

‘A TALENTED YOUNG GERMAN’¹: EXPLORATION OF THE EARLY CAREER OF JACOB BRACHÉ

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ABSTRACT: Jacob Braché (1827–1905) arrived in Melbourne in 1853, two years into the Victorian gold rush, and soon became a significant figure in local mining circles. For almost fifty years, he contributed actively to mining endeavours — during periods as a civil servant, in numerous mining enterprises, and as a consulting mining engineer. Following a summary of Braché’s contributions in Victoria, this paper focuses on his education and experience prior to emigrating to the Colony, looking at the expertise that he brought to his colonial roles. It concludes with insights into why this ‘talented young German’ was a controversial figure over his half century of professional life in Australia.

BACKGROUND

Jacob Braché (1827–1905), a nineteenth century civil and mining engineer, contributed actively to mining endeavours in Victoria for almost fifty years. After extensive travel and professional experiences in the Americas, he sailed to Victoria in 1853 to join the world’s newest gold rush and soon became a significant figure in Victorian mining circles. He quickly gained prominence as a talented and outspoken mining expert — during periods as a civil servant, in numerous mining enterprises, and as a consulting mining engineer.

By 1851 the Port Phillip District of the Colony of New South Wales had developed pastoral runs and was making a significant contribution to the continent’s wool production and export. Two major developments in the middle of that year had a profound impact on the region’s future. The first was the founding of the Colony of Victoria on 1 July, with separation of the Port Phillip District from the Colony of New South Wales. At the same time, gold was discovered at multiple locations across Victoria, spurring one of the most significant gold rushes on record and in the 1850s accounting for over a third of global gold production.²

The population of the new Colony grew rapidly from 77,000 in mid-1851 to over 400,000 by 1857.³ Prospectors came to Victoria initially from the other Australian colonies but also, across the decade, in hundreds of thousands from overseas. The latter were lured by the gold but at the same time, in many instances, were also seeking to escape the harsh economic circumstances in much of Europe. Among the Europeans were small numbers of experienced professionals such as the Spaniard Henry Rosales (1820–1916) and the German Georg Ulrich (1830–1900). Both were German-trained, and arrived in Melbourne in 1853, bringing their European experience to the Colony’s

mining endeavours (Lloyd & Combes 2010; Birch & Darragh 2015, respectively). The gold-rush migrants to the Colony also included some who had followed precious metal rushes around the world and brought to Victoria knowledge and experience won in North or South America, or both, or the Ural Mountains in Russia. Jacob Braché was one such miner.

Following an outline of Braché’s contributions in Victoria, this paper focuses on his education and experience prior to emigrating to the Colony, looking at the expertise he brought to his colonial roles. It concludes with insights into why this ‘talented young German’ was a controversial figure over his half century of professional life in Australia.

OUTLINE OF BRACHÉ’S CONTRIBUTIONS AS A CIVIL AND MINING ENGINEER IN VICTORIA

Jacob Braché’s contributions to Victorian mining development were considerable and have been recognised with an entry in the *Australian Dictionary of Biography* (Morris 1969), and acknowledgement in books and other records of the history and assessment of mining in Victoria (e.g. Birrell 1998; Blainey 1963; Cusack 1973). He also wrote extensive reports and had innumerable letters and articles published in local newspapers. In these publications, Braché titles himself, and is also recognised in official sources, as civil and mining engineer (e.g. Braché 1859a: 130; 1860a).

Bringing his Californian experience to the Victorian goldfields, Braché is credited with being the first to apply machinery to quartz mining here (Select Committee 1856: 2). With an outlay of £2000 pounds and in partnership with Denis Eisenstaedler, Braché established a mining company at Specimen Hill in Forest Creek in early 1854. In contrast to the alluvial mining practices of the diggers

on the Victorian goldfields, Braché and his cooperative had the first steam-powered quartz crushing machine and a Chilean mill, as well as a large dam to supply water and a multinational team of 22 workmen (Blainey 1963: 64; Braché 1859b: 70–73; Select Committee 1856: 5–9).

Braché was ahead of his time, both in relation to the diggers on the Victorian goldfields who tended to prospect individually and were prejudiced against mining companies, and to the authorities who in 1854 failed to recognise that, as alluvial gold was depleted, larger-scale company mining would be able to muster the resources for sustained and economical mining of the Victorian goldfields' riches embedded in quartz. The Braché–Eisenstaedler venture failed, indirectly due to the Eureka uprising in Ballarat and 'the anarchy it caused on other gold fields' (Select Committee 1856: 6), although subsequently the adjacent Wattle Gully Mine was worked most successfully (Blainey 1963: 64; Brown 1935). There had previously been attacks on Braché's claim by other miners and then, following the transfer of troops from the Forest Creek goldfield to Ballarat, his company was severely vandalised in protest against such cooperative initiatives.

