

# Eucalyptus Acclimatisation for Fighting Malaria: Environmental and Medical Experiments in the Iberian Nineteenth Century

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*Portugal on Fire* made the headlines of newspapers, journals and TV programs, following the catastrophic fires of 2017.<sup>1</sup> Eucalyptus' plantations were highly criticized and fostered a wide discussion. Against the interests of paper companies, a part of the national community of forest engineers, ecologists and agronomists argued that a eucalyptus plantation is a monoculture which cannot be considered as a forest as it does not support biodiversity. Moreover, one part of this expert community considered the eucalyptus tree as an exotic which is invasive in Portugal.<sup>2</sup> Although the eucalyptus tree is currently envisioned in Portugal and Spain as the cause to blame for these devastating fires,<sup>3</sup> we feel this has to be historically analyzed as in the nineteenth century this tree was seen as the 'salvation for several problems'.

The eucalyptus tree is one of the world's most successful plant migrant from Australia.<sup>4</sup> People have transported eucalypts to every continent, to almost every nation, mingling them with other exotic and indigenous woody plants. Nevertheless, it was in regions with a similar climate to the one of Australia, such as California, Italy, France, Algeria and the Iberian Peninsula, that its dissemination was more effective.

The Iberian Peninsula stands at the western end of Europe and its two countries, Portugal and Spain, generally experience a Mediterranean climate while Atlantic in the

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<sup>1</sup>João Camargo and Paulo Pimenta de Castro, *Portugal em Chamas, como resgatar as florestas* (Lisboa: Bertrand Editora, 2018).

<sup>2</sup>João Domingues de Almeida and Helena Freitas, 'Exotic Flora of Continental Portugal: A Reassessment,' *Botanica Complutensis*, 2006, 30, 117–130.

<sup>3</sup>However, and after every fire, ever more forest owners have switched to eucalyptus, hoping that a shorter

production cycle might allow them to recoup their losses faster and harvest their trees before the next fire erupts.

<sup>4</sup>*Eucalyptus* is a genus of trees and it belongs to the large family of Myrtaceae (which includes 46 genera and almost 1300 species). Its species are mostly exotic and have ornamental value. Most of the species in this family are originally from Australia, South America, India and Africa.

north.<sup>5</sup> Beyond geography, these two countries also share their history that unfolded in parallel, with more factors uniting than separating them.

Due to the biophysical conditions found in the Iberian Peninsula and the rise of social agents and a network with links that reached as far as Australia, the introduction and acclimatisation of the eucalyptus tree was really successful, to such an extent that in 1871, the editor of the Belgium review, *Belgique Horticole*, stated that ‘... a real Eucalyptomania now reigns throughout the temperate world. In Portugal, Spain, Argelia, Italy, Egypt, California, etc. . . It is a precious tree. Its wood is hard and magnificent’.<sup>6</sup>

Since its introduction into Iberian soil, these Australian trees have shown certain advantages over native species, especially in regard to drought resistance and rapidity of growth. Its size and beauty were also attractive features that helped to create interest in planting their seeds.

The history of the discovery of the eucalyptus tree has been endlessly repeated. In the late eighteenth century, the British explorer James Cook, as well as the French Jacques-Julien Houtou de Labillardière, reached Australian lands, where they saw a tree to which the French naturalist gave the name—*Eucalyptus*.<sup>7</sup> Since then, eucalyptus trees have been cultivated in Europe as an exotic in gardens. Botanists were also curious about this fast-growth tree. In 1813, Bonpland, Humboldt’s friend, noticed its potential in southern regions of the French empire and its adaptability to the Mediterranean climate, as it ‘can grow with olive, pomegranates, lemons, and other useful trees’.<sup>8</sup> The Swiss botanist Pyramus Candolle had described 52 species of eucalyptus by as early as 1828.<sup>9</sup> In parallel with botanists, gardeners and horticulturists demonstrated the same curiosity towards eucalypts. *The Gardener’s Magazine* published the first reports on eucalyptus trees in the 1830s.<sup>10</sup> Furthermore, the Scottish botanist, horticulturist and garden designer John Claudius Loudon considered the genus of *Eucalyptus* as ‘a very remarkable one’, showing large potential for timber and medicines.<sup>11</sup>

Starting in the middle of the nineteenth-century, the role played by the director of the Botanic Garden in Melbourne, German-born botanist Ferdinand von Mueller,<sup>12</sup> was

<sup>5</sup>Orlando Ribeiro, *Portugal, o Mediterrâneo e o Atlântico* (Coimbra: Coimbra Editora, 1945).

<sup>6</sup>Oliveira Júnior, ‘Chronica’, *Jornal de Horticultura Prática* (*Journal of Practical Horticulture*, hereafter *Journal or JHP*), 1871, 135. On this *Journal*, see A. D. Rodrigues and A. Simões, ‘Horticulture in Portugal 1850–1900: The role of science and public utility in shaping knowledge’, *Annals of Science*, 2017, 74, 201–205; and Ana Duarte Rodrigues, *Horticultura para Todos* (Lisboa: Biblioteca Nacional de Portugal, 2017), 89–93.

<sup>7</sup>Eucalypts appear for the first time in his travel memories. Jacques Labillardière, *Novae Hollandiae Plantarum Specimen* (Paris : Dominae Huzard, 1804). On this topic, see Guintanas Kantvillas, ‘Labillardière and the Beginnings of Botanical Exploration in Tasmania’, in *Rediscovering Recherche Bay* (Canberra: Academy of the Social Sciences in Australia, 2007), 35–44.

<sup>8</sup>Aimé Bonpland, *Description des plantes rares cultivées à Malmaison et à Navarre* (Paris, Imprimerie de Didot, 1813).

<sup>9</sup>Augustin Candolle, *Prodromus systematis naturalis regni vegetabilis : sive Enumeratio contracta ordinum generum specierumque plantarum huc usque cognitarum, juxta methodi naturalis normas digesta Pars Tertia, Sistens Calyciflorarum Ordines XXVI* (Paris: Truttel, 1828).

<sup>10</sup>*The Gardener’s Magazine*, 1830, 202.

<sup>11</sup>John Claudius and Pinus Loudon, In Longman and Orme, eds, *Arboretum et Fruticetum Britannicum*, Vol. 4 (London : Longman, 1838), 2152–2292.

<sup>12</sup>Among the vast bibliography on Mueller, we would highlight the following : Edward Kynaston, *A Man on Edge: a Life of Baron Sir Ferdinand von Mueller* (Vic: Penguin Books Australia Ringwood, 1981); Andrew Brown-May and Sara Maroske, ‘Breaking into the Quietude: Re-reading the Personal Life of Ferdinand von Mueller,’ *Public History Review*, 1994, 3, 36, 63; R. W. Home, *The Scientific Savant in Nineteenth Century Australia* (Canberra: Australian Academy of Science, 1997) ; R. W. Home, A. M. Lucas, S. Maroske, D. M. Sinkora and

crucial for the dissemination of the eucalyptus tree in Europe. The relationship between Mueller and the French botanist and horticulturist Prosper Ramel constituting one of the reasons behind the spreading of eucalypts in Europe is well-known.<sup>13</sup> It was Mueller who raised Ramel's awareness of a Blue gum from Tasmania that grew up extremely fast. Starting in 1856, Ramel and Mueller began to send seeds of eucalyptus to Europe, collecting numerous seeds to distribute to several public and private gardens and nurseries, such as the Zoological Society of Acclimatization of Paris. Moreover, the Society decided to spend 500 fr. on eucalyptus seeds and Mueller was in charge of their distribution, not only to French societies, but also to diverse places in Italy, Spain and Portugal.<sup>14</sup>

The second half of the nineteenth century did witness a boom in attention towards the planting of eucalypts in the Iberian Peninsula, which already encompassed a diverse set of interests: it was a business pursuit, a medical necessity, and a leisure activity; a task undertaken by seed- and nurserymen, by pharmacy businessmen, gardeners and farmers.<sup>15</sup> Moreover, just as in the French case, the network established between Mueller and experts in the Iberian Peninsula proved to be crucial for the dissemination of eucalyptus plantations in the region.

The eucalyptus tree has raised a lot of interest in international historiography.<sup>16</sup> However, despite its current importance in the Iberian Peninsula, especially as Portugal and Spain are among the top-five producers of pulp from eucalyptus tree in absolute terms,<sup>17</sup> studies on eucalyptus trees focus on agronomic issues in a very generalist way.<sup>18</sup> Furthermore, just a few works have focused on its healing properties in international bibliography, and the arguments of the Iberian physicians have remained rather uninvestigated.<sup>19</sup>

J. H. Voigt, eds, *Regards Yours: Selected Correspondence of Ferdinand von Mueller*, Volume I. 1840-1859, *Life and Letters of Ferdinand von Mueller* (Bern: Peter Lang, 1998); A. M. Lucas, Sara Maroske and Andrew Brown-May, 'Bringing Science to the Public: Ferdinand von Mueller and Botanical Education in Victorian Victoria,' *Annals of Science*, 2006, 63, 25–57; A. M. Lucas, 'Ferdinand von Mueller's Interactions with Charles Darwin and his Response to Darwinism,' *Archives of Natural History*, 2010, 37, 102–130.

<sup>13</sup>In 1857 returning from his first trip to Australia, Ramel (1807–1881) brought back seeds of *Eucalyptus globulus* to be sown in the nurseries of Hamma, a garden in Algiers, in the spring of 1861 as well as in the gardens of Hyères (Var) and in Corsica. The encounter with Mueller in Australia was divulged both in Portugal and in Spain. In the Portuguese press at the A. J. de Oliveira e Silva 'Eucalyptus Globulus,' *JHP*, 1874, 30. In the Spanish press at *El pensamiento español*, 27 February, 1868, 1; and 'Plantaciones de eucaliptos,' *El siglo Futuro*, 6 August, 1892, 1.

<sup>14</sup>A. J. de Oliveira e Silva 'Eucalyptus Globulus,' *JHP*, 1874, 30.

<sup>15</sup>On fruit breeding see Daniel Kevles, 'Fruit Nationalism: Horticulture in the United States from

the Revolution to the First Centennial', in Marco Beretta et al., eds, *Aurora Torealis: Studies in the History of Science and Ideas in Honor of Tore Frängsmyr* (Sagamore Beach: Science History Publications, 2008), 131–148.

<sup>16</sup>Robin W. Doughty, *The Eucalyptus: A Natural and Commercial History of the Gum Tree* (Baltimore: Johns Hopkins University Press, 2000); Peter Boomgaard and Marjolein't Hart, eds, *Globalization, Environmental Change, and Social History, International Review of Social History Special Issues* (Cambridge: Cambridge University Press, 2011), 18. Francisco Javier Silva-Pando and R. Pino-Pérez, 'Introduction of *Eucalyptus* into Europe', *Australian Forestry*, 2016, 79, 283–291.

