS A NEW PERSPECTIVE

The academic purges which were carried out by the Portuguese dictatorial regime in 1935 and 1946–1947, which led to the expulsion from Portuguese universities of a number of academics, have been traditionally understood as a result of the political views of these individuals and their opposition to the Estado Novo.³⁰ In recent years, new historiographical interpretations have emerged, in which science policy issues regarding resistance by Portuguese universities to the adoption of the German model of the university—combining teaching and research—which was fostered by the JEN and supported by professors who were expelled, surface as a key causal factor of these purges.³¹ In accordance with these new interpretations, university professors who argued that the universities should be exclusively dedicated to teaching were responsible for the expulsion of their fellow professors, who were also researchers, using the pretext of the political views held by the latter to settle scores within these institutions.

This reading of circumstances, with regard to the specific case of the purges carried out at the Faculty of Sciences of the University of Lisbon in 1947, displays a degree of similarity with that which occurred in the 1930s at the Faculty of Letters in the same university. Manuel Rodrigues Lapa, a JEN scholarship-holder and lecturer at the faculty, was removed by the government from his post in 1935; this was preceded, in 1933, by the termination

²⁹ Under the heading ‘Representação em congressos’, the JEN funded attendance by Portuguese academics at 28 international scientific congresses from 1929 to 1936, at 24 of which papers or reports were delivered by Portuguese attendees. See Lopes, *op. cit.* (note 4), pp. 239–265.

³⁰ Álvaro Garrido, ‘A universidade e o Estado Novo: de “corporação orgânica” do regime a território de dissidência social’, *Rev. Crit. Cienc. Soc.* **81**, 133–153 (2008); Fernando Rosas and Cristina Sifredo, *Estado Novo e universidade. A perseguição aos professores* (Tinta-da-China, Lisbon, 2013); Rollo, Queiroz, Brandão and Salgueiro, *op. cit.* (note 7), pp. 110–115.

³¹ Júlia Gaspar and Ana Simões, ‘Physics on the periphery: a research school at the University of Lisbon under Salazar’s dictatorship’, *Hist. Stud. Nat. Sci.* **41**, 334–341 (2011).

of his contract as a university lecturer in retaliation for his criticism of peers for their lack of engagement with research, and the practice of plagiarism.³²

In the international literature that focuses on academia under authoritarian and totalitarian regimes we find further material supporting the abandonment of the traditional notion of university staff exclusively being the victims of these political powers. Recent studies focus on Franco's Spain, arguing that academic purges were motivated by rivalry and resentment among academics. Some complained about their peers and thus ensured that competitors who stood in the way of their career advancement were removed.³³ In the case of Germany, studies on the relationship between science and diplomacy have shown the impact of the public intervention of German scientists on the political agenda of the Nazi state.³⁴ Similarly, Italian academics played a key role in the racially motivated campaign launched in Italy in 1938, which saw universities as some of the immediate targets.³⁵

The present study is aligned with these interpretive readings and it thus advocates holding universities responsible for some of their actions, and no longer regarding them as being merely victims of persecution by the regime. In addition to the academic purges mentioned above, we present below episodes that occurred within Portuguese universities in support of our thesis. The nature of these cases is distinct from the purges, but all of them contribute to the historiographical reassessment in question.

Let us begin by stating that the identification of all instances of funding made by the JEN to laboratories and study centres in Portugal from 1929 to 1936 demonstrates that JEN funding allowed these bodies to purchase the latest research equipment for use those who had been scholarship-holders abroad. However, sometimes disagreements and enmities among peers prevented some researchers from making full use of these resources and they were forced to return abroad to pursue their research.³⁶ Such a situation occurred for the physicists António da Silveira and Manuel Valadares, who were both JEN scholarship-holders. After working at the Collège de France from 1930 to 1932, where he received Paul Langevin's support, Silveira returned to the Laboratório de Física do Instituto Superior Técnico in

32 In the same year, Rodrigues Lapa was appointed assistant professor of the faculty, a post from which he was dismissed in 1935. Lopes, *op. cit.* (note 4), pp. 111–112. See also Norberto Ferreira da Cunha, *Génesis e evolução do ideário de Abel Salazar* (Imprensa Nacional-Casa da Moeda, Lisbon, 1997), pp. 271–273.