Over some forty years, Braché was involved in a number of other mining company partnerships and consultancies to assess mining prospects (Table 1). His assessments of mining ventures were, on occasions, over-optimistic or ahead of their time, as in his exploration of and investment in coal mining in Gippsland (Braché 1895). It was often difficult to raise capital for mining ventures and, unless a prospectus was optimistic about a mine's potential, the venture was unlikely to attract investment. The reputation of the assessor would also be on the line: one who had a reputation for very cautious appraisals was probably out of a job. With analyses of potential mineral deposits limited by the instruments and assays of the day, much mining was on a speculative basis — a prospectus was focused on potential rather than actual outcome. 'Talking up' mining ventures was likely a characteristic of the times (e.g. McMullen 1996: 162; 1998: 190).⁴

Braché is credited with founding the short-lived Mining Institute of Victoria and was involved in other professional societies — for example, as member of the Royal Society of Victoria's predecessor, the Philosophical Institute of Victoria in 1856, the *Deutscher Verein* (Melbourne German Club) where he lectured in 1856, and a council member of the Victorian Engineers' Association in 1883–1885.⁵

In 1856, after the fledgling Colony of Victoria established a Mining Commission, a South Australian newspaper reported:

The Mining Commission has been appointed. It consists of Professor McCoy, who holds the Chair of Natural History in our University; A.R.C. Selwyn,

Esq., the Geological Surveyor to the Government; and J.A. Panton, Esq., the Resident Warden at Sandhurst.⁶ A talented young German (Mr. Jacob Braché) has been appointed Secretary and Mechanical Draughtsman to the Commission.⁷

Some years later Braché gained another significant appointment (1862–1864) as Superintendent of Mining and Topographical Surveys in the Victorian Government's Lands and Survey Office.⁸ He was industrious in these roles but outspoken and, on occasions, critical of his superiors. These criticisms were, at least in some instances, justified — for example, McCoy failed to recognise the potential of quartz mining in Victoria. However, Braché's severely worded critiques of such prominent figures and their lack of vision and planning for the future of mining in Victoria saw him resign or terminated from the Colony's civil service on two occasions.⁹ Subsequently, Braché worked mostly as a private mining consultant (see, for examples, Table 1) and in the role of manager of mines — for example, Caw Baw Falls Gold-mining and Sluicing Company (Coliban River) (also a director) and Happy-Go-Lucky Gold Mining Company Ltd.¹⁰ Museums Victoria has mineral samples collected by Braché during his expeditions, as illustrated by the copper ore shown in Figure 1. In the 1870s Braché had another civil service role as land classifier under the *Land Tax Act*, a role which he is said to have approached 'in a spirit of fairness'.¹¹

At the end of the nineteenth century, the London *Mining Journal* carried a retrospective series of articles on mining in Victoria. The 30 January 1897 contribution recounted an incident from when the above-mentioned Mining Commission was in Bendigo, and the article was reprinted in *The Bendigo Advertiser*. It recalled that McCoy, like eminent Scottish scientist Sir Roderick Murchison (1792–1871),¹² was then of the view that 'the



Figure 1: Specimen of copper ore showing azurite and malachite collected by Braché in the 1860s from a lode outcrop near Lake Omeo. Museums Victoria specimen E13777.⁶³