<sup>17</sup>The pulp industry in Portugal and Spain no longer relies on native species like poplars and pines. Instead, it is increasingly built on eucalyptus, which feeds a pulp and paper sector that accounts for up to 10 percent of Portuguese exports.

<sup>18</sup>Ernesto Goes, *Os Eucaliptos: identificação e monografia de 121 espécies existentes em Portugal* (Lisboa: Portucel, 1985); Manuel Martín Bolaños, *Especies de Crecimiento Rápido: Los Eucaliptos* (Madrid: Instituto Forestal de Investigaciones Forestales, 1964).

<sup>19</sup>Kenneth Thompson, 'The Australian Fever Tree in California: Eucalyptus and Malaria Prophylaxis', *Annals*

This article proposes to tackle this question through two paths of experiments on eucalypts in the Iberian Peninsula—experiments related with the acclimatisation of eucalypts and the planting of eucalypts for medical reasons, in a time of shifting practices, research and medical knowledge.<sup>20</sup>

The nineteenth century was a particular period of European colonialism in which an international network of botanists and horticulturists shared novel knowledge on eucalyptus. We argue that experts and amateurs established in the Iberian Peninsula participated in this international network due to their relationships, namely through the bounds extant among German experts living in different European countries and their colonies. The flourishing of horticultural societies in this period also contributed to expanding international networks as most would include foreign members.

This international network shared knowledge on the growth and virtues of eucalypts as the experiments' results were published in a different set of scientific journals. The periodical press became the main forum for opinion-making, creating a 'community of discourse,' in which the abstract concept of 'acclimatization' became visible, just as it happened in the French and British Empires.<sup>21</sup>

Moreover, this paper also argues that a wide range of amateurs and professionals were involved in the multiplication and exploitation of eucalypts. Members of the social and economic elite, civil engineers, physicians, forest engineers, horticulturists, botanists, as well as plant growing amateurs were all involved in the growth of eucalyptus, experiments, and the dissemination of knowledge concerning this botanical species. 'Amateur tree experimenters,' who did not engage in tree experimentation as their main occupation, but were driven by different goals, and saw their experiments as a leisure activity, sustained this activity without regard to any economic or scientific compensation. Conversely, some physicians developed experiments with the goal of exploring a new pharmaceutical market. Focusing on these networks, this paper shows the different trajectories of botanical, horticultural and medical knowledge and how they were appropriated in the Iberian Peninsula, adding different patterns of transfer and international networks in the context of European colonialism.<sup>22</sup>

Finally, we argue that the eucalyptus was introduced in the Iberian Peninsula due to its hygienic environmental capability as it was able to dry marshy land. Moreover, experts and amateurs envisioned eucalyptus as a potential production source for fever remedies and, therefore, as an alternative for malaria prophylaxis.

We will show how the challenging intellectual atmosphere affected the course of events. Altogether, they contributed to an optimistic botanical, environmental and

*of the Association of American Geographers*, 1970, 60, 230–244; Jack Malloy, *The Power of Eucalyptus for Health & Healing* (Indiana: Authorhouse, 2005).

<sup>20</sup>W. F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge: Cambridge University Press, 1994); David Knight, *The Making of Modern Science. Science, Technology, Medicine*

*and Modernity: 1789-1914* (Malden: Polity Press, 2009).

<sup>21</sup>Michael A. Osborne, 'Acclimatizing the World: A History of the Paradigmatic Colonial Science', *Osiris*, 2000, 15, 135–151.

<sup>22</sup>Poonam Bala, ed., *Learning from Empire: Medicine, Knowledge and Transfers under Portuguese Rule* (Cambridge: Cambridge Scholars Publishing, 2018).

medical discourse on the eucalyptus genus, therefore encouraging the spread of these tree plantations.

### The Introduction and Acclimatisation of Eucalypts in the Iberian Peninsula

Although the Iberian Peninsula ensured a climate and soils appropriate for the growth of eucalypts, sparse data report the growth of eucalypts during the first half of the nineteenth century, but their cultivation securely occurred in several villas and estates in the Douro region, in northern Portugal.

Although it is not known who was the first to grow eucalyptus trees in Portugal,<sup>23</sup> it is said that Carlos Butler, in Vila Nova de Gaia, northern Portugal, may have been the first Portuguese land owner to have planted some eucalyptus trees in 1829.<sup>24</sup> At the Quinta Rangel, in the surroundings of Porto, a specimen of *Eucalyptus obliqua* was considered to be 30 years old by 1874, and it could therefore have been planted in 1844. This is the earliest credible record of the introduction of eucalypts in Portugal.<sup>25</sup> Further records are dated from around the 1850s. In the south of Porto, in 1852, the Baron of Massarellos was growing a eucalyptus tree on his Quinta da Formiga estate, which was already 22 m high in 1874.<sup>26</sup> Initially, the growth of eucalypts was experimented by amateurs in the Douro region, but in 1854, the distinguished businessman and diplomat Francisco Rodrigues Batalha was also interested in eucalypts from a professional perspective.<sup>27</sup>

Moreover, while the first references appear in northern Portugal, but it is certain that eucalypts had already reached the south of Portugal by the 1850s. In the region of Lisbon, eucalypts were being cultivated by the counsellor Agostinho da Silva on his estate in Colares, and the Duke of Palmela also had eucalypts in his villa in Lumiar.<sup>28</sup> In 1858, mature *Eucalyptus robusta* trees were already present at the Campo de Santana, a public garden in Lisbon,<sup>29</sup> and the new Agronomy school, established at Quinta da Bemposta, Lisbon, was receiving seeds from the Algeria Botanic Gardens.<sup>30</sup>

Eucalyptus trees were first cultivated by amateurs, landowners and their gardeners, and only afterwards were experiments carried out by agronomists, until in the 1860s and 1870s, they were grown on a larger scale by government institutions, where tree planting and forestry had become more widely practiced and covered a more diverse set of activities.<sup>31</sup>

<sup>23</sup>de Oliveira e Silva, 'Eucalyptus Globulus', 31.

<sup>24</sup>According to Mendes Almeida the introduction of eucalyptus was in 1829 by Mr. Carlos Butler in Gaia, in Ernesto Goes, *Os Eucalyptos em Portugal*, vol. II, Ecologia, Cultura e Produções (Lisboa: Ministério da Economia, 1962), 22.

<sup>25</sup>de Oliveira e Silva 'Eucalyptus Globulus', 31.

<sup>26</sup>de Oliveira e Silva 'Eucalyptus Globulus', 31. Also mentioned by Goes, *Os Eucalyptos*, 22.

<sup>27</sup>Goes, *Os Eucalyptos*, 23. A biographical summary of Francisco Rodrigues Batalha can be found at Bruno Henriques, *Teatro D. Fernando: um teatro de curto prazo* (Lisboa: Master thesis, University of Lisbon, 2014), 11–14.

<sup>28</sup>Rodrigo de Moraes Soares, 'Crónica Agrícola,' *Arquivo Rural*, 1872, 358–362.

<sup>29</sup>Map of Lisbon afforestation in 1858. AML, Correspondência Recebida pela Repartição de obras públicas, 1834-1864, PT/AMLSB/AL/CMLSB/UROB-E/23, Cx. 48 do SGO, 1858, published in Ana Duarte Rodrigues, *O Triunfo dos Jardins. O pelouro dos Passeios e Arvoredos de Lisboa (1840-1900)* (Lisboa: Biblioteca Nacional de Portugal/Lisboa Capital Verde Europeia 2020, 2020), document 5, 516-517.

<sup>30</sup>João Barata, *O Instituto de Agronomia e Veterinária [1852-1910] Ciência e Política na segunda metade de Oitocentos* (Lisboa: Universidade de Lisboa, 2019).

<sup>31</sup>Ignacio García Pereda, 'Creando el bosque matemático en la década de 1860. Barros Gomes en la Mata Nacional da Machada (Barreiro, Portugal): Testigos cartográficos'. In Pedro Fidalgo, ed., *Estudos da Paisagem* (Lisboa: IHC, 2017), 217–240.

Around 1870, two personalities stand out in the dissemination of eucalypts in Portugal: the horticulturist José Marques Loureiro and Francisco Rodrigues Batalha. The internationally renowned horticulturist José Marques Loureiro, owner of the most famous nursery in the country, located in Porto—the Horto Loureiro –, was the first to order large quantities of eucalyptus seeds to sell in his nursery.<sup>32</sup> Before Loureiro, public nurseries had only sold between 40 and 50 thousand Eucalyptus, and Eduard Morren (1833–1886) states that resistance to innovation in Portugal lay behind this low result.<sup>33</sup> However, in four years he sold more than 60,000 feet of eucalyptus trees, quite clearly showing the fast reception the tree got in Portugal.<sup>34</sup> Together with Francisco Rodrigues Batalha, they highly contributed to the spread of plantations among amateurs, entrepreneurs and firms such as the Railway Company.<sup>35</sup>

Moreover, the forestry expert Ernesto Goes associates the rise of the economic cultivation of the eucalypts in the 1870s with the multiplication of publications on eucalypts promoted by Duarte de Oliveira Júnior, especially as editor of the *Journal of Practical Horticulture*, whose owner was José Marques Loureiro.<sup>36</sup> This journal played a very important role in the dissemination of the results obtained from experiments on eucalypts and promoted the sharing of these results among its readers.<sup>37</sup> José Marques Loureiro stressed the necessity of the directors of nurseries studying this new species and disclosing their results or they would not be acknowledged by the community of experts.<sup>38</sup> Moreover, the first books on eucalypts were published in Portuguese in this period. Oliveira Junior published *Breve notícia sobre o Eucalyptus globulus* in 1870.<sup>39</sup> Six years later, in 1876, Sousa Pimentel published *The Eucalyptus globulus*, which remained as the standard reference in Portugal and Spain.<sup>40</sup>

Early experiments took place in private gardens and woods. However, the fact that amateur tree planters were eager to report their results in the *Journal* was an essential step to publicise a differentiated kind of knowledge on eucalyptus trees. In 1870, the landowner Mariano de Lemos Azevedo recounted that two of the eucalypts he had planted eight to ten years before were broken by the wind.<sup>41</sup> This misfortune had led

<sup>32</sup>de Oliveira e Silva, 'Eucalyptus Globulus', 31. On José Marques Loureiro, see A. D. Rodrigues and A. Simões, *Annals of Science*, 192–213; and Rodrigues, *Horticultura para Todos*, 79–166.

<sup>33</sup>Oliveira Júnior, 'Chronica', 134.

<sup>34</sup>de Oliveira e Silva, 'Eucalyptus Globulus', 31.

<sup>35</sup>*Ibid.*

<sup>36</sup>Ernesto Goes, *Os Eucaliptos: Ecologia, cultura, produções e rentabilidade* (Lisboa: Portucel, 1977), 25–26. On Goes works, see Ignacio García-Pereda, 'Experts, Study Tours, Arboretums and Tree Manuals: Eucalyptus Introduction in Portugal and its Connections with Morocco and Spain,' in Francisco Javier Martínez, ed., *Entangled Peripheries. New Contributions to the History of Portugal and Morocco. Essays in Homage to Eva Maria von Kemnitz* (Évora: Publicações do Cidehus, 2020).