33 Otero Carvajal, *op. cit.* (note 24), p. 122. As part of a more traditional perspective, for the argument that the universities were victimized during the Franco regime in Spain, see Agustí Nieto-Galan, 'Reform and repression: Manuel Lora-Tamayo and the Spanish university in the 1960s', in *Sciences in the universities of Europe, nineteenth and twentieth centuries: academic landscapes* (ed. Ana Simões, Maria Paula Diogo and Kostas Gavroglu), pp. 159–174 (Springer, Dordrecht, 2015); Sara González Gómez, 'History of the university in Spain during the Franco regime: bibliographical analysis', *Educació i Història: Revista d'Història de l'Educació* 26, 187–212 (2015).

34 On the action taken by German geneticists to legitimize Nazi racial policies abroad, see Sheila Faith Weiss, 'The sword of our science as a foreign policy weapon: the political function of German geneticists in the international arena during the Third Reich', *Ergebnisse* 22, 4–31 (2005). See also Mitchell G. Ash, 'Essay review: science, technology, and higher education under Nazism', *Isis* 86, 458–462 (1995). On racial questions and the impact of the persecution of academics on the decline of science in Nazi Germany and the development of science in other countries in which many scientists sought exile, see Stephen H. Norwood, 'Complicity and conflict: Columbia University's response to fascism, 1933–1937', *Mod. Judaism* 27, 253–283 (2007); Marjorie Lamberti, 'The reception of refugee scholars from Nazi Germany in America: philanthropy and social change in higher education', *Jewish Soc. Stud.* 12, 157–192 (2006); Charmian Brinson, 'Science in exile: Imperial College and the refugees from Nazism—a case study', *Leo Baeck Inst. Yearb.* 51, 133–152 (2006); Siegmund-Schultze, *op. cit.* (note 3); Reinhard Siegmund-Schultze, *Mathematicians fleeing from Nazi Germany: individual fates and global impact* (Princeton University Press, Princeton, 2009).

35 'The July 1938 "Manifesto of racial scientists", signalling the beginning of state anti-Semitism, was signed by individuals who all occupied full-time posts in the Italian university system'. Ruth Ben-Ghiat, 'Italian universities under Fascism', in Connelly and Grüttnner, *op. cit.* (note 2), pp. 45–73, at p. 67.

36 The equipment included Leica cameras, and Zeiss microscopes, cine-cameras, micromanipulators, spectrographs and microphotometers (Caixa 1308, pasta 2; caixa 1320, pasta 2; and caixa 1480, Pasta 11, all Arquivo Camões).

612 Lisbon; as head of the laboratory he was granted JEN funding, enabling the purchase of a
613 Zeiss microphotometer. However, JEN stipulated that the instrument, the only one of its
614 kind in Portugal, could only be used by Portuguese scientists who had acquired the skills
615 required to operate it, and invested Silveira with the authority to authorize access to it,
616 which brought unexpected negative consequences for JEN members.³⁷

617 Although Silveira and Valadares both supported the theory and practice of scientific
618 research, the deterioration of personal relations between the two, following the closure in
619 1939 of the Núcleo de Matemática, Física e Química (Mathematics, Physics and Chemistry
620 Unit), which they had jointly set up in 1936 and run, led to Silveira preventing Valadares
621 from using the microphotometer in his research, although he had received his doctorate
622 from the University of Paris under the guidance of Marie Curie in 1933, and was thus
623 endowed with the skills required to operate it. Silveira instead granted Francisco Mendes,
624 Valadares' assistant, access to the instrument. In the face of these circumstances and the
625 JEN's reluctance to provide a second microphotometer, Valadares was forced to leave
626 Portugal once again, moving to Italy in 1940, where he was able to use a microphotometer
627 in his research.³⁸

628 During the Estado Novo there is also evidence of the existence of informants among
629 university teaching staff who passed on information about colleagues to the secret police,
630 in some cases leading to their being forced into retirement. One such situation involved
631 Sílvio Lima, a professor at the Faculty of Letters of the University of Coimbra, who was
632 denounced by colleagues who suggested that he should be expelled, and this indeed
633 contributed to the decision by the government to expel him in 1935.³⁹

634 Besides this, bureaucratic manoeuvres were employed by full professors with the aim of
635 preventing PhD candidates from attending viva voce examinations and withholding
636 recognition in Portugal of doctorates gained abroad, thereby preventing new teaching
637 researchers, especially JEN scholarship-holders—who were not their protégés—from
638 becoming established in their academic careers. Let us consider the case of Delfim Santos,
639 who as a JEN fellow attended the seminars of the Vienna Circle, the classes of Nicolai
640 Hartmann in Berlin, and the University of Cambridge. During his time spent abroad,
641 studying the history and philosophy of science, he began to study for a PhD.