Table 1: Examples of Brachés professional activities

Name	Role/s
Assessments	<p>Report on the state of the mines in Victoria as compared with that of other mining countries (Braché 1858–1859: 16, 54, 131–132)</p> <p>Assessment of Bank Vale Estate near Donnybrook, 22 miles north of Melbourne, for the owners (<i>The Age</i> 29 August 1859: 3)</p> <p>Assessment of the Campaspe Gold Mining Company (<i>The Colonial Mining Journal, Railway and Share Gazette</i> 2(1) Supplement: 1 September 1859, 1)</p> <p>Report on Mr Wilkinson’s Patent for the Extraction of Gold from Quartz which includes three ‘well-executed’ plates drawn by Braché to illustrate the invention (Osborne, Bland, Hodgson, Braché & Alpin 1861)</p> <p>Description of Eldorado Mines, District of Beechworth, and the Deep Leads Adjoining (Braché 1867)</p> <p>Prospectus of the Projected Great Long Tunnel Gold Mining Company, Walhalla with two maps and two plans (Braché 1876)</p>
Evidence to inquiries	<p>Evidence to Select Committee on Gold (Select Committee 1856: 1–20, 45–56)</p> <p>Report on Mining Survey’s progress (Selwyn 1863: 9–10, 27–46)</p>
Exhibits	<p>Category V: Printing, Engraving, Books, Etc. No. 264: Braché, J., 32 Collins-street W, Architect, Five Designs for Geelong Town Hall. <i>Official Catalogue of the Melbourne Exhibition, 1854 in Connexion with the Paris Exhibition, 1855</i>. F. Sinnett & Co., Melbourne, 1854, p. 27</p> <p>Class 32 – Mining and Metallurgy, No. 1387 – Braché, J., Northcote, Melbourne – manganese and cobalt ore, from near Walhalla. Melbourne International Exhibition. <i>The Official Catalogue of the Exhibits</i>. Second Edition. Mason, Firth & McCutcheon, Melbourne, 1880, Vol. 1, p. 61</p> <p>Minerals, Rocks, and Fossils – Second Order of Merit: Jacob Braché, Northcote, Melbourne, cobaltiferous manganese ore. Melbourne International Exhibition Awards (<i>The Argus</i> 8 March 1881: 6)</p> <p>Class 83 – Mining and Metallurgy, No. 1344 – Braché, J., Merri-st., Northcote. – coal. Centennial International Exhibition Melbourne. <i>Official Catalogue of the Exhibits</i>. Mason, Firth & McCutcheon, Melbourne, 1888, p. 81</p>
Maps	<p>Braché, J., 1861. <i>Ballaarat Map: Ballaarat Gold Field No. 1</i>, compiled & drawn by J. Brache; engraved and printed in colors by Brown & Slight (described in Historical Cartography Example 2 Ballaarat Gold Field, 1861. <i>Cartography</i> 11(2): September 1979, 113–114)</p> <p>Braché, J., 1861. <i>Map of Beaufort Goldfield</i>, showing topographic features and alluvial gold working areas, parish of Beaufort. Plan No 1705/M/1 (3/G/1) (Geological Survey of Victoria)</p> <p>Braché, J., ca. 1864. <i>Plan of Upper Northcote</i>, surveyed & compiled by J. Brache. Epping Road Board District, Melbourne (in the possession of Darebin City Council, Melbourne)</p>
Mining ventures	<p>Braché formed the Adventure Company with 21 shareholders in 1865 to mine for copper at Quidong (McQueen 2009)</p> <p>Notice of Registration at Beechworth of claims for the Great Extended El Dorado Gold and Tin Mining Company by Braché, Resident Director, Great Extended El Dorado Gold and Tin Mining Company, El Dorado (<i>The Ovens and Murray Advertiser</i> 5 May 1868: 1)</p> <p>The North Wellington Gold and Tin Mining Company ‘claim situated to the north of the well-known Wellington claim, El Dorado’ was successfully floated by Braché who judged it to be ‘second to no other claim on El Dorado’ (<i>The Ovens and Murray Advertiser</i> 1 July 1869: 3)</p> <p>Notice of Application for a Gold Mining Lease by Gustavus Rendall and Jacob Brache in trust for the Meadow Valley Sluicing Company (<i>The McIvor Times and Rodney Advertiser</i> 15 June 1882: 3)</p> <p>Application to register the Great Yarragon Coal Proprietary Company for which Braché was a shareholder (<i>The Warragul Guardian</i> 13 December 1889: 3. Reginald Murray of the Geological Survey of Victoria at the time Braché was exploring for coal in Gippsland stated: ‘I believe that Mr. J. Brache was the first explorer and discoverer of the immense deposits of brown coal in Gippsland ... [but] has been ruined ... as the Government were not able to give Mr. Brache a valid title when applied for’ (<i>The Narracan Shire Advocate</i> 12 January 1904: 2)</p>
Patents	<p>Petition of 6 March 1856 in regard to deficiencies of the Patent Act (<i>Victoria, Votes and Proceedings of the Legislative Council</i>, Session 1855–6, Paper E, No. 13)</p> <p>Jacob Braché for letters patent for a ‘machine for searching in alluvial and other deposits to ascertain their auriferous qualities, and also to be used in geological surveys; capable of being worked by hand, or horse or steam power’ (Figure 5) (<i>Victoria Government Gazette</i> 100: 3 November 1854, 2445; 123: 29 December 1854, 3096). The patent was granted on 12 January 1855 (The Chief Secretary, 1856. <i>Letters Patent Granted in the Colony of Victoria</i>, Session 1855–6. J. Ferres, Melbourne)</p> <p>Thomas Oultram and Jacob Braché for ‘Portable Prospector for Searching Auriferous Lands, and for Geological Surveys’ (<i>Index to NSW Registrations of Innovations 1855–1884</i>, 28 May 1855, Application No. 2)</p>

reef on Bendigo would not be payable below 100 feet'. As Selwyn was about to sign a report along these lines, he 'received a pencil written memorandum from his colleague at his elbow (Mr. Jacob Brache), to this effect:— "Don't wreck your reputation by signing such nonsense." Messrs. Selwyn and Brache left the room. Messrs. McCoy and Pantou put the remaining touches to the report'.¹³

Braché was obviously bright and confident as well as outspoken. What education and experience had this 'talented young German' brought to the new Colony of Victoria?

FAMILY AND EDUCATION IN GERMANY

Braché was born on 5 June 1827 in Coblenz (since 1926 Koblenz), a German city at the confluence of the Rhine and Moselle rivers in Prussia.¹⁴ The years prior to his birth were a turbulent period for the region. It was occupied by the French at the end of the eighteenth century, with Coblenz made capital of the new French *Département* of Rhin-et-Moselle in 1801, and then by the Russians in 1814. Following the Congress of Vienna, which addressed the settlement of Europe after the Napoleonic Wars, Coblenz was allotted to Prussia and in 1822 made the seat of government for the Prussian Rhine Province.