<sup>37</sup>This *Journal* on horticulture performed the same role as scientific periodicals. Gowan Dawson, Bernard Lightman, Sally Shuttleworth and Jonathan R.

Topham, *Science Periodicals in Nineteenth-Century Britain. Constructing Scientific Communities* (Chicago and London: The University of Chicago Press, 2020); Ana Carneiro, Teresa Salomé Mota and Isabel Amaral, 'Shaping Doctors and Society: The Portuguese Medical Press (1880–1926),' *Media History*, 2018, 1–25; and Maria de Fátima Nunes, *Imprensa Periódica Científica (1772-1852). Leituras de "sciencia agrícola" em Portugal* (Lisboa: ESTAR, 2001).

<sup>38</sup>Oliveira Júnior, 'Chronica', 37.

<sup>39</sup>Oliveira Júnior, *Breve notícia sobre o Eucalyptus globulus e a utilidade da sua cultura* (Porto: Typ. Lusitana, 1870).

<sup>40</sup>Carlos Augusto de Sousa Pimentel, *Eucalyptus Globulus: Modo de Vegetar, Cultura, Produção, etc* (Lisboa: Typ. Universal, 1876).

<sup>41</sup>Letter from a landowner in Ourém, in central Portugal, Mariano de Lemos Azevedo to Oliveira Junior, who published it in the *JHP*. Oliveira Júnior, 'Chronica', 20.

him to discover two uses for this tree. First, it could be intended for strain, and subjected to periodic cuts such as chestnut trees or willows, although with the advantage of taking five or six years to provide thicker sticks rather than eight or ten. The second application might be to provide shade, especially the species *E. rubra* and *E. falcata*, since, when the main stem is cut and truncated, it takes the form of a beautiful shade tree. Moreover, he had observed in the farm of his friend Agostinho da Silva, in Colares, the private secretary of Queen D. Maria Pia, which he had never cut his *Eucalyptus globulus* and that at a certain point it lost its oblique line and adopted a horizontal one. There, he saw trees 8 m high that nature had cleaned without the intervention of any tools. Eucalypts were displayed as a grove around the villa's boundaries, showing that they do not need any kind of support from walls or tutors (Figure 1).

The forestry expert and naturalist Adolpho Frederico Moller also sent a letter to Oliveira Júnior in which he described his observations on the development of different species of eucalyptus in the national wood of the Canas valley, established near the botanical garden in Coimbra in 1867.<sup>42</sup> He reports that 50 *E. globulus* were planted in December 1867 with a height of 0.5 m high and had reached 8 m height and 0.10 m of diameter by 1871. He also reports the growth of three *E. piperita* and two *E. obliqua*,

	Height	Diameter
<i>Eucalyptus amygdalina</i>	4 m	0.05 m
<i>Eucalyptus gigantea</i>	4.5 m	0.06
<i>Eucalyptus globata</i>	4.5 m	0.06
<i>Eucalyptus resinifera</i>	4 m	0.07
<i>Eucalyptus risdonii</i>	4 m	0.05
<i>Eucalyptus falcata</i>	3 m	0.03
<i>Eucalyptus globulus</i>	6 m	0.08
<i>Eucalyptus marginata</i>	2 m	0.02
<i>Eucalyptus robusta</i>	3 m	0.03

which were around 5 m tall. Moreover, in May 1869, some specimens of different eucalyptus were cultivated on the forest paths and presented the following results between

	Height	Diameter
<i>Eucalyptus montana</i>	3 m	0.02 m
<i>Eucalyptus reciana</i>	5 m	0.02
<i>Eucalyptus occidentalis</i>	2 m	0.02
<i>Eucalyptus pendula</i>	3.5 m	0.03
<i>Eucalyptus globulus</i>	6 m	0.09

May 1869 and January 1871:

<sup>42</sup>Oliveira Júnior, 'Chronica', 37.

In the same area, some more eucalypts were cultivated in December 1869, and up until January 1871, they were:

They concluded that the eucalyptus trees planted in 1869 in the valley achieved better development than those cultivated in the highest and windiest area of the hill, on schistose soil, with a three-meter distance between each tree.<sup>43</sup> Regarding the comparison between the different species of eucalyptus, Moller studied from the book *Manuel de l'amateur des Jardins* (1862–1871), by the French botanists Decaisne and Naudin.<sup>44</sup>

However, the experiments were not always that successful. At that time, Oliveira Júnior was asking several farmers for news on their eucalyptus plantations and the *Journal* fostered a similar role to that of the French Society in collecting all the news on eucalyptus experiments.<sup>45</sup> On 18 February 1871, a landowner João António Gomes from Murça, northern Portugal, wrote a letter admitting that the results were not positive and that a lot of experiments were still required to discover the kind of soil that would suit this species. He had cultivated several feet of eucalyptus tree, four years before, circa 1867, and many of them had died. He concluded that this species could not survive in dry lands and in cold weather. In the Douro region though, some of them grew.<sup>46</sup> Oliveira Júnior immediately published this letter in the *Journal* to contradict the farmer's conclusions. He doubted the cause of death could be the one pointed out by the farmer as '*Eucalyptus globulus* thrives on almost every soil and does not fear the cold, unless it is 5° C below zero'.<sup>47</sup> He ends this reasoning by saying that, in Murça, the thermometer has probably never recorded such temperatures.<sup>48</sup>

In 1871, Oliveira Júnior admits that 'many people have complained that the Eucalyptus' seeds have not grown well'.<sup>49</sup> However, the letter from Oliveira e Silva, dated from 25 April 1871, and published in the *Journal*, revealed that he had cultivated eucalyptus seeds and that, 22 days later, they were already growing very well in the surroundings of Porto.<sup>50</sup> He had planted the eucalypts on soil coming from his vegetable garden, to which he had mixed all the leaves from garden pruning, as well as sand.<sup>51</sup>

Besides sharing their experiments and results, farmers from all over the country also requested data and expertise from the editors of the *Journal*. A farmer from the Algarve asked for information on the botanical characteristics of eucalypts and Oliveira Junior's opinion about the hypothesis of planting eucalyptus trees on an Algarvean mountain.<sup>52</sup> Oliveira Junior advised him that the eucalyptus prefers dry rather than humid soils.<sup>53</sup>

The desire to acclimate eucalyptus increased after national nurseries were placed near the eucalyptus groves, such as the Choupal wood, near the Coimbra Botanical Garden in

<sup>43</sup>Oliveira Júnior, 'Chronica', 37.

<sup>44</sup>Oliveira Júnior, 'Chronica', 37. For example, Moller was interested in *Eucalyptus Gunnii* which is as big as the *Eucalyptus globulus* species, but more resilient since it grows in the Australian mountains. The *Manuel de l'Amateur* was also in the specialized library of the Department of Gardens and Green Grounds of the Lisbon City Council, and, therefore, it had some impact on tree planting in Portugal. See A. D. Rodrigues, 'Greening the City of Lisbon under the French Influence of the Second Half of the Nineteenth Century', *Garden History*, 2017, 45, 224–250.

<sup>45</sup>Oliveira Junior, 'Eucalyptus globulus', 144.

<sup>46</sup>Oliveira Júnior, 'Chronica', 57.

<sup>47</sup>*Ibid.*, 57.

<sup>48</sup>*Ibid.*, 57.

<sup>49</sup>*Ibid.*, 134.

<sup>50</sup>*Ibid.*, 134.

<sup>51</sup>*Ibid.*, 134.

<sup>52</sup>Letter from José Maria Mascarenhas de Mello to Oliveira Junior, dated 25 March 1871, and published on the *JHP*, 1871, 95.

<sup>53</sup>*Ibid.*, 95.



which Goeze promoted the growth of 22 species of eucalyptus.<sup>54</sup> In the Choupal and Vale de Canas' woods, in Coimbra, which were under the direction of the Hydraulic Services of the Campos do Mondego and Barra da Figueira da Foz, important arborisations were carried out in the years of 1866 and 1870, to fix and drain those lands: Thirty-two species of eucalyptus were planted, reaching a total of 4800 trees.<sup>55</sup>

Moller visited the Choupal wood on 15 May 1871, and the results on the growth of *Eucalyptus* were admirable. The eucalyptus trees had been planted in March 1870 and were then only 0.40 meters high; one year and two months later, they were 5.35 meters high. The soil in which they were planted was mixed with debris from the works of the gas factory. The distance between the eucalyptus trees and the gasometers was only 8.30 meters and it seemed that it did not affect their growth. Moller records the growth of the several *Eucalyptus*' varieties: *E. gigantea*, *E. globulus*, *E. falcata*, *E. piperita*, *E. species gum topped stringy-bark*, *E. robusta*, *E. diversifolia*, *E. stewartiana*, *E. pendula*, *E. viminalis*.<sup>56</sup>

In Portugal, *E. marginata* was clearly the variety that showed a slower growth during the cold season. Therefore, Moller advised those who wanted to experiment to choose two-year trees and wait for the beginning of March to plant them. Additionally, Moller stated that he had already made this experiment and had got good results in the Choupal wood. He considered that the whole cultivation process was similar to *E. globulus*, and he recommended the reading of Oliveira Junior's book.<sup>57</sup>

Under the supervision of the director of the Royal Railways Company, the engineer Afonso de Espregueira, some of them reached an exceptional size, more than 1 meter in diameter and 60–70 m in height. On Quinta da Foja, near Montemor-o-Velho, 30,000 *E. globulus* were planted in 1870.<sup>58</sup> In 1871, the rich entrepreneur José Maria Eugénio de Almeida planted 5,000 *E. globulus* on his Monte Flores estate, in Évora.<sup>59</sup>

However, the first large eucalyptus plantations were made by the Port wine merchant William Chester Tait (1844–1928) in 1880–85 in the Vale de Cortiços estate, a few kilometres south of Abrantes. Two woods were cultivated, one named New Australia, with *E. globulus* and acacias (*A. molissima*, *A. pucnantha* or *A. dealbata*), covering 390 hectares of land; and the other called New Tasmania, which included over 200 hectares mostly of *E. globulus* and *E. camaldulensis*.<sup>60</sup>

Under the tutelage of the National Forests Institute, plantations of *E. globulus* began in 1883, mainly in the Moinhos of Valverde, Gaio and Leiria. This was certainly the species that spread the most throughout the country and was used for various purposes—the afforestation of roads, sewage treatment, purification of air in urban centres, rapid collection of woody material, etcetera. Sousa Pimentel confirmed that most of Portuguese plantations were of *E. globulus*, although *E. resinifera*, *E. stuartiana* and *E. gigantea* might also be profitable, especially *E. gigantea*, which is appropriate for the paper industry.<sup>61</sup>

<sup>54</sup>Júlio Henriques, *Catálogo das plantas cultivadas no Jardim Botânico da Universidade de Coimbra no ano de 1878* (Coimbra: Imprensa da Universidade, 1879).