642 In order to demonstrate how his work was progressing, in 1937 he sent two chapters of his
643 PhD dissertation to the Instituto para a Alta Cultura, which, having replaced the JEN, was
644 providing funding for Santos' PhD course. However, in the event, presenting these
645 chapters prevented him from defending his doctorate at the University of Coimbra, which
646 would have allowed him to join its teaching staff. On 18 June 1938, the secretariat of the
647 University of Coimbra informed Santos that his dissertation could not be accepted since
648 two chapters had been sent to the Instituto para a Alta Cultura. In the opinion of Delfim
649 Santos, the origin of this message of refusal, based on the supposed lack of originality of
650 his dissertation, was the opposition of Joaquim de Carvalho, a full professor at the Faculty
651 of Letters, to Santos' admission to the faculty as a teaching officer. Carvalho was probably
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655 37 Caixa 1308, pasta 2, and caixa 1339, pasta 7, both Arquivo Camões.

656 38 Founded by some of the JEN's former fellows who had studied abroad, and supported by other researchers, the Núcleo de
657 Matemática, Física e Química was formally dissolved, amid disagreement and dispute among its members, on 5 November 1939
(Caixa 0488, pasta 9, and caixa 1480, pasta 11, Arquivo Camões). See also Lopes, *op. cit.* (note 4).

658 39 Paulo Archer de Carvalho, 'Sílvio Lima, ou o retorno do recalçado', *Revista Filosófica de Coimbra* 39, 213–244 (2011).

659 aiming to hold this post in reserve, it having been previously occupied by his disciple Sílvio
660 Lima, who, as mentioned above, had been expelled from the university in 1935.⁴⁰

661 The actions of full professors also limited scientific development in Portugal during the
662 interwar period as they invariably refused to undertake long-term JEN scholarships abroad,
663 being unwilling to play a subordinate role vis-à-vis foreign scientists. This resulted in the fact
664 that, from 1929 to 1936, only 6% of holders of such scholarships were full professors,
665 lecturers accounting for 28% of the total, assistant professors 10% and non-university teachers
666 23%. On the other hand, among academics who received JEN funding to attend congresses,
667 where no similar question of hierarchical relations was involved, 47% were full professors,
668 and lecturers accounted for 7% of the total, while there were no assistant professors.⁴¹

669 Among the range of fields of knowledge funded by the JEN, shown in table 3, the unique
670 position of law faculties should be noted. In contrast with institutions in other fields, they did not
671 apply for funding. A similar tendency is evident in the absence of applications for JEN funding
672 for long-term scholarships abroad by law faculty teaching staff; of the five holders of long-term
673 scholarships abroad in the field of law, none had achieved a lectureship in a Portuguese faculty
674 by the time their funding ended. Academics in law faculties held that the JEN's role should be
675 to produce propaganda extolling the national culture rather than providing funding for science,
676 so the lack of applications for funding provides evidence of their resistance to the development
677 of law studies, something the JEN meanwhile sought to encourage.⁴²

678 The cases presented show how attention to detail in the examination of an institution like the
679 JEN responsible for funding the national science system renders the 'academic landscape' more
680 complicated.⁴³ The present study, focusing on the Portuguese Estado Novo, provides a
681 contribution towards increasing our knowledge about resistance, rivalry and resentment
682 among academics which affected the progress of scientific development at universities in
683 countries governed by non-democratic regimes. As part of a new historiographical approach
684 to events, the responsibility of universities for shaping events is emphasized, in contrast to
685 the traditional perspective in which they were seen as passive victims of political power.⁴⁴

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688 40 Caixa 0401, pasta 7; caixa 1273, pasta 16; caixa 1323, pasta 4; caixa 1377, pasta 1, all in Arquivo Camões. The notion that
689 Joaquim de Carvalho prevented Delfim Santos from defending his doctorate at Coimbra in 1938 was advanced by José Alves,
690 'Logificação da psicologia: o itinerário intelectual de Edmundo Curvelo sobre a mente, a lógica e a filosofia', PhD thesis,
691 Universidade do Minho (2015), p. 649. See also Lopes, *op. cit.* (note 4), pp. 278–283.

692 41 Processos individuais dos congressistas e dos bolsheiros externos de longa duração, Arquivo Camões. For 1936, all congress
693 attendees and holders of long-term scholarships abroad who received a grant up until 10 April are included. Besides the categories
694 mentioned, the beneficiaries include undergraduate students, university researchers (all those who did not teach but carried out
695 academic work at universities) and graduates who worked as doctors, lawyers and agricultural scientists.