Braché's paternal grandfather, Anton, was *Bürgermeistersekretär* or mayoral secretary in Coblenz.¹⁵ Anton's son, Jacob Braché (senior) (1797–1867), served in the Napoleonic army. Following his invaliding and honorable discharge, he also joined the civil service as *Bürgermeistersekretär* in Coblenz.¹⁶ Thus, Braché was born into a middle-class family — Jacob senior had married Johanna Elisabeth Heppner (1798–1867) of Dillenburg in 1826 and they had eight children of whom four survived to adulthood. Besides Jacob, these were Klemens (1833), Susanne Elisabeth (Elise) (1835) and Johann Carl Fridolin (Charles) (1837), who ultimately all came to Australia (see below).¹⁷ The significant position held by his father and the family's economic circumstances would have ensured that Braché received good schooling, but no educational records are extant for that period.¹⁸

In 1846 Braché left Prussia for the Americas as a 19-year-old civil engineer with experience in the Prussian civil service (Select Committee 1856: 50).

Education

The education and training offered through German universities and technical colleges in the nineteenth century were recognised as of high standard, often giving their graduates an 'edge' over those qualifying in Great Britain and most other countries (e.g. Abel 1887). The breadth of Braché's activities and writings indicates that he also had

this opportunity. He recorded in 1856 that he 'received the education of a civil engineer in Prussia' (Select Committee 1856: 52). It was 'a thorough polytechnical education' which introduced him to 'Geology, Metallurgy, Chemistry, Mechanics etc.' as well as the design and construction of machinery (Braché 1856: 6 and 25 March).

With multiple generations of the family in Koblenz, it seemed likely that Braché would have prepared for his professional life through studies or training in the region. However, no related records could be located in several archives contacted.¹⁹ There is the possibility that records had been lost during the wars in the intervening period. However, engineering was a well-developed profession in Prussia in the early 1840s when Braché was a student and there were many institutions elsewhere from which Braché could have graduated — for example, polytechnical institutes had been founded in Berlin in 1821, Karlsruhe in 1825, Darmstadt in 1826, Munich in 1827, Dresden in 1828, Stuttgart in 1829 and Hannover in 1831 (Lubitz 2019: 174–175).

In his published writings Braché did not name his *alma mater*. However, an inspection of the catalogue of the 1854 Victorian Exhibition revealed a surprising entry attributed to Braché as architect:

Category V: Printing, Engraving, Books, Etc., item 264: Braché, J., 32 Collins-st. W., Architect.—Five Designs for Geelong Town Hall.²⁰

The Geelong Council bought land in 1854 to build a town hall and held a competition for its design. Twelve entries for the prize of £100 were received, with Melbourne architect Joseph Reid judged the winner.²¹ In 1854 Braché and a partner, George O'Brien, advertised as 'Architects, Surveyors, Civil Engineers, Land and General Agents' based in Collins Street West.²² Entries for Braché were found in two indexes of architects, *Biographical Index of Australian Architects* and *Australian Architectural Index*, recording that he was a graduate of the Royal Academy of Architects Berlin. Besides details of routine projects, these sources noted the significant achievement of Braché winning second prize in the competition to design the Melbourne Royal Exchange (Tibbits 2017; Lewis n.d.).²³ An article in *The Argus* stated that the winning entry 'would probably far exceed the estimates given', suggesting that the second-placed entry, the 'designs of Mr. J. Braché, graduate of the Royal Academy of Architects, Berlin, consisting of six drawings, for architecture, accommodation and probable cost and revenue', was probably more realistically costed.²⁴

An 1854 advertisement placed by Braché (Figure 2), 'Neave's-buildings, corner of Swanston and Collins-streets' in Melbourne, stated:

Being a graduate of the Royal Academy of Berlin, and through his practice and connection with architectural and engineering works ... [he] flatters himself to fulfil any charges entrusted to him, within the capacity of his profession. The most fashionable, practical, and artistic designs for public and private buildings, shop fronts, country residences, etc., made and superintended with the utmost integrity and despatch. Also Land Surveyed, and sub-divided, and engineering works of private character tested, and superintended.²⁵

Royal Academy of Architects Berlin

During the eighteenth and nineteenth centuries, expansion of Prussia and its ambitious development projects led to a great demand for master builders. Apart from the erection of public buildings and other major urban works, construction of roads and railways, canalisation and harbour upgrades were progressed. In the consequent expansion of the civil service, Prussia 'increasingly favored designers who could claim technical training, skill, and accomplishment' over architects with a more 'aesthetic and classical' training (Ringrose 2021). The polytechnical institutions emerged to meet this need.

Interestingly, there was no distinction in the German states between the professions of architect and civil engineer in the era when Braché was a student. The same word, namely *Bauingenieur*, embraced both — literally the term translates as building or construction engineer. These days *Bauingenieur* would be understood to mean civil engineer with architect (*Architekt*) denoting the other profession (Mislin 1999: 917–918). It is against this background that Braché denoted himself 'architect' in the early years after his arrival in Melbourne, but later used the descriptor 'civil engineer'.

The *Königliche Bauakademie zu Berlin* (Royal Building Academy Berlin), through a series of mergers, is one of the predecessors of the Technical University of Berlin (*Technische Universität Berlin*). In the sources above, Braché referred to it as Royal Academy of Architects Berlin which, in his era, is an equally valid English translation.