<sup>55</sup>*Ibid.*, 134.

<sup>56</sup>*Ibid.*, 134.

<sup>57</sup>*Ibid.*, 134.

<sup>58</sup>Goes, *Os Eucalyptos*, 23.

<sup>59</sup>*Ibid.*

<sup>60</sup>*Ibid.*, 24.

<sup>61</sup>C. A. de Sousa Pimentel, 'Especies de Eucalyptus que convem cultivar,' in *JHP*, 1884, 82.

Based on the hitherto research, the eucalyptus tree was firstly introduced in Portugal and then, possibly, reached Galicia in around 1863. Valdés and Gil point out that ‘...the eucalyptus is cited for the first time in Spain concretely in Galicia, in 1863’.<sup>62</sup> They feel this might have arriving from Portugal through Tuy, rather than being sent from Australia by Fray Rosendo Salvado, who was the key-actor for the circulation of seeds between Australia and Spain in this period.<sup>63</sup> At the same time, eucalyptus trees were also being cultivated in the Hyères Islands of France, and in Valencia and then in Barcelona, in Spain, by 1866.

In Valencia, the horticultural establishments were important and numerous. The most important one was Felix Robillard (known in Spain as Francisco Robillard), the director of the Botanic Garden of Valencia, who had a nursery located in a neighborhood of Valencia called Grao.<sup>64</sup> He cultivated fruit trees on a large-scale and especially plants used for perfumes, such as Geranium rosa, Verbena, Vetiver, etcetera.<sup>65</sup> Robillard visited the Jardin des Plantes de Paris in 1864, where the superintendent of horticulture showed him the *E. globulus* as a novelty. ‘Do you call that a novelty?’ exclaimed Robillard; ‘It may be one for you Parisians, but not for the countrymen of Valencia; there, its properties are so well known as a cure for intermittent fevers that its leaves are often plundered, and, in a public garden of a great city, it is necessary to surround the fever-tree with a guard, in order to prevent it from being stripped’.<sup>66</sup>

Among many horticulturists who at that time cultivated a great number of products to export to northern Europe such as eucalypts, the following stand out: the widow Roca, D. Luis Corset,<sup>67</sup> Ramon Bigne Gonzalez, and finally, Garces de Marcilla, head of the garden of Capuchinos.<sup>68</sup>

In Barcelona, a newspaper published that ‘despite the fabulous price at which the seed is paid, Mr Barlan has started the large-scale cultivation of this tree in the nursery located next to the Sarria railway station, and in that of the tower of the widow Codolá, and in the outskirts of Horta, which houses more than fifty thousand seedlings’.<sup>69</sup>

This expansion had not only been encouraged by foresters, horticulturalists and physicians, but also promoted by a growing commercial seed and nursery trade over the course of several decades.<sup>70</sup> The eucalyptus trade was intimately connected with

<sup>62</sup>Carlos Manuel Valdés and Luis Gil Sánchez, *Tercer Inventario Forestal Nacional. La transformación histórica del paisaje forestal en Galicia* (Madrid: Ministerio de Medio Ambiente, 2001), 127.

<sup>63</sup>Silva-Pando and Pino-Pérez, ‘Introduction of Eucalyptus into Europe’, 285–287.

<sup>64</sup>Robillard (1812–1888) was born in Aunneuil (France). He was trained as a gardener at the ‘Institut Horticole de Fomont.’ In the Paris Botanical garden he learned the cultivation of greenhouse plants. In 1845, he was chief gardener of the Monville Garden. In 1847, he obtained the position of gardener in the greenhouses of the Champs-Élysées. Once in Valencia, with thousands of hollyhocks ordered in a row, Robillard designed and, in 1860, launched a distillery of essences that was one of the first that worked in Spain. His perfumes, based on this popular plant, and in the mo-

dality of mint from which the patchouli is obtained, soon gave him a great commercial triumph.

<sup>65</sup>*Journal de la Société Centrale de Horticulture de France*, 1883, 426.

<sup>66</sup>‘The Eucalyptus’, partial translation of Planchon, in *The Horticulturists and journal of Rural Art and Rural Taste*, 1875, 30, 124.

<sup>67</sup>As reported also in Bosch, *Parte Forestal*, 95.

<sup>68</sup>*Journal de la Société Centrale de Horticulture de France*, 1883, 426. Although there is reference that all these establishments produced catalogues similar to those made in France, there are no known examples.

<sup>69</sup>*La Iberia*, 9 Mai, 1866.

<sup>70</sup>Philip P. Pauly, *Fruits and Plains: The Horticultural Transformation of America* (Cambridge, Massachusetts: Harvard University Press, 2007).



**Fig. 1** *Eucalyptus Globulus* in *Occidente*. *Revista Illustrada de Portugal e do Estrangeiro*, nº 160, 1 June 1883, 128. Courtesy of the Biblioteca Nacional de Portugal.

international networks of experts, amateurs and politicians, to such an extent that the Spanish government was among one of various countries with which Mueller had a commercial arrangement. On the contrary, to the Danish government he declares it will not cost anything as the samples sent were just a few, but he recognises that 'larger orders, such as repeatedly the Governments of India, of France, of Spain and other countries did order, could not well be supplied except under mercantile arrangements'.<sup>71</sup>

Mueller's role as disseminator of eucalyptus trees was also crucial for the Iberian Peninsula. His role as director of the Botanical garden of Melbourne, which he raised to high fame, was to establish 'scientific relations with all parts of the globe, in order to introduce useful plants into the colony, and to make known Australian plants abroad'.<sup>72</sup> Therefore, Mueller had developed a large network for the dissemination of eucalyptus and had established contacts with diplomats, botanists, and horticulturists worldwide, including in Portugal and Spain.

For example, Mueller sent large amounts of seeds to Spain through British diplomats living there. In 1864, he advised the British consul at Jerez de la Frontera<sup>73</sup>: 'I would beg to remark, that the seeds now offered will be sufficient to raise many thousand plants of the Blue Gumtree, that it is likely to prove highly adapted to the Climate of Spain, that it is of unparalleled rapidity of growth and huge size and that its timber is exquisitely adapted for ship-building. I may further be allowed to remark, that the seedlings should be transplanted to the final place of distinction when they are but a few inches high and this process must be effected in moist & cool weather'.<sup>74</sup>

Mueller had privileged contacts with the British consul of Spain and with German experts on Spanish botany. For example, Mueller exchanged seeds and books with Professor Johan Lange, who sent him his book on Spanish botany.<sup>75</sup> Professor Lange did not collect specimens himself but used to send the ones collected in Spain by the German botanist Heinrich Moritz Willkomm to Melbourn.<sup>76</sup> Although one might think that the circulation of eucalyptus seeds was a one-way route, from Australia to the Iberian Peninsula, this was far more complex. The collaboration between Mueller and



Y83/996, unit 1403, VPRS 3991/P inward registered correspondence, VA 475 Chief Secretary's Department, Public Record Office, Victoria. Letter from Mueller to Thomas Wilson, dated 29th January 1883. "FVM-83-01-29c," in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/83-01-29c> (12 June 2021, date last accessed).

<sup>72</sup>Letter from John Forrest to Adolph Miessler, dated 1889. Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Berlin. Correspondence Project. "FVM-90-00-00k," in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/90-00-00k> (12 June 2021, date last accessed).

<sup>73</sup>Jerez de la Frontera, not far from Gibraltar, was the capital of Sherry wine.

<sup>74</sup>Letter from Mueller to Henry Warde, dated 16 August 1864. M4164, unit 18, VPRS 1096 inward

correspondence, VA 466 Governor, Public Record Office, Victoria. Correspondence Project. "FVM-64-08-16a," in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/64-08-16a> (12 June 2021, date last accessed).

<sup>75</sup>Lange papers, Botanisk Centralbibliotek, Copenhagen, letter dated 26 October 1864. Correspondence Project. "FVM-64-10-26," in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/64-10-26> (12 June 2021, date last accessed).

<sup>76</sup>Letter from Mueller to Professor Lange, dated 14 August 1868. Lange Papers, Botanisk Centralbibliotek, Copenhagen. Correspondence Project. "FVM-68-08-14a," in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/68-08-14a> (12 June 2021, date last accessed).

the Iberian community of experts was in a to and fro movement. Mueller used to send seeds through Henry Warde to the British consul at Jerez de la Frontera, Spain—a ‘small parcel of seeds of the Blue Gum tree (*Eucalyptus Globulus*) as a reciprocate for the sending just received’, in order for him ‘to naturalize a highly valuable and rapidly growing tree in the locality in which he resides’.<sup>77</sup> Evidence shows seeds and plants from the Iberian Peninsula were also sent to Australia, such as the extant *Quercus suber* at the Botanic Garden of Melbourne.<sup>78</sup>

Mueller’s contributions for Spanish botany, horticulture, agronomy and forestry were so valuable that King Amadeus of Spain<sup>79</sup> honoured Mueller with a nomination for Commander of the Royal Order of Isabel la Católica in 1872.<sup>80</sup>

Mueller received the same kind of recognition in Portugal. A little bit later than in Spain, and due to the relationship with the German botanist Edmond Goeze, chief gardener of the Botanic Garden of Coimbra.<sup>81</sup> In view of this cooperation, Mueller was twice awarded by the King D. Luís I of Portugal. The first time, in 1870, the king nominated him Commander of the Ancient Most Noble and Illustrious Order of St Thiago for scientific, literary and artistic merit for the valuable offerings he made to the botanic garden of the University of Coimbra.<sup>82</sup> Later, in 1887, he received the dignity of the Grand Cross of the Portuguese Royal Military Order of Our Lord Jesus Christ for the important contributions made to the Museum of Natural History in Lisbon.<sup>83</sup> This grace was only granted to men of the science and the arts and, therefore, it had enhanced the prestige of botany among the Portuguese Royal family and the international network established between Portuguese and Australian botanists and horticulturists.<sup>84</sup> European colonialism fostered the dissemination of eucalyptus, but not embedded in the context of a single empire. This case study shows that there was a Anglo-German network of experts overlapping the Portuguese, Spanish, French and British empires.<sup>85</sup> Furthermore, at the

<sup>77</sup>Letter from Mueller to Henry Warde, dated 13 August 1864. M4164, unit 18, VPRS 1096 inward correspondence, VA 466 Governor, Public Record Office, Victoria Correspondence Project. “FVM-64-08-13,” in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/64-08-13> (12 June 2021, date last accessed).

<sup>78</sup>As it is shown in 1864 plan of Melbourne Botanic Garden, published by Richard Aitken, *The Garden of Ideas. Four Centuries of Australian Garden* (Melbourne: University Publishing Limited, 2010), 88.

<sup>79</sup>Son of King Vittorio Emanuele II of Italy, who was briefly king of Spain, between 1870 and 1873, but then renounced the throne.