696 42 The juridical institutions of the faculties of law of the universities of Coimbra and Lisbon were established according to the
697 provisions of Decreto no. 4,874 of 5 October 1918, while their importance in the 'science education of students' and their role in
698 'conducting original research' were restated in Decreto no. 12,707 of 17 November 1926. Despite this, no head of either of these
699 juridical institutions expressed a willingness to carry out research with the support of the JEN. See Processo do professor José Alberto
700 dos Reis, caixa 253, and Processo do professor Domingos Fezas Vital, caixa 388, both in Arquivo da Universidade de Coimbra,
701 Coimbra. See also Ângela Salgueiro, 'Ciência e universidade na i república', PhD thesis, Universidade Nova de Lisboa (2015),
702 pp. 95–96, 152–153.

703 43 The importance of attention to detail in the study of institutions, objects and scientific collections is stressed in Miruna Achim
704 and Irina Podgorny, 'Introducción: descripción densa, historia de la ciencia y las prácticas del coleccionismo en los años de la
705 revolución, la guerra y la independencia', in *Museos al detalle. Colecciones, antigüedades e historia natural, 1790–1870* (ed. Miruna
706 Achim and Irina Podgorny), pp. 15–26 (Prohistoria Ediciones, Rosario, 2013). We have adopted the expression 'academic landscape'
707 used by Nieto-Galan, *op. cit.* (note 33), p. 160.

708 44 On the idea that 'the history of political repression is replete with inhumanity and tragedy, but science as an institution
709 cannot be understood merely as a passive victim of external power', see Richard Beyler, Alexei Kojevnikov and Jessica Wang,
710 'Purges in comparative perspective: rules for exclusion and inclusion in the scientific community under political pressure', *Osiris* 20,
711 23–48 (2005), at p. 24.

POLITICAL VISIBILITY AND SCIENTIFIC (IN)VISIBILITY: JEN SCHOLARSHIP-HOLDERS
AS NEW 'INVISIBLE TECHNICIANS'

Steven Shapin drew attention to the importance of technicians and operators in the production and recording of scientific knowledge in 1989.⁴⁵ His historiographical interest in 'invisible technicians' provided a contribution towards the reassessment of the traditional approach, focusing on the principal figures associated with scientific institutions, by highlighting the importance of other actors. Thus, technical ancillary staff, artificers, assistants, collectors, landowners and rural workers, priests and merchants, among other actors, have in recent years become the central focus of analysis, demonstrating the collective nature of the production of scientific knowledge.⁴⁶

The case study presented in this paper reveals how internationally recognized Portuguese scientists became invisible historiographically, in keeping with the ideas of Shapin but from a different perspective. Rather than playing a secondary or even anonymous role and largely obscured by mainstream scientists, these were the heads of institutes and scientists recognized for their scientific work but who nevertheless became invisible, despite there being many references to their work in historical sources. As they were not persecuted for political reasons during the Estado Novo, their memory was consigned to oblivion, while during the process of transition to democracy in Portugal after 25 April 1974 historiographers focused mainly on the recovery of the memory of scientists who *were* persecuted by the dictatorship. An examination of reference works and overviews of the Estado Novo and Portuguese academics during this period provides support for this idea.⁴⁷

The story of a few such scientists presented below, selected on the basis of the quantitative analysis discussed above, provides evidence supporting this new perspective on Shapin's 'invisible technicians'. João Maia de Loureiro, a full professor at the Faculdade de Medicina de Lisboa and a fellow of the Rockefeller Foundation, is one of them. He gained a degree in medicine from the University of Lisbon in 1926, and from 1932 to 1938 carried out research with a scholarship from the JEN and the Rockefeller Foundation at the Chemistry Laboratory of the University of Zurich, the Biophysics Laboratory of the École des Hautes Études in Paris, the London School of Hygiene & Tropical Medicine, the National Institute for Medical Research in London, and the Johns Hopkins School of Hygiene and Public Health, where he completed his doctorate in biochemistry in 1938.⁴⁸

The articles he published in journals such as *Klinische Wochenschrift* (1932), *Biochemische Zeitschrift* (1933), *Comptes Rendus de la Société de Biologie de Paris* (1933