Braché later wrote that he was in the service of the government 'first in my own country, Prussia' (Braché 1859a: 16). Thus, commencement of his studies at the *Bauakademie* presumably accompanied his entry to the civil service. His fellow students were almost exclusively career public servants. They could commence their course at 15 years of age with applicants required to demonstrate mastery of basic Latin and French as well as arithmetic, the ability to compose text, and legible handwriting (Schneider 1998: 80).

Braché's student years would have been 1842–1846.²⁶ The enrolment at the *Bauakademie* in 1844/1845 was 43 students (Schneider 1998: 81). In this period, studies generally encompassed one and a half years for surveying and then two and a half years for engineering or four years if both were completed. Examinations were conducted externally by the *Oberbaudeputation* (State Construction Commission) in Berlin (Schneider 1998: 80; Mislin 1999: 918).²⁷

As noted above, Braché later recorded that he had studied chemistry, geology and metallurgy. While the full details of the mid-1800s Berlin syllabus are not available, the civil engineering curriculum for the comparable

by mutual consent. All debts due to and by the late firm will be collected and paid by the undersigned Moses Benjamin. DAVID BENJAMIN, MOSES BENJAMIN. Witness, Geo. W. McKeand. Dated this 27th day of March, 1854. 299 ap 1

NOTICE.—The party who obtained the plan of Balingdon Township from Messrs. Gibbon and King, is requested to return it to the office of Smith and Willian, solicitors, without delay. 138 ap 1

NOTICE to the Building Community at large.—J. Brache, Architect, Civil Engineer, Land Surveyor, and Agent, Neave's-buildings, corner of Swanston and Collins-streets, continues to practice his profession. Being a graduate of the Royal Academy of Berlin, and through his practice and connection with architectural and engineering works on the continent of Europe, this colony, and his practice of eight years on public works, both in North and South America, (as the railway across the Isthmus of Panama, the Panama Water-works, etc.,) flatters himself to fulfil any charges entrusted to him, within the capacity of his profession. The most fashionable, practical, and artistic designs for public and private buildings, shop fronts, country residences, etc., made and superintended with the utmost integrity and despatch. Also Land Surveyed, and subdivided, and engineering works of private character tested, and superintended. 272 ap 26 alt

NOTICE.—If James Hardsley does not fetch away the Boxes left at 177 Great Lonsdale-street east they will be sold to pay expenses seven days from this date. March 31st. 41 ap 3

NOTICE.—All Parties that have got Luggage stored at Mrs. Hunter's, will please to remove it as soon as possible. No. 111 Little Lonsdale street east. 345 ap 3

NOTICE.—If Peter O'Brien does not redeem his goods within seven days from this date, they will be sold without further notice. HENRY PADDEN, Emerald Hill, March 31st, 1854. 76 s p 3

NOTICE.—I have this day sold the undermentioned Horses, of the following Brands, and, as the vendors were not able to give satisfaction as to our ability, they are now published for general information:—
 Bay Mare, A S near shoulder, O N off shoulder
 Black Mare, H R near shoulder
 C
 Black Mare, S H near shoulder
 D C
 Black Colt, W near shoulder
 S
 Grey Horse, L J off shoulder
 Bay Horse, J H C conjoined, C near shoulder
 W R
 Bay Mare, 2 near shoulder, J S near rum
 2
 Dark Grey Horse M M near shoulder
 H
 W. W. ANSLOW, Horse Repository, Bourke-street, March 7th, 1854. 5065 a 7

THE Partnership hitherto carried on by the undersigned, under the firm F. Peyrusseu, Appert, is hereby dissolved by mutual consent.

Figure 2: Braché's 1854 advertisement (see endnote 25).

polytechnic in Karlsruhe included chemistry, geology and mineralogy subjects, as well as some economic, legal and social studies (e.g. technological culture, principles of civil right, financial sciences) (Capecchi & Ruta 2014: 17). Braché's future writing beyond mining-related subjects suggests that he benefited from such a broad polytechnic education. For example, he wrote about socio-economic and wider community development (Select Committee 1856: 1–2, 18–19, 50–52) and importing vine-dressers to develop the wine industry in Victoria (Braché 1861).²⁸

Braché's descendants recounted that he received a free education in recognition of a prize that he had won to design a cathedral, some members of the family having seen a copy of the building plans in their earlier years.²⁹ It seems more likely that the plans were designed as part of his course, as the *Bauakademie* had staff who influenced church design in Prussia.³⁰

JOURNEYS IN THE AMERICAS

South America

Braché's tenure with the Prussian civil service was short-lived. He likely completed his studies in 1846 and left for the Americas in the same year (Select Committee 1856: 50). Thus, his experiences of the Prussian civil service, noted above, presumably relate to his student years. He wrote in 1856: 'Ten years ago I left Europe, with an intense desire to travel, having received the education of a civil engineer' (Select Committee 1856: 52). This commenced a period of seven years of extensive travels in Central, North and South America (Braché 1859b: 25) where Braché secured his livelihood by working in civil and mining engineering roles (Select Committee 1856: 52).