<sup>80</sup>RB MSS M200b.50, Library, Royal Botanic Gardens, Melbourne. Correspondence Project. “FVM-72-03-18b,” in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/72-03-18b> (12 June 2021, date last accessed).

<sup>81</sup>The relationship between Edmond Goeze and Mueller was acknowledged by Oliveira Júnior. *JHP* 1874, 221. Following Goeze’s return to Germany in 1876, their collaboration continued as Goeze became Mueller’s translator from English to German. Mueller, *Aussetropischen Pflanzen, vorgüglich*

*greignet für Industrielle Kulturen und zur Naturalisation, mit Angabe ihrer Heimathsländer und Nutzenanwendung. Ausdem Englischen von Edmond Goeze* (Berlin: Theodor Fischer, 1883).

<sup>82</sup>The letter from the King of Portugal to the Baron Ferdinand von Muller, naturalist, is dated 29 November 1870. Royal Botanic Gardens Melbourne, RB MSS M200a.0a, Library. Correspondence Project. “FVM-70-11-29,” in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/70-11-29> (12 June 2021, date last accessed).

<sup>83</sup>Letter from John Forrest to Adolph Miessler, dated 1889. Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Berlin. Correspondence Project. “FVM-90-00-00k,” in *epsilon*: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/90-00-00k> (12 June 2021, date last accessed).

<sup>84</sup>*JHP*, 1871, 57.

<sup>85</sup>Although the nineteenth century German Empire was not that large as other empires, German experts circulated and had prominent positions in all of them. H. L. Wesseling, *The European Colonial Empires: 1815- 1919* (New York: Routledge, 2013); Sebastian Conrad, *German Colonialism: A Short*

head of two empires—the Portuguese and the British—were two German princes, who were cousins, and promoted this network.<sup>86</sup> Due to bounds of language and confidence, a group of German princes and experts were crucial for the dissemination of eucalyptus in the Iberian Peninsula.

### Healing Eucalypts

'Observations made all around Europe, where this plant has been cultivated, are unanimous on acknowledging a fabulous growth rhythm to the Eucalyptus'.<sup>87</sup> Discussions on the utility as well as the beauty of eucalypts enjoyed a wide circulation from the 1860s onwards. While eucalypts were gaining considerable popularity for practical reasons, a radical and powerful new incentive to eucalypt-planting developed. This new stimulus consisted in the possibility of having the planting of eucalypts disinfect an unhealthy territory. These concerns are part of a broader movement related to hygiene and public health, in which the most visible aspects are generally the establishment of piped water, basic sanitation, planting of trees and construction of public parks.<sup>88</sup> London led the movement in the first half of the nineteenth century, and clearly influenced the measures regarding public health and hygiene in other countries, such as France, Spain and Portugal.<sup>89</sup> For example, the Lisbon urban renewal pursued in the second half of the nineteenth century included both the construction of hydraulic systems and public parks.<sup>90</sup> The hygiene movement was clearly pushed by the cholera epidemic of 1855–1856 to such an extent that the contract with the Companhia das Águas de Lisboa (Water Company of Lisbon) was finally established in 1858.<sup>91</sup> In view of this context, most of the

*History* (Cambridge: Cambridge University Press, 2008); Stefan Manz, *Constructing a German Diaspora. The 'Greater German Empire', 1871-1914* (New York: Routledge, 2014); and Andrew Cunningham and Perry Williams, *The Laboratory Revolution in Medicine*, (Cambridge: Cambridge University Press, 1992), which includes 'Laboratories, medicine and public life in Germany 1830-1849. Ideological roots of the institutional revolution', showing how this terrain was prepared.

<sup>86</sup>For example, the German King of Portugal, D. Fernando Saxe-Coburg Gotha, married with Queen D. Maria II, invited another German to build the Park of Pena in Sintra—the mines' engineer Eschwege, who, in turn was a correspondent of another German—Humboldt. Eschwege became the translator of Humboldts' texts at the Academy of Sciences of Lisbon. D. Fernando Saxe-Coburg Gotha was cousin of King Albert, husband of Queen Victoria. King Albert also facilitated the circulation of German experts throughout the British Empire. Heather Ellis and Ulrike Kirchberger, eds, *Anglo-German Scholarly Networks in the Long Nineteenth Century* (Leiden, Boston: Brill, 2014).

<sup>87</sup>Oliveira e Silva, 'Eucalyptus globulus', 70.

<sup>88</sup>Virginia Berridge, Martin Gorsky and Alex Mold, *Public Health in History* (Berkshire and New York: Open University Press, 2011); Isabel Amaral, Ana Carneiro, Victor Machado Borges, José Luís Doria (coord.), *Percursos da saúde pública nos séculos XIX*

e XX: a propósito de Ricardo Jorge (Lisboa: Centro Editor Livreiro da Ordem dos Médicos, 2011); Francisco Javier Martínez Antonio, 'Public Health and Empire in Isabell in Spain (1833-68): The Case of Military Health', *História, Ciências, Saúde – Manguinhos*, 2006, 13, 139–173.

<sup>89</sup>Regarding the British hygienic movement see: Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865-1900* (Cambridge: Cambridge University Press, 2000); Paulo Castro Seixas, 'Higienismo: Textos que Fizeram Cidade', in Isabel Patim (org). *Literatura e Medicina. I Encontro de Estudos sobre Ciências e Culturas* (Porto: Universidade Fernando Pessoa, 2003), 119–137; José Luis Ramos Gorostiza, 'Edwin Chadwick, el movimiento británico de salud pública y el Higienismo español', *Revista de Historia Industrial*, 2014, 23–55, 11–38; José Alejandro González and Patricia Alvarino Serra, 'La importancia del higienismo y la potabilización del agua en la ciudad de Valencia (1860-1910)', *Investigaciones Geográficas*, 2016, 65, 45–55.

<sup>90</sup>Regarding the urban renewal of Lisbon see Rodrigues, *O Triunfo dos Jardins*.

<sup>91</sup>Álvaro Ferreira da Silva, 'Thirsting for Efficiency: Technological and Transaction-Cost Explanations for the Municipalisation of Water Supplies', and José Manuel Brandão and Pedro Miguel Callapez, 'Engineering, Geology and the Water Supply to Lisbon in the Second Half of the Nineteenth

texts on public hygiene concern the urban environment, although it was also extended to the rural milieu.<sup>92</sup>

The existence of swampy areas, during the warm season in the Iberian Peninsula, with their abundance of decomposing plant remains and moisture, represented nature's major sources of disease, such as malaria.<sup>93</sup> Although malaria has been almost extinct since the 1960s, it was a devastating disease on the Iberian nineteenth century.<sup>94</sup> Furthermore, at that time, the cause and the cure for malaria were not well established.<sup>95</sup>

The etiological view of malaria until the end of the nineteenth century was based on the miasmatic theory of disease.<sup>96</sup> Prior to the bacteriological developments of the late nineteenth century, many physicians believed that decomposed material, cadavers, and marshlands, generated disease through miasmas (noxious gases) that polluted populations.<sup>97</sup> This theory held that diseases—such as cholera, typhoid, tuberculosis, diphtheria—were caused by a miasma (μίχσμα, ancient Greek: "pollution"), a noxious form of 'bad air', also known as night air.<sup>98</sup> Exposure to such atmospheric toxins,

Century. Expertise and Innovation', in Ana Duarte Rodrigues and Carmen Toribio Marín, eds, *The History of Water Management in the Iberian Peninsula between the 16<sup>th</sup> and 19<sup>th</sup> centuries* (Cham: Springer, 2020), 89–136.

<sup>92</sup>For example, rice cultivation raised several health issues in the Iberian countryside. Henrique da Cunha Mendia, *A cultura do arroz no distrito de Coimbra: relatório dos trabalhos da comissão nomeada por portaria de 16 de Setembro de 1882 apresentado a sua excelência o senhor Ministro das Obras Públicas* (Lisboa: Impr. Nacional, 1883); Irene Vaquinhos, 'O 'mal das seções': Arrozaís, malária e protesto popular nos campos do Mondego (séculos XIX e XX)' In *Percursos da história*. Estudos in Manuel Sílvia Alves Conde; Margarida Vaz Rego Machado; Susana Serpa Silva, ed., *Memórias Fátima Sequeira Dias* (Ponta Delgada: Nova Gráfica, 2016), 65–87; Rubén Bueno Mari and Ricardo Jiménez Peydró, 'Crónicas de arroz, mosquitos y paludismo en España: el caso de la provincia de Valencia (S. XVIII-XX)', *Hispania: Revista española de Historia*, 2010, 70/236, 687–708.

<sup>93</sup>The malarial category included not only malaria as we currently define it, but also a number of other disease entities with which malaria was diagnostically confused, notably typhoid fever.

<sup>94</sup>Mónica Saavedra, 'Malária, Mosquitos e Mortalidade no Portugal do século XX', *Etnográfica*, 2013, 17, 51–76; Randall Packard, *The Making of a Tropical Disease: A Short History of Malaria* (Baltimore, Md.: Johns Hopkins University Press; 2007); Charles Rosenberg, 'Introduction: Framing Disease: Illness, Society, and History,' in Charles E. Rosenberg and Janet Lynne Golden, eds, *Framing Disease: Studies in Cultural History* (New Brunswick, NJ: Rutgers University Press, 1992).

<sup>95</sup>That malaria was spread by a mosquito was only acknowledged in 1897, when Ronald Ross demonstrated that malaria was carried by mosquitoes. In 1882, Horace Waller published a booklet on *Bilious Remittent Fever of Africa*, in which he ascribed the main cause of remittent fever to 'the overpowering presence of miasma', Michael Jennings, 'This Mysterious and Intangible Enemy': Health and Disease amongst the Early UMCA Missionaries, 1860–1918', *Social History of Medicine*, 2002, 15, 65–87, 72.

<sup>96</sup>Gregg Mitman and Ronald L. Numbers, 'From Miasma to Asthma: The Changing Fortunes of Medical Geography in America,' *History and Philosophy of the Life Sciences*, 2003, 25, 391–412.

<sup>97</sup>Proponents of anti-contagionism argued that the human body had a dynamic relationship with the environment and that skin was permeable to the poisons of the environment it inhabited. Doctors connected miasmas to certain environments and societies. Humid marshes, swamps and lowlands with dense vegetation created the suitable atmosphere for miasmas. In contrast, lush grasslands, high altitudes, clean air, were considered the most salubrious Carlos Dimas, 'Harvesting Cholera: Fruit, Disease and Governance in the Cholera Epidemic of Tucumán, Argentina 1867–1868', *Journal of Latin American Studies*, 2017, 49, 115–142; Kenneth Thompson, 'Insalubrious California: Perception and Reality', *Annals of the Association of American Geographers*, 1969, 59, 50–64.