45 Steven Shapin, 'The invisible technician', *Am. Sci.* **77**, 554–563 (1989).

46 Among many other examples which may be cited, see Simon Schaffer, Lissa Roberts, Kapil Raj and James Delbourgo (eds), *The brokered world: go-betweens and global intelligence, 1770–1820* (Science History Publications, Sagamore Beach, MA, 2009); Chris Gosden and Francis Larson, *Knowing things: exploring the collections at the Pitt Rivers Museum 1884–1945* (Oxford University Press, Oxford, 2007); Achim and Podgorny, *op. cit.* (note 43); Lorraine Daston and H. Otto Sibum, 'Scientific personae and their histories', *Sci. Context* **16**, 1–8 (2003); Catherine M. Jackson, 'Visible work: the role of students in the creation of Liebig's Giessen research school', *Notes Rec. R. Soc. Lond.* **62**, 31–49 (2008); Elisabete J. Santos Pereira, Maria Margaret Lopes and Maria de Fátima Nunes, "'Collective wisdom" at the National Archaeological Museum in Portugal', *Museum Hist. J.* **12**, 171–191 (2020). See also Alan Briskin, Sheryl Erickson, John Ott and Tom Callanan, *The power of collective wisdom and the trap of collective folly* (Berrett-Koehler Publishers, San Francisco, 2009).

47 See Fernando Rosas and J. M. Brandão de Brito (eds), *Dicionário de história do Estado Novo*, 2 vols (Bertrand Editora, Venda Nova, 1996); Rosas and Sifredo, *op. cit.* (note 30); and Augusto Fitas (ed.), *Cultura científica e neo-realismo* (Edições Colibri, Lisbon, 2019).

48 Caixa 0399, pasta 1; caixa 0532, pasta 3; caixa 0546, pasta 22; caixa 1229, pasta 2, all in Arquivo Camões.

and 1934) and *Journal de Chimie Physique* (1934 and 1936), and the two works that he published in *Actualités Scientifiques et Industrielles* (1934 and 1935), attest to the kind of brilliance that the Rockefeller Foundation sought in fellows. Having accumulated significant merit outside Portugal, he was awarded a grant by the Rockefeller Foundation to pursue his doctorate at Johns Hopkins University from 1936 to 1938.⁴⁹

Besides international recognition of Loureiro's research work, he occupied a number of posts at Portuguese scientific institutions. He became Professor of Hygiene and Epidemiology at the Faculdade de Medicina in Lisbon in 1939 and was appointed head of the Instituto Bacteriológico Câmara Pestana in 1942. In spite of these academic achievements, Loureiro, a scientist who was politically neutral during the dictatorship, is absent from contemporary Portuguese historiographical literature. By contrast, colleagues of his who were also recognized internationally by contemporary academics, but who were persecuted politically by the Estado Novo, such as the scientists Abel Salazar and Aurélio Quintanilha, have garnered the attention of historians from the establishment of democracy in 1974 to the present day.⁵⁰

The identification of JEN research fellows also enables us to rescue from oblivion and restore to the history of science the name of a world pioneer in the field of experimental phonetics: Armando de Lacerda.⁵¹ In the early thirties, noting the lack of suitable devices that could confirm the mutual influence exerted by contiguous speech sounds—'one of the crucial problems of general phonetics of the time (perhaps even one of the most important issues in the history of this field of language science)', Lacerda, a JEN scholarship-holder at the University of Bonn, invented the 'oral labiograph inscriber' and the 'polychromograph'.⁵² At the same time as being the first instruments to enable the recording of reciprocal effects of sequential sounds in speech, these devices also brought improvements which rendered obsolete the more limited kymographic method, the main experimental process at the time, and introduced a new method of research—chromography—enabling Lacerda and Paul Menzerath (head of the Institute of Phonetics at the University of Bonn) to publish what was to become a standard work of reference in the field of phonetics: *Koartikulation, Steuerung und Lautabgrenzung* (1933).⁵³

With regard to Lacerda's scientific work in Portugal, in 1936 he established the first experimental phonetics laboratory in the country at the Universidade de Coimbra, thanks to funding from the JEN. The use of chromography techniques at the Laboratório de Fonética Experimental de Coimbra, employing the most advanced equipment in the field, demonstrates why it was regarded by several mid-twentieth century scientists as the most

49 Dr. João Avelar Maia de Loureiro, RG. 10.2 Fellowship recorder cards, G. 2; RF Fellowship cards, D. 9; MNS, box D. 3, folder C; in Rockefeller Foundation Collection, Rockefeller Archive Center. João Maia de Loureiro, 'Chemical analysis of tissues', PhD thesis, Johns Hopkins University (1938), Special Collections, Sheridan Libraries, Johns Hopkins University. Caixa 0399, pasta 1; caixa 0532, pasta 3; caixa 0546, pasta 22; caixa 1229, pasta 2, all in Arquivo Camões.