Braché later recounted: 'I first directed my course to Columbia, South America, but a revolution ... soon compelled me to leave. I then passed over to the United States ... I traversed the whole of the American continent during this period, from the Canadas downwards to Chili [*sic*]' (Select Committee 1856: 52). He recorded in his writings that, apart from his Prussian experience, he was in the civil service of the Republic of New Granada (Braché 1859a: 16). The latter (1831–1858) consisted principally of present-day Columbia and Panama together with smaller portions of territory now part of neighbouring countries. Braché also recounted being in both Peru and Bolivia while in South America. Thus, in the context of national irrigation systems, he wrote that he had seen the remains of ancient Incan works along the western slope of the Cordilleras in Peru (Braché 1860a). In relation to mining in South America, Braché reported that in Bolivia he had seen the positive impact of capital investment on demand for labour and improved wages (Select Committee 1856: 9).

Arrival in the United States

Braché 'arrived in the United States from Venezuela, after one of those disastrous revolutions to which that country has been subject, in which I lost everything' (Braché 1859b: 50).³¹ Over the next few years, his North American travels took him to Washington and various engagements in California, Missouri, North Carolina and Virginia. Significantly, in January 1848, around the time of his arrival in the United States, gold was discovered in California on the American River at Coloma, beneath the Sierra Nevada Mountains. By August that year the news had reached the east coast of the continent and by the end of 1848 a gold rush was underway (Weiser 2020).

Newly-arrived in the United States, Braché, who had gained familiarity with Spanish in South America, was on the east coast, ignorant of the English language, and penniless due to his recent misfortune (Braché 1859b: 50). He later wrote:

Scarcely had the first news of the gold discovery in California reached the Eastern States, when I, like many others, became attacked by the gold fever; but the expenses of the voyage (then very enormous) were beyond my means. I had therefore to devise ways and means to accomplish the voyage, which I soon found on paying attention to the construction and designing of such machinery which I thought would be soon required in California (Braché 1859b: 50).³²

Braché was able to design 'an apparatus suitable to wash the auriferous river sands, which propelled a boat, and at the same time could be used for pumping the water required in washing the soil'. With his lack of resources and skill in the English language, he wondered how to secure his invention. An American of means whom he told about it recognised its value and arrived at terms to purchase Braché's invention, if letters patent were granted. In the meantime, he offered to defray any expenses. Braché readily agreed to the arrangement and the gentleman was soon able to inform him that the Washington examiners had received the invention favourably. Braché was astonished when the gentleman offered him \$(US)1800 for it before letters patent were granted. He consented, thinking that he had secured a good deal but, within two weeks and prior to the granting of letters patent, his patron had re-sold the rights to his invention for \$(US)3500. Braché understood that it changed hands a number of times 'as a marketable article ... before it was applied in California, where it was found to answer well' (Braché 1859b: 50–51).

Braché later wrote that he lived in Washington for an extended period³³ and had familiarised himself with the United States patent system, which he held in high regard for 'the encouragement of the inventive genius' (Braché

1859b: 49). In his 1859 report on learnings from other countries to inform gold mining in Victoria, he recounted his experience of underselling the invention due to his lack of commercial acumen and poor English (Braché 1859b: 51). Despite being exploited as described above, Braché now had sufficient funds to head to the goldfields.

In search of gold

Braché joined the gold rush to California and later recorded that he had been on the original goldfield at American River (Braché 1859b: 50; Select Committee 1856: 19). He indicated that, from his experiences, he was well acquainted with the Californian goldfields and the system of mining employed there (Select Committee 1856: 1).

In 1849, presumably en route to California, Braché was in Missouri where he visited Hermann, a German wine-growing settlement, founded in the late 1830s (Weiser-Alexander 2021). Western Missouri was the departure point for one of the major overland routes to the Californian goldfields. Braché described Hermann as 'the central seat of a settlement of German vine-growers in the west of the United States, mostly from the Rhine and Moselle' (Braché 1861). Given that the wine-growing region on these rivers was Braché's homeland, he may have had acquaintances or other contacts in Hermann.

In an 1861 article in *The Argus*, Braché commented on a scheme to bring skilled vine-dressers and manufacturers of wine into Victoria. In presenting wide-ranging input on practices in several other countries, he noted that he had been 'either directly or indirectly connected with several similar colonization and immigration schemes in America' and engaged for some years, in various parts of North and South America, as an agent for several continental states in the collection of statistics (Braché 1861). Presumably Braché's visit to Hermann, which had been established under such a colonisation scheme, *Deutsche Ansiedlungs-Gesellschaft zu Philadelphia* (German Settlement Society of Philadelphia), was in one or both of these agent capacities. The 1861 *Argus* article is an example of Braché's writings, noted above, on wider societal development, as was his prize-winning essay on national irrigation systems in a Royal Society of Victoria (RSV)–Victorian Government 1860 competition (Braché 1860a) (Figure 3).