<sup>98</sup>During the nineteenth century, three epidemics of cholera devastated Spain, the last one occurring in 1885. For the last outbreak, the Spanish forester Primitivo Artigas recommended more tree plantations for the protection of clean water sources.

according to the theory, had morbid effects. Emanations from the earth produced by decomposing bodies and excrement poisoned the air and transmitted disease.

In the absence of any understanding of malaria's microbial causes, which would only come with the germ theory, the restriction of malaria to certain geographical localities strongly suggested that there was an environmental factor as a source of the disease. Experts reasoned that, if environmental conditions were the cause of disease, then these circumstances only needed to be modified in order to eradicate it.<sup>99</sup>

Due to the reputation of eucalypts as trees able for soaking up water from the ground as if they were sponges, they were planted in marshy areas in order to neutralise miasmas and improve health in the region.<sup>100</sup> This property is widely recognised, as the eucalyptus tree absorbs eight to ten times its own weight within 24 hours, while returning anti-septical vapours to the atmosphere. In fact, these plantations absorbed so much water that, in these marshes, crops could only be planted 10 metres away from eucalyptus windbreaks.<sup>101</sup>

The effect of drainage, operated in the soil by the strong suction power of the roots and the corresponding exhalation of leaves, explained the salutary action of groups of these trees. But there was another reason: the balsamic emanations which the aircells of the tree profusely throw out into the atmosphere.

However, the *Gardeners' Chronicle* published an article whose author was 'rather sceptical as to the efficacy of the balsamic emanations to neutralise malaria and prevent fever'.<sup>102</sup> The beneficial effects of the tree were never at stake, but there were some questions as to whether it was due to the improvement of general conditions provided by the growth of trees or there was really a cause-consequence between the eucalyptus tree and the success of malaria prophylaxis. Moreover, the author argued that, in England, the same kind of effect can be achieved by the planting of poplars, willows, alders, and other fast-growing trees.

Besides the betterment of health through the drainage of marshy areas, we argue that the emergence of the concept of healing eucalypts was not only due to their capacity for environmental change, but also due to their benefits on human health for malaria prophylaxis.

Although quinine was already considered appropriate for malaria prophylaxis and as a febrifuge,<sup>103</sup> ever since the discovery of this alkaloid in 1820 by the French physicians Pelletier and Caventou,<sup>104</sup> other solutions were experimented. For example, hake oil was

<sup>99</sup>The miasma theory challenged the old contact contamination model of contagion. Contamination was no longer direct as in person-to-person contagion; it was, instead, the result of exposure to certain conditions in the atmosphere.

<sup>100</sup>Jules-Émile Planchon, 'L'Eucalyptus globulus au point de vue botanique, économique et médical,' *Revue des Deux Mondes*, 1875, 7, 149–174, translated into English by the department of Agriculture, *Eucalyptus globulus. Its Introduction, Culture and Uses* (Washington: Government printing office, 1875).

<sup>101</sup>Federico Caprotti, 'Malaria and Technological Networks: Medical Geography in the Pontine Marshes, Italy, in the 1930s', *The Geographical Journal*, 2006, 172, 145–155.

<sup>102</sup>*Gardeners' Chronicle*, 29 March, 1879.

<sup>103</sup>Quinine was well-known for its prophylactic qualities by this date. After a period of relative unpopularity between the 1790s and 1820s, quinine was once again the method of choice for both the prevention and cure of malaria. Jennings, 'This mysterious and intangible enemy', 65–87.

<sup>104</sup>Quina had been addressed in the Spanish and Portuguese scientific literature and pharmacopoeia since the beginning of the eighteenth century. Célia Cabral, Ana-Leonor Pereira and João Rui Pita, 'Pharmacy, Quina and Quinine in Portugal, 18th–20th Centuries,' *Circumscribere*, 2015, 16, 139–141.



also considered as a substitute for quinine against intermittent fevers by the French Tauffieb and the German physician Schenck, in 1840.<sup>105</sup> Likewise, in the Iberian Peninsula in the 1860s, eucalyptus was also considered a substitute for quinine due to its properties.

In the nineteenth century, several eucalyptus products were already used for therapeutic purposes: oil extracted from eucalyptus acts upon the organism as a general stimulant; aromatic emanations from pines were favourable for lungs' diseases; the essence of eucalyptus was used for sub-acute bronchitis; its powder used for chest infections; the alcoholic extract used as a disinfectant; the leaves used in distilled water for inhalations and injections; eucalyptus leaf cigars for spasmodic coughs and asthma.<sup>106</sup> The concept of eucalyptus's alkaloid was also naturally envisioned as a substitute for quinine.

Besides the eucalyptus properties, there were the difficulties encountered with the quinine supply as it was not always easy to obtain.<sup>107</sup> Therefore, the eucalyptus tree was considered as a cheaper alternative. Moreover, we argue that Spanish peasants used eucalyptus for fever prophylaxis, caused by malaria, and that these experiments were included by French physicians in their publications, and therefore, contributing to the testing of these secret remedies.<sup>108</sup> These doctors also performed experiments using eucalypts for medical purposes and their empirical results were spread worldwide.<sup>109</sup>

Reports of the prophylactic efficiency of the eucalyptus tree continued. For example, from the Algiers acclimatisation garden, news arrived on such growth as '8-year-old globulus trunks [that were] 10 meters high,' and on this tree's virtues for health, as there was 'the general belief that the aromatic emanations that these trees depleted would neutralize the influence of malarial miasmas'. This belief lies behind the multiplication of plantations in Algeria.<sup>110</sup>

In Spain, the physician José Tristany y Serret, director of the Granja Experimental de Barcelona (hereafter Experimental Barcelona Farm),<sup>111</sup> was the first to report the positive impact of eucalyptus leaves as a febrifuge for peasants. Tristany provided eucalyptus

<sup>105</sup>'Filosofia Medica', in *Boletín de Medicina, cirugía y Farmacia*, 1840, 14, 105.

<sup>106</sup>JHP, 1874, 145.

<sup>107</sup>Even when quine was cultivated outside the Americas, namely in the Portuguese former colonies, it was not always successful, but it was certainly expensive. Bernardino Barros Gomes, *Cultura das Plantas que Dão a Quina* (Lisboa: Imprensa Nacional, 1864). See also Andrew Goss, 'Building the World's Supply of Quinine: Dutch Colonialism and the Origins of a Global Pharmaceutical Industry', *Endeavour*, 2014, 38, 8–18.

<sup>108</sup>Following Matthew Ramsey conceptual framework in 'Academic Medicine and Medical Industrialism: The Regulation of Secret Remedies in Nineteenth-Century France', in Ann Elizabeth Fowler La Berge and Mordechai Feingold, eds, *French Medical Culture in the Nineteenth Century* (Amsterdam: Atlanta GA, 1994), 25–78.

<sup>109</sup>Robert Bentley, *On the Characters, Properties, and Uses of Eucalyptus globulus and Other Species of Eucalyptus* (London: Printed by Taylor and Francis,

1874); Adolphe Brunel, 'Propiedades medicinales del Eucalyptus globulus', translation of Papillion's *Les progrès de la thérapeutique*, 1872, 669, in *Anales de la Sociedad Rural Argentina*, 1872, 6, 269; 'The Eucalyptus', partial translation of Planchon, in *The Horticulturists and journal of Rural Art and Rural Taste*, 1875, 30, 124; Carlo Ohlsen, 'L'eucalyptu nell' agro romano e nelle regioni meridionali d'Italia', *Giornale di Agricoltura*, 1877, 4, 122–124; 'Therapeutica Medica', translated from Gubler, *El Pabellón Médico, Revista Científica e Profesional de Medicina, Cirugía e Farmacia*, 1871, 11, 483–486.

<sup>110</sup>Bosch, *Parte forestal*, 84.

<sup>111</sup>José Tristany y Serret, *Memoria leida por el director de la Granja Experimental de la Provincia de Barcelona, en la inauguración del 2o curso trienal de alumnos agricultores prácticos* (Barcelona: Tipografía de Ramírez 1864); by the same author *Apuntes para un Programa de Elementos de Agricultura* (Barcelona: Tipografía de Ramírez, 1878).

leaves for doctors and at least in the case of a child and an elderly patient, they attributed the cure to the eucalyptus leaves.<sup>112</sup> From then on, they recommended the use of tea made with the tree leaves to lower the fever, probably caused by malaria.

The marvellous febrifugal properties of eucalypts were locally noted by other *científicos* such as the pharmacist José Simón, who had a drug shop and laboratory in Madrid (Caballero de Gracia street, 3, Oficina y Laboratorio).<sup>113</sup> As early as 1868, he was already selling eucalyptus' essence for fever prophylaxis (Figures 3 and 4).<sup>114</sup> Following Tristany's conclusions, since 1862, Simón cultivated 1500 eucalypts in his own nurseries in la Mancha region, southern Madrid, for selling eucalyptus' oil.<sup>115</sup> This expert, along with other pharmacists from Catalunya, such as Teixidor,<sup>116</sup> were members of the Instituto Agrícola Catalán de San Isidro, a reputed society for its serious works on forestry, agronomy and horticulture. The journal *El genio medico cirurgico* described some experiences in Barcelona, where the medicinal values of the leaves, 'virtud febrifuga ponderosa', were confirmed.<sup>117</sup>

In Portugal, the Spanish doctors were acknowledged for their experiments on eucalyptus for intermittent fevers. However, the names of the first experts to be revealed on the *Journal* were the Austrian Lorinser and the German Lamach, since the journal's editor, Duarte Oliveira Junior, was amended by the chief-gardener of the public gardens in Seville, Jules Meil, who told him that in Valencia they had been making such experiments for a long time.<sup>118</sup> They began to seriously treat the intermittent fevers and even the gout with an infusion made out of eucalyptus leaves and bark, and the count Maillard de Marafy claimed to have found in its leaves a substitute for the Sumagre,<sup>119</sup> the common name for *Rhus coriaria*, whose fruit is highly used for therapeutic goals.

Although experiments on eucalypts for malaria prophylaxis were not undertaken in Portugal, this topic was discussed at the Faculty of Medicine of the University of Porto when a student of medicine called Augusto Moreira Pinto presented a dissertation on 'Do Eucalyptus globulus e seus efeitos na Economia Humana' (Of Eucalyptus globulus and its effects on human economy) to get his medical degree (Figure 4).<sup>120</sup>

Following an international trend and aware of the eucalypt febrifugal properties due to tannin and eucalyptol, Pinto decided to legitimise eucalyptus for malaria prophylaxis as a valid medical practice in Portugal.<sup>121</sup> Pinto stressed that only in the last years had some experiments on the chemical properties of eucalyptus had been made by the French physician Adrien Sicard,<sup>122</sup> with the most thorough research made by the French

<sup>112</sup>José Simón, 'El Eucalipto', *La Nueva Iberia. Diario Liberal*, 1868, 82, 4.

<sup>113</sup>Since 1844, Simón maintained an establishment of medicinal milk in his pharmacy. In *Boletín de medicina, cirugía y farmacia*, 1 de diciembre 1844).