50 As an example of this kind of historiographical treatment, see Rosas and Sizifredo, *op. cit.* (note 30); Cunha, *op. cit.* (note 32); Amélia Filomena de Castro Gomes, 'A educação libertária segundo Aurélio Quintanilha', master's thesis, Universidade do Minho (2005).

51 Caixa 1337, pasta 3, Arquivo Camões.

52 The terms quoted may be found in Brian F. Head, 'Lacerda (Armando de)', in *Enciclopédia verbo Luso-brasileira de cultura, edição século XXI*, 17, pp. 219–221 (Verbo, Lisbon, 2000), at p. 219. See also Caixa 1337, pasta 3, Arquivo Camões.

53 Paul Menzerath and Armando de Lacerda, *Koartikulation, Steuerung und Lautabgrenzung* (Ferd. Dümmlers Verlag, Berlin, 1933). See also caixa 1337, pasta 3, Arquivo Camões; António Almeida, 'Necrologium: Armando de Lacerda', *Phonetica* 42, 48–49 (1985); Göran Hammarström, *Memories of a linguist 1940–2010* (Lincom Europa, Munich, 2012), p. 90.

advanced experimental phonetics laboratory in Europe.⁵⁴ This explains why, from 1936 to the mid-twentieth century, the laboratory, located on the European periphery, attracted many scientists from Europe, the Americas and Africa, who sought to undergo a period of specialist scientific training at Coimbra.⁵⁵ Among them were academics from universities such as Harvard, the Sorbonne, Cambridge, Bonn, Uppsala and Edinburgh.⁵⁶

Despite his standing worldwide, Lacerda has been forgotten by Portuguese historiographers, which may be understood as resulting from his politically neutral stance during the period of the dictatorship. He was never barred from working at universities by the Estado Novo nor prevented from pursuing his career as a researcher. His public profile, monitored by the Portuguese political police, did not raise suspicion of political opposition to the dictatorial regime.⁵⁷

From the above it is clear that the present study is part of the movement which includes the work of authors such as Tiago Saraiva, who refers to the existence of a ‘traditional historical approach of studying the relations between science and fascism as two separate entities’.⁵⁸ It is Saraiva’s distancing from this perspective that enables him to identify a new aspect to the path followed by the Portuguese scientist Aurélio Quintanilha. While in traditional historiography Quintanilha’s political opposition to the fascist New State is highlighted, Saraiva, finding in Quintanilha’s anarchist beliefs one of the main causes of his expulsion from his post as a full professor at the University of Coimbra in 1935, recognizes that, despite his well-known political opposition to the regime, the scientific work of Quintanilha is associated with one of the darkest pages in the history of Portuguese colonialism.⁵⁹ During Quintanilha’s internal exile, to the Portuguese colony of Mozambique following being barred from working at universities in the home country, he was recruited by the Junta de Exportação do Algodão Colonial (Colonial Cotton Export Board) to head the Centro de Investigação Científica Algodoeira (Centre for Scientific Research into Cotton) and therefore his name is associated with a body that managed cotton plantations on which local native people were forced to work on pain of physical violence.⁶⁰ In other words, although Quintanilha’s political views contrasted starkly with the regime that sent him into exile, by applying his skills as a geneticist at the Centro de Investigação Científica Algodoeira in Lourenço Marques (present-day Maputo), he

54 This opinion may be found in, among others, Pierre Van Bever, ‘Chronique’, *Rev. Belge Philol. Hist.* **31**, 206–369 (1953), at p. 248; ‘Cinco minutos de palestra com o Professor Silva Bueno’, *1.º de Janeiro*, 12 November 1952, Arquivo Familiar Paulo de Lacerda, Porto. See also Francis M. Rogers, ‘Review: étude de phonétique auditive sur les parlers de l’Algarve’, *Romance Philol.* **8**, 284–299 (1955), at pp. 284–285.

55 In many studies the importance of scientific peripheries in the production and international circulation of knowledge is highlighted. Among such works, which challenge the traditional idea of the unidirectional transfer of knowledge from the centre to the periphery, see Lissa Roberts, ‘Situating science in global history: local exchanges and networks of circulation’, *Itinerary* **33**, 9–30 (2009); James A. Secord, ‘Knowledge in transit’, *Isis* **95**, 654–672 (2004); Tessa Hauswedell, Axel Körner and Ulrich Tiedau (eds), *Re-mapping centre and periphery: asymmetrical encounters in European and global contexts* (University College London, London, 2019); Marcos Cueto, *Excelencia científica en la periferia. Actividades científicas e investigación biomédica en el Perú, 1890–1950* (Grade, Lima, 1989).