Braché did not spend an extended period in California in the first instance. He recounted in 1858 that he had been at gold mines in Fredericksburg, Virginia, and in North Carolina eight years previously (Braché 1858a; Select Committee 1856: 1). Thus, he seems to have returned to the east coast of America after some months in California. From the early 1800s, gold mining was conducted extensively in Virginia. Significantly, 1849 was the peak production year for Virginian gold mining and this may



Figure 3: Braché's silver medal for his prize-winning 1860 essay on national irrigation systems. Photograph courtesy of Nobel Numismatics.

have motivated Braché's visit the following year (Sweet 1980: 2). North Carolina was significant because the first gold in the United States of America had been discovered there in 1799. Until the Californian gold rush, it supplied the nation's gold and introduced innovative mining practices (Hines & Smith 2006).³⁴

Braché's visits to these mining regions were presumably during his tenure as a draftsman with the Orange and Alexander Railway Company, for which construction commenced in 1850.³⁵ The 1850 *Annual Report of the Board of Public Works to the General Assembly of Virginia* presented details, dated 19 October 1850, of the company's officers, who included Jacob Braché, whose per diem was two dollars.³⁶ The United States Federal Census for that year records 22-year-old Jacob Brasche [*sic*], engineer, dwelling in Alexandria in County Alexandria, Virginia.³⁷ This role was likely the third of his four civil service positions.

Braché made a further trip to California in 1852, arriving in San Francisco aboard the steamer *New Orleans* on 5 March following an 18-day journey from Panama via Mexico.³⁸ Since his previous visit, quartz gold mining had commenced in California; he later reported on his experiences of quartz mining there and the related geology and mining technologies. Gold-bearing quartz was discovered in 1850 at Gold Hill, near the town of Grass Valley in western Nevada County. Californian quartz mining commenced here and was a major industry for more than 100 years (Clark 1970). Gaining insights into quartz mining was probably the purpose of Braché's second trip to California.

Braché also had an opportunity to observe some mining operations in Mexico during his years in the Americas. In his later evidence to the Victorian Select Committee of the Legislative Council on Gold, he stated: 'In Mexico, as well as in South America, I have seen that all the establishments there are founded with a great deal of capital' (Select Committee 1856: 9). This experience underpinned his advocacy for investment in mining companies in Victoria.

Panama

The record of his further American travels sees Braché in Panama. In 1853 he wrote that he had been engaged for two years in different surveys for a canal and railway across the Isthmus of Panama (Braché 1853a). Later he elaborated that he was ‘engaged in 1851 and 1852 in making a survey for the Panama waterworks on the Isthmus of Panama, and subsequently whilst employed as engineer on the Panama railway’ (Select Committee 1856: 52).

During his South and Central American travels, the German explorer and polymath Alexander von Humboldt (Wulf 2015) had envisaged a canal across the Isthmus of Panama, connecting the Atlantic and Pacific Oceans. In his 1811 *Political Essay on the Kingdom of New Spain*, he proposed several potential routes, favouring the one through Nicaragua, as it would not require locks, rather than the Panama route eventually constructed (Gause & Carr 1912: 232). At that time, Panama was still part of New Granada and a Spanish territory. In the following decades, the idea of constructing a canal continued to surface (Riehl 2019) and presumably Braché was engaged during his period in Panama surveying in exploration of one such venture. In an 1853 application seeking employment as a Victorian Government draftsman, Braché attached an example of his work in Panama and wrote that the ‘rough tracing’ illustrated the survey for the Panama waterworks, in which he had been engaged in the previous year. There was British as well as American interest in a canal across the Isthmus of Panama, and Braché wrote that the original of his map was in the possession of a company in London (Braché 1853b).³⁹

With the gold rush to California, there was a particular interest from 1849 to develop an effective route across the Isthmus of Panama to shorten the travel time between the east and west coasts of the United States. For those on the east coast of America this passage offered an arduous but shorter route to the goldfields. Prior to and then during construction of the railroad, multimodal means were necessary for the crossing — by boat, mule, foot and later rail. Construction of the railroad commenced in 1850 and concluded in 1855. The venture was an engineering feat, to which Braché brought, and from which he gained, surveying experience. He was part of a huge workforce brought in from every part of the world. Significantly, many thousands died during the construction of this first transcontinental railway in the Americas. In particular, a steamer brought cholera to the Isthmus in 1852 and, as a result, all but two of the fifty American engineers, surveyors and draftsmen died. That was the year that Braché left Panama.⁴⁰

Apart from railway and canal surveys, and possibly while undertaking them, Braché discovered gold in Panama. He spoke about this to the 1856 Select Committee on Gold: ‘Whilst employed as an engineer on the Panama railway, I discovered gold in various parts of the Isthmus, especially along the coast of Cheppo [*sic* Chepo], on the Pacific, about thirty miles north-east of the city of Panama’ (Select Committee 1856: 52). This report seems to be the only time when Braché recorded that he had discovered gold during his American travels.⁴¹

In relation to his Panama discoveries, Braché noted that while these finds were of some interest to the Californian adventurers, who had been detained in Panama waiting for their passage to San Francisco, the latter were deterred by the lack of provisions on the Isthmus and ‘the insalubrity of the climate’. Significantly, the wait in Panama for a ship to California could be a matter of weeks or even months. Braché was giving consideration to what would have been a very challenging mining enterprise on the Isthmus, when reports of the discovery of incredibly rich gold deposits in the Colony of Victoria started to arrive. While these were tantalising, Braché was initially cautious about their credibility and delayed departure to Australia. However, as each new report was more glowing about the richness of the goldfields, he determined to leave for Victoria where the ‘goldfields offered such great inducements and natural advantages to the exertions of a mining engineer’ (Select Committee 1856: 53).