<sup>114</sup>José Simón, 'Jarabe Tónico Febrifugo de Eucalipto' (Eucalyptus globulus de Labillardière) Preservativo y Curativo de las Calenturas Intermitentes ò periódicas,' *La Nueva Iberia. Diario Liberal*, 1868, 82, 4.

<sup>115</sup>His property was named 'dehesa de Santa catalina' (Navalpino, Ciudad Real), José Simón, 'El Eucalipto', *La Nueva Iberia. Diario Liberal*, 1868, 82, 4.

<sup>116</sup>Teixidor reported these experiments in *El Compilador Medico*, 13 November, 1865, 188-189.

<sup>117</sup>José Simón, 'El Eucalipto', *El genio medico-cirurgico*, 22th July 1868, 449. It is another newspaper in which Simón advertises the oils he has to sell.

<sup>118</sup>Duarte Oliveira Junior, 'Eucalyptus globulus', 144.

<sup>119</sup>Goeze, 'Excursão Botanica e Horticola', 145.

<sup>120</sup>Augusto Moreira Pinto, *Do Eucalyptus globulus e seus efeitos na Economia Humana* (Porto: Typographia de António José, 1876).

<sup>121</sup>Pinto became aware that this was almost unknown in Portugal. Pinto, *Do Eucalyptus*, 16.

<sup>122</sup>President of the Imperial Society of Medicine of Marseille.

## LABORATORIO Y OFICINA DE FARMACIA DEL DOCTOR SIMON.

No siéndonos posible contestar particularmente á cada una de las muchas cartas que vamos recibiendo, preguntándonos acerca del uso de las hojas del eucalipto, lo hacemos por medio del presente anuncio, manifestando:

1.º Que las hojas deben cortarse de la planta en el mes de Agosto.

2.º Deben secarse sobre cañizos á la corriente del aire y en paraje donde no les dé el sol, cubriéndolas con papel para evitar en lo posible, que se impregnen de polvo.

3.º La infusion para cada dosis se hará con tres hojas de regular tamaño, dentro de vaso de cobre estañado, cerrado herméticamente procurando que la temperatura no pase de 60.º Réamur. El vaso no se destapará hasta hallarse completamente frio.

Estas precauciones y otras de menor importancia, que solo están al alcance del Farmacéutico, son necesarias para conseguir que la infusion contenga todos los principios aromáticos del vegetal, que son los que principalmente destruyen los miasmas palúdicos, causa de las calenturas intermitentes.

Para las personas que no puedan, ó no quieran practicar estas operaciones, tenemos el jarabe de eucalipto y su elixir que encierran en sí la infusion concentrada con todos los principios medicamentosos de la planta, en términos que, una cucharada del jarabe, equivale á una dosis de infusion, ya debidamente azucarada.

Con estos productos se obtienen todos los dias curaciones de calenturas intermitentes mas ó menos antiguas que en vano se habia procurado combatir con la quinina. De estos casos vamos formando relacion para publicarla en su dia.

Fig. 2 'Laboratorio y Oficina de Farmacia del Doctor Simon', in *Diario de Avisos de Madrid*, 21.2.1867, 3. Courtesy of the Dirección General de Bibliotecas, Archivos y Museos, Madrid City Council.

pharmaceutical and chemist François Stanislas Cloez, who named the eucalyptus oils as *Eucalipto*.<sup>123</sup> Pinto also quoted Ahumada, a director at the Royal Palace of Aranjuez, as he had experimented with eucalyptus leaves and their ability to fight malaria, and the French physician Tedeschi whose experiments were published by Adolphe-Marie Gubler.<sup>124</sup>

<sup>123</sup>President of the Society of Chemistry of France.

<sup>124</sup>Pinto, *Do Eucalyptus*, 45. Gubler was the founding-member of the Society of Biology and member of the Society of Medicine in France, as well as a professor at the Parisian Medical School. His most im-

portant article on this topic was Gubler, 'Sur l'Eucalyptus globulus et son emploi thérapeutique', *Bulletin de thérapeutique médicale et chirurgicale*, 1871, 145-157.



**JARABE**  
 DE SAVIA DE PINO MARÍTIMO  
 DE LAGASSE  
 FARMACÉUTICO DE BURDEOS

Empleado victoriosamente en el tratamiento de los CATARROS, BRONQUITIS, HEMOPTISIS y muy poderoso en los diversos periodos de la tisis.

Cura los espufos de sangre, las toses mas tenaces, la opresion, los dolores de pecho, la alteracion de la voz, los accesos nocturnos de los asmáticos y modifica las lesiones graves de los órganos respiratorios.

Depósito general en Madrid, farmacia del Doctor Simon, calle del Caballero de Gracia, núm. 3; Borrel hermanos, Puerta del Sol; Ulzurrun, calle de Barrio-nuevo y Moreno Miquel, calle del Arenal.

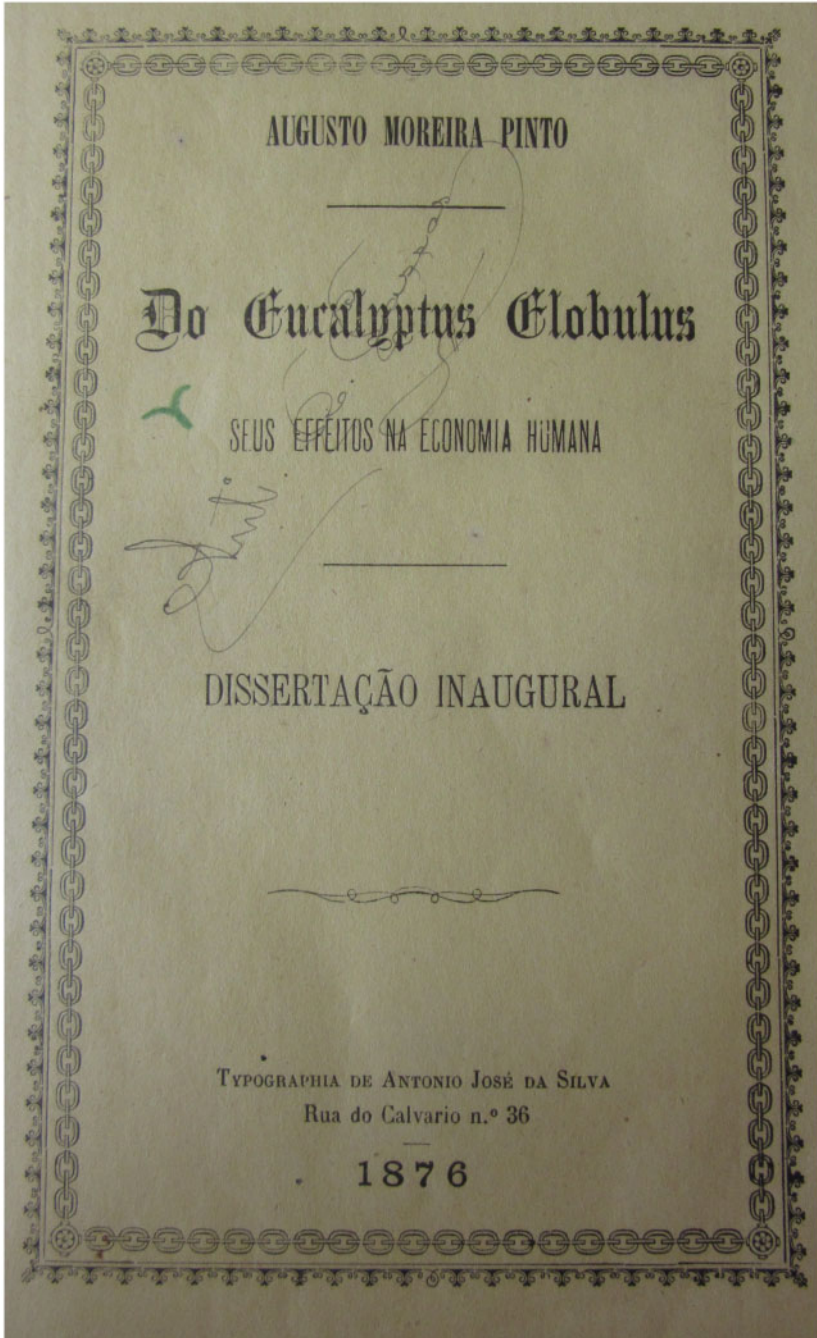
**Fig. 3** Advertisement of a medicine produced with pine in 'Jarabe de Savia de Pino Marítimo', *La Nueva Iberia. Diario Liberal*, 1868, 82, 4. Courtesy of the Dirección General de Bibliotecas, Archivos y Museos, Madrid City Council.

Chemical experiments sought to identify a vegetal alkaloid similar to quinine in eucalyptus. However, the French physician Antoine Rabuteau demonstrated that eucalyptus does not contain an alkaloid similar to quinine in the 1870s.<sup>125</sup> On the other hand, the eucalyptus tree does contain tannin, securing its astringency properties. Nevertheless, there were multiple opinions regarding where the tannin was concentrated, as Pinto demonstrated. The French pharmaceutical Emmanuel Debray considered that eucalyptus' leaves contain more tannin than the other parts of the tree.<sup>126</sup> On the contrary, the Portuguese horticulturist Duarte Oliveira Junior's report based on Ferreira Lapa's experiments stated that eucalyptus bark contains more tannin than other parts of the tree.<sup>127</sup> Both authors, the French pharmaceutical and the Portuguese horticulturist are cited by Pinto, showing the large spectrum of his sources which go from pharmacy to horticulture. However, Pinto's report shows that he was not that familiar with the Spanish doctors' experiments, as he often cited the French sources. Pinto provided a summary of

<sup>125</sup>Pinto, *Do Eucalyptus*, 30. See also Antoine Rabuteau, *Elements de Therapeutique et Pharmacologie*, (Paris: Lauwereins, 1873), 657–662.

<sup>126</sup>Pinto, *Do Eucalyptus*, 31. Emmanuel-Claude Debray, *De l'eucalyptus globulus: Thèse soutenue à l'école de pharmacie de Paris* (Paris: Florez, 1872).

<sup>127</sup>Pinto, *Do Eucalyptus*, 31.