56 Some of these cases were examined by Quintino Lopes and Elisabete Pereira, ‘Armando de Lacerda and experimental phonetics in the inter-war period: scientific innovation and circulation between Portugal, Germany and Harvard’, in *Proceedings of the third international workshop on the history of speech communication research* (ed. Michael Pucher, Jürgen Trouvain and Carina Lozo), pp. 95–104 (Technische Universität Dresden Press, Dresden, 2019).

57 The information held by the Estado Novo political police on Armando de Lacerda may be found in Arquivo da PIDE/DGS, DEL C, PI 5277, NT4499, Arquivo Nacional da Torre do Tombo.

58 Saraiva, *op. cit.* (note 1), pp. 169–170.

59 *Ibid.*, p. 172.

60 *Ibid.*, pp. 168–183.

847 contributed to making the notion of imperial territories supplying the autarkic economy of the
848 Portuguese fascist regime seem plausible.⁶¹

849 The present study is part of this new perspective regarding the action of scientists under
850 dictatorial regimes and indeed complements it: firstly, because it enables scientific actors such
851 as Loureiro and Lacerda to be identified and rescued from historiographical oblivion, and
852 secondly, as we will see below, because it enables aspects of the work of Portuguese
853 scientists during the Estado Novo period which have not been afforded the recognition they
854 deserve to be rehabilitated as part of the history of science. Rather than being opponents of
855 the dictatorial regime, or politically neutral, such academics expressed a degree of tacit
856 support for it and thus ended up playing an enthusiastic role in its construction and consolidation.

857 The story of António Augusto Mendes Correia, a full professor at the Faculdade de Ciências
858 do Porto, is a case in point, demonstrating how his explicit support for the dictatorial regime
859 resulted in only some of his public service becoming invisible with the coming of
860 democracy, rather than his work being completely ignored, as was the case with Loureiro
861 and Lacerda, who were politically neutral. During the Estado Novo, Correia served as Mayor
862 of Porto from 1936 to 1942 and as a deputy in the Assembleia Nacional from 1945 to 1957.
863 Focusing on his nationalist views, which were well received by the Estado Novo as they
864 portrayed the Lusitanians as the founding forefathers of the Portuguese nation, in present-day
865 democratic Portugal historiographers have rehabilitated this aspect of his life and work.⁶²
866 Although in recent years some studies have covered the role he played in international
867 scientific networks, his outstanding international profile in the interwar and post-World War
868 II periods has not, as yet, been afforded the recognition it deserves.⁶³

869 Having served as a full professor at the Faculdade de Ciências do Porto from 1921 and
870 head of its Institute of Anthropology from 1923, Correia was welcomed in France,
871 Belgium and Germany in 1931 as a ‘Portuguese sage’ at conferences where he delivered
872 papers, at venues such as the École d’Anthropologie de Paris and the Kaiser-Wilhelm-
873 Gesellschaft zur Förderung der Wissenschaften in Berlin.⁶⁴ His international reputation,
874 enhanced mainly by his work in the fields of archaeology, anthropology, ethnology and
875 criminology, is evidenced by the honorary doctorates he was awarded by the University of
876 Lyon in 1929 (for which journey he benefited from JEN funding), the University of
877 Montpellier in 1941 and the University of Johannesburg in 1949.⁶⁵

878 Correia was also a member of board of the International African Institute in London, and
879 his importance in the advancement of knowledge is attested to by the fact that by 1929 his
880 works were being cited by authors and journals in Spain, France, Britain, Italy, Belgium,
881 Holland, Switzerland, Germany, Austria, Poland, Czechoslovakia, Lithuania, Brazil and the
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884 61 *Ibid.*

885 62 See Sérgio Gomes, ‘O passado, a identidade e as teias do governo: estudos sobre os entrelaçamentos das práticas de produção
886 do conhecimento arqueológico e de construção da identidade nacional salazarista’, PhD thesis, Universidade do Porto (2011),
887 pp. 428–490; Patrícia Ferraz de Matos, ‘Mendes Correia e a Escola de Antropologia do Porto: contribuição para o estudo das relações
888 entre antropologia, nacionalismo e colonialismo (de finais do século XIX aos finais da década de 50 do século XX)’, PhD thesis,
889 Universidade de Lisboa (2012); Patrícia Ferraz de Matos, *The colours of the empire: racialized representations during Portuguese
890 colonialism* (Berghahn Books, New York, 2013), pp. 54–69.