Braché sailed from Aspinwall (now Colón), Panama to New York on the steamship *Georgia*, arriving on 2 March 1853.⁴² Here he was joined by his younger brother, Clement (Klemens), and on 22 April they departed New York for Australia via Rio de Janeiro on the *Rockland*.⁴³

EXPERIENCE AND EXPERTISE GAINED IN THE AMERICAS

Braché had spent seven years in the Americas, where he travelled extensively and had wide-ranging engagements. What expertise did he gain from these experiences and bring to his long career in the mining branch in Australia?

Knowledge of mining

Most of Braché’s engagements in the Americas seem to have been in various types of surveys, as detailed above, and not personal involvement in mining. His experience included heading surveys, as he did later as Superintendent of Mining and Topographical Surveys in Victoria (e.g. Selwyn 1863: 9–10, 27–46). He wrote in relation to his suitability for roles in Victoria of having previously been in charge of surveying parties and of his familiarity with the privations of being in the field well away from civilisation (Braché 1853a).

Braché had, however, acquired extensive knowledge of geology and mining practices from his American experiences. In documents related to his employment, evidence to mining inquiries, and writings in Victoria, he emphasised in particular his expertise in relation to gold, silver and coal mining gained during his travels in Central, North and South America. He advised that he was familiar with the modes of gold and silver mining in California and Central and South America and had devoted himself to studying the 'comparatively new science of gold mining' (Select Committee 1856: 52). He stated: 'I am well acquainted with the Californian gold fields and the system of mining employed there; and prior to my residence in California I was in Central and South America, seeing the different modes of silver as well as gold mining of those countries' (Select Committee 1856: 1).

In his efforts to promote improved regulation of mining in Victoria as well as the introduction of mining companies, Braché emphasised the ordered and systematic nature of gold mining in California and that 'from the very first discovery of the gold, machinery was applied to mining in California ... There is no prejudice raised against the introduction of capital and machinery'. He argued that similar practices were desirable in the Colony of Victoria to maximise returns for miners and government, while noting the considerable resistance to advancing from 'a gold hunting race' (Braché 1859b: 34–35, 56).

Braché wrote a major essay of over 60 pages for the Mining Institute of Victoria, *Report on the State of the Mines in Victoria as Compared with that of Other Mining Countries* (Braché 1859b). In it he compared the Victorian mining industry with those of Spanish America, California and the Ural in Siberia, as well as providing extensive material on mining in Great Britain and Europe, particularly Germany, and on his own American and Victorian experiences. The report is illustrative not only of the knowledge which he had gained from his observations and experiences in the Americas but also of his ability to report data gathered in the field or from books and reports. A further area in which Braché had built on the knowledge gained through his studies in Berlin relates to mining machinery. He stated in 1856 that he had become knowledgeable about its construction. He also emphasised on that occasion: 'I made the enquiry into the nature and working of metallic veins, especially the argentiferous and auriferous quartz veins and their deposits here [Victoria] and elsewhere my particular study' (Braché 1856: 25 March).

Language skills

In South and North America, respectively, Braché added the languages of Spanish and English to his 'repertoire'.

From his homeland experience, he spoke both German and French. As noted above, Coblenz had been occupied by the French in his parents' youth. In an 1856 job application, he wrote that he had 'a complete knowledge of several modern languages', including Spanish (Braché 1856: 18 March), while highlighting the significance of 'the Spanish language, as the most important works on gold and silver mining are written in that tongue' (Select Committee 1856: 12). His command of Spanish may have enabled him to publish in that language, as he wrote in 1860: 'I have conducted periodicals in more than one language'.⁴⁴ In Victoria, he was founding editor of *The Colonial Mining Journal* (Braché 1858–1859) and of *The Transactions of the Mining Institute of Victoria* (Braché 1859a).⁴⁵

Braché wrote extensively during his Australian years. His command of English was good, although occasionally idiosyncratic expressions and word usage emerged. He was often apologetic to his audience about the imperfections of his English. Thus, at an 1857 meeting of the Victorian Mining Institute, he expressed reservations about assuming the role of Honorary Secretary, as he was a foreigner. Braché advised, on that occasion, that 'he had gathered his knowledge of the English language in his engineering expeditions in the wilds of America, in the midst of rude camp life. He had, however, striven to become acquainted with the elegancies [*sic*] of the English tongue during his residence in this colony'. He was duly appointed to the role of Honorary Secretary (Braché 1859a: 117).

Philosophy of mining administration and jurisprudence

Braché was intelligent and diligent and often wrote of particular books and reports that he had read. Perhaps surprisingly for one who had spent much time in survey camps and mining communities in the Americas, he wrote in an 1860 article for the *Melbourne Herald*:

The philosophy of the mining administration and jurisprudence as practised in the European States is a branch of political science by itself, well worthy of attention on the part of those, to whom the fate and progress of our mines is intrusted [*sic*]. The task is a stupendous one, and I find, that after I have made it my particular hobby for several years in succession, in my travels, by personal observation, and from my studies of