**Fig. 4** Cover of Augusto Moreira Pinto's medical dissertation entitled *Do Eucalyptus globulus e seus efeitos na Economia Humana* (University of Porto, 1876). Courtesy of the Biblioteca Nacional de Portugal.

several experiments made by the French landowner and politician François Trottier and the physician Regulus Carlotti<sup>128</sup> from Corsica, seeking to understand the eucalyptus absorbing power.<sup>129</sup> Trottier demonstrated the enormous capacity of water absorption of eucalyptus roots in 1867 and 1868, since eucalypts absorbed three times their weight of water in two hours, and quickly eliminated a great part of it.<sup>130</sup> Furthermore, Carlotti made an experiment with 25 kg of eucalyptus' leaves that he submersed them in maceration in 22 l of water and 24 hours after there was 1.5 l more as the leaves had lost part of their water.<sup>131</sup> These experiments were for the first time disclosed at the *Journal of Practical Horticulture* in which the French physician Henri Gimbert, working at Cannes, observed that the medical sciences had been taking advantage of the eucalyptus therapeutic properties.<sup>132</sup>

Clearly, knowledge on the characteristics of eucalypts was being produced by a multi-disciplinary network of experts, from medical doctors to agronomists and horticulturists. Although Pinto acknowledges all of these authors, he considers that only Cloez, Gimbert and Gubler did original experiments, whereas all the others reproduce their observations.<sup>133</sup> The eucalyptus medical properties were first tried on animals by Cloez, and then on humans by Gimbert, who made some experiments on himself.<sup>134</sup> Due to their novelty and impact, Pinto transcribed experiments XI and XII in his dissertation.<sup>135</sup>

Pinto states that the expansion of eucalyptus' plantations in Spain, Algeria, Corsica and Germany allowed for verifying the properties of this vegetal 'already named in Spain as the *fever tree*'. However, he had not heard about Barcelona's experiments, which were probably the first ones. On the contrary, he mentions that Spanish physicians from Valencia, Cadiz, Seville and Cordoba unanimously advised the Society of Acclimatization to promote the growth of this tree.<sup>136</sup> Moreover, he was also aware of the use Valencian peasants make of eucalyptus leaves as treatment against fever, through Brunel's book. In 1867, peasants from Valencia were using it, but they 'had never seen it being employed by any doctor',<sup>137</sup> which is clearly contradicted by the Barcelona's experiments chronology.

Finally, Pinto ends by listing the names of the physicians who treated patients with eucalyptus oil.<sup>138</sup> Gimbert, 'one of the most devoted propagators of *Eucalyptus globulus* for the therapeutic armoury', only got six unsuccessful cases in a universe of over 36.<sup>139</sup>

<sup>128</sup>Carlotti was a member of the Medical Society of Montpellier. See Antoine-Louis-Regulus Carlotti, *Eucalyptus globulus, son rang parmi les agents de la matière médicale* (Ajaccio: Imprimerie de Leca, 1872). Later he published *Assainissement des régions chaudes* (Ajaccio: Imprimerie de Leca, 1875).

<sup>129</sup>Pinto, *Do Eucalyptus*, 25–27.

<sup>130</sup>de Oliveira e Silva, 'Eucalyptus globulus', 49.

<sup>131</sup>Gimbert, 'O Eucalyptus globulus e a sua importância em agricultura', in A. J. de Oliveira e Silva, 'Eucalyptus globulus', *JHP*, 1874, 49.

<sup>132</sup>*Ibid.*

<sup>133</sup>Pinto, *Do Eucalyptus*, 34.

<sup>134</sup>Gimbert, *L'Eucalyptus Globulus son importance en Agriculture, en hygiène et e Médecine* (Paris: Adrien Delahaye, 1870).

<sup>135</sup>Experiment XI and XII described in Pinto, *Do Eucalyptus globulus e seus efeitos na Economia Humana*, 36, are reproduced from Gimbert, *L'Eucalyptus Globulus*, 43–44.

<sup>136</sup>Pinto, *Do Eucalyptus*, 45.

<sup>137</sup>Adolphe Brunel, *Observations cliniques by L'Eucalyptus globulus* (Paris: Bailliere, 1872), 9.

<sup>138</sup>Doctor Lorinser healed 43 out of 53 patients; Castan observed 5 cases of cure in 27 patients; Doctor Keller, from Austria, healed 310 out of 432. From these, 122 cases became immune to eucalyptus' prophylaxis, and 58 were cured with quinine. Carlotti, Tavera, Brunel, Weller, Lorinser, Kirchber and Gubler reached the same conclusions. In Pinto, *Do Eucalyptus*, 46–47.

<sup>139</sup>Pinto, *Do Eucalyptus* 48.

In Portugal, almost no medical experiments took place, or, even if they did, were not publicised. When Pinto proposed to the faculty's scientific committee to make experiments with patients at the University of Porto hospital, both the hospital and the faculty refused his proposal.<sup>140</sup> In the journal of the *Sociedade das Ciências Medicas*, the importance of Brunel's experiments was publicised, and the president of the Medical Society emphasised they should also be made in Portugal. However, Doctor Gomes, from the Hospital of St Joseph in Lisbon concluded, after a lot of experiments on patients with different forms of eucalypts, that the plant did not hold any particular medical properties. Nevertheless, Pinto weakens his conclusions and argues that Professor Carlos Moreira presented a lesson on the topic, based on his own practice, and that it matched the international results.<sup>141</sup>

In Europe, the eucalyptus tree was also praised for its healing qualities and experiments were being carried out in different contexts, to such an extent that on 21 February 1876, G. F. Bowen, the governor of Victoria, Australia, stated that 'When I was last in Europe I heard everywhere of the good done by this tree in neutralizing the ill effects of malaria'.<sup>142</sup> However, it was in Australia that this solution was developed as Mueller was also one of the first to recommend eucalypts for anti-malaria prophylaxis.

Mueller was the first to suggest to the Marquis of Toverene that malaria could be restrained if eucalypts were extensively cultivated in La Campagne.<sup>143</sup> Mueller advised Dr Goold to take a considerable amount of eucalyptus seeds to Rome 'for antimalarial purposes, when the first great Council took place' in 1869.<sup>144</sup> Additionally, on a letter to Eduard Fenzl, dated 14 October 1871, Mueller assumed that 'the discovery that eucalyptus can also be used in the treatment of malaria makes these trees even more important'.<sup>145</sup>

When queries emerged, Mueller was challenged to give his opinion and, by then, although he was not that assertive, he stated that, 'like all the terebenthine oils of Pines, so the cajuput oil of Eucalyptus and Melaleuca, and others of our Myrtaceae generate binoxide of hydrogen, that potent disorganiser of putrid compounds'.<sup>146</sup> When confronted with questions regarding the healing power of eucalyptus, he could not deny what he had believed throughout all of his life. Therefore, prudently, he just replied that he 'would be cautious in condemning Eucalyptus culture in suitable climatic zones for hygienic reasons alone'.<sup>147</sup>

<sup>140</sup>*Ibid.*, 46.

<sup>141</sup>*Ibid.*, 48.

<sup>142</sup>J76/1546, unit 952, VPRS 3991/P inward registered correspondence, VA 475 Chief Secretary's Department, Public Record Office, Victoria.

<sup>143</sup>Letter from Mueller to Alessandro de Goyzueta, Marquis of Toverana, dated from 16 August 1880. Versamento IV Busta 243. Fascicolo 1435. Direzione generale dell'agricoltura, Ministero dell'Agricoltura, Industria e Commercio, Archivio Centrale dello Stato, Rome. <https://epsilon.ac.uk/view/epsilon/letters/JHC431> (11 June 2021, date last accessed).

<sup>144</sup>Letter from Mueller to Lajos Haynald, dated 22 November 1882. Magyar Természettudományi Múzeum, Budapest. Correspondence Project. "FVM-82-11-22," in epsilon: The Ferdinand von Mueller Collection, <https://epsilon.ac.uk/view/vonmueller/letters/82-11-22> (12 June 2021, date last accessed).

<sup>145</sup>Eduard Fenzl Nachlass, Archiv der Universität Wien, Vienna.

<sup>146</sup>*Gardeners' Chronicle*, February 1879.

<sup>147</sup>*Ibid.*

When Mueller died, on his obituary Memorial, he was acknowledged ‘for the benefits he conferred upon them by the introduction of the Eucalyptus as the destroyer of malaria and the conservator of human life’.<sup>148</sup>

### Final Remarks

This research conveys how Iberian actors contributed to deepening knowledge on Eucalyptus genera in the second half of the nineteenth century, not only due to this exotic plant botanical and horticultural qualities, but also due to its medical potential and its capacity to transform ‘toxic places’ into healthy environments.

This study contributes to historically understanding the introduction of an exotic plant that has become unpopular in current times due to forest fire dangers, among others. In the nineteenth century, the Australian tree attracted a great deal of interest worldwide, benefiting from international networks extant between European countries and their colonies. Moreover, the dissemination of eucalypts in the gardens and farms of the Iberian Peninsula was so significant that eucalypts popularity became as important locally as globally.

In the two countries of the Iberian Peninsula, similar leitmotifs inspired tree acclimatisation projects with parallel chronologies, but their emphasis on horticultural and medical interests were slightly different. In the Portuguese case, horticulturists, botanists, gardeners and amateurs had the aim of studying eucalyptus trees to create forests. In the Spanish case, pharmacists, physicians and foresters stand out as they sought to use science and technology to restore normality for the human life in toxic areas and claimed it could replace quinine for malaria prophylaxis. Although a Portuguese physician argued in this sense, the majority of Portuguese doctors were doubtful.

An array of articles published in both scientific journals and the press reflected not only the growing popular interest in tree cultivation in the Iberian Peninsula during the second half of the century, but also its intersection with an increasingly professional and technical culture of gardening, forest improvement and public sanitation and health. Through the analysis of scientific publications, we concluded that the experts working on the Iberian Peninsula—Pimentel, Oliveira Junior, Moller, Goeze, in Portugal, Ramel, Cortés and Malingre, in Spain—were among the most important eucalyptus experts in global terms. They were granted such authority not just for their institutional positions, but also because of their role as consultants, as well as their practical and theoretical knowledge.

Their books, articles and reports demonstrated their life-long emphasis on precise observation and description, contributing to promoting scientific and collaborative study, to transforming some rural areas, and adding an economic value to forestry activities. Furthermore, the emergence of eucalypts in the Iberian Peninsula helped give rise to a notion of tree experimenter, and especially to the sense that this experimentation could be pursued as an economic or medical goal or as a rewarding leisure activity. As a result, they became internationally acknowledged experts, who backed the expansion of eucalyptus plantations.

In describing how and why laypeople engaged in tree experimentation, we draw attention to a few key features of this practice: the enrollment of horticulturists, farmers,

<sup>148</sup>From William Potter to the general public.



landowners on tree experimentation as both leisure and scientific labour; the application of newly sanctioned methods by growing professional communities; the development of a community of practitioners inclined to share methods and experiences on horticultural and gardening journals as well as on medical reviews, and, finally, the adoption of 'experiment' as a term to describe tree essays related with both growth and medical properties.

### **Acknowledgements**

We thank the referees and Richard Aitken for their comments and suggestions. We also thank the Biblioteca Nacional de Portugal (National Library of Portugal) and the Dirección General de Bibliotecas, Archivos y Museos (General Board of Libraries, Archives and Museums) of Madrid for their permission to publish figures.

### **Funding**

This work was supported by the Fundação para a Ciência e a Tecnologia (Portuguese Foundation for Science and Technology) under the research projects AQUA—PTDC/HAR-HIS/28627/2017 and UID/HIS/UI0286/2019.