891 63 See Patrícia Ferraz de Matos, ‘Anthropology in Portugal: the case of the Portuguese Society of Anthropology and Ethnology
892 (SPAÉ), 1918’, in *Local knowledge, global stage* (ed. Regna Darnell and Frederic W. Gleach), pp. 53–97 (University of Nebraska
893 Press, Lincoln, NE, 2016); Patrícia Ferraz de Matos, ‘Um olhar sobre as relações entre Portugal e o Brasil a partir da obra de Mendes
894 Correia: desafios, pontes e interações’, *População e Sociedade* 21, 53–69 (2013).

895 64 Caixa 0399, pasta 18, Arquivo Camões.

896 65 Caixa 0399, pasta 18, and caixa 0495, pasta 4, Arquivo Camões.

894 United States, among them the British journal *Nature* and the French publication
 895 *L'Anthropologie*, as well as researchers such as the Swiss anthropologist Eugène Pittard
 896 and the French archaeologist Henri Breuil, a professor at the Collège de France.⁶⁶

897 The historiographical rehabilitation of academics such as João Maia de Loureiro and
 898 Armando de Lacerda, and the recuperation of the visibility enjoyed by António Augusto
 899 Mendes Correia at the international level, resulting from the analysis of JEN funding for the
 900 Portuguese academic community, provides a further example of the importance of studying
 901 institutions which funded science in the interwar period. In this section, we have shown how,
 902 in the category of invisible actors, not only Shapin's 'assistants', 'technicians', 'operators'
 903 and 'artificers' should be considered, but also internationally renowned scientists whose lack
 904 of visibility in the case of Portugal is due to choices made in the field of historiography
 905 within the democratic political context.⁶⁷ Historians have previously prioritized the study of
 906 scientists who were opposed to the dictatorial regime of the Estado Novo.

907 CONCLUSION

908 The present study has demonstrated the advantages of analysing in detail the work of a
 909 scientific planning and funding body—the Portuguese Junta de Educação Nacional—
 910 throughout the period of its existence, within the constraints inherent in an investigation
 911 adopting a comparative and transnational approach.

912 The authoritarian nationalist Estado Novo has been shown to have contributed towards the
 913 creation and development of international scientific networks from a time which precedes the
 914 emergence of post-World War II European movements for cooperation. An example of this is
 915 provided by the development of networks for the exchange of knowledge involving
 916 Portuguese and Spanish scientists. These were supported by the main bodies in the two
 917 countries responsible for funding science, the JEN and the JAE, which is of particular
 918 interest when we take into account the mutual political antagonism of the two Iberian
 919 states during the 1930s, leading to diplomatic relations between the two being cut in 1936.

920 The methodology used in our analysis of the JEN has enabled the dominant
 921 historiographical perspective—in which the Portuguese scientific community is portrayed
 922 as being isolated and deprived of state support in the period between the wars—to be
 923 reassessed, and the image of a well-supported internationalized institutional community to
 924 be constructed. Benefiting from what was a significant investment of funds by the state,
 925 Portuguese scientists were able to undergo specialist training funded by grants from the
 926 JEN at the principal international science institutions of the era, such as Imperial College
 927 London and the Institut du Radium in Paris. Later, they received support for producing
 928 knowledge in Portugal and disseminating it in the international arena. On a few occasions,
 929 the support of the JEN and its successor, the Instituto para a Alta Cultura, even enabled
 930 Portugal to play a leading role in certain fields of knowledge, as was the case with the
 931 Coimbra Phonetics Laboratory, which from the 1930s attracted researchers from
 932 universities such as Harvard and Cambridge who sought specialist scientific training in the
 933 new methods of research developed there.

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 939 66 Caixa 1213, pasta 28, Arquivo Camões.

940 67 Shapin, *op. cit.* (note 45).

941 This paper has also highlighted the contribution of new studies which promote the idea that
942 constraints on scientific development in non-democratic states go well beyond the political
943 and ideological questions associated with academic purges. Within Portuguese universities,
944 rivalry, resentment and enmity among peers and resistance to the incorporation of research
945 as an integral part of the academic *métier* was reflected in the way that new teachers were
946 prevented from entering the profession, while conducting research was made more difficult.

947 Finally, the paper has rehabilitated the work of a number of scientists who were not
948 persecuted by the authoritarian Estado Novo, having shown how their contribution was
949 consigned to historiographical oblivion following the establishment of democratic rule in
950 Portugal in 1974. Thus, political context is of paramount importance for identification of
951 new scientific actors.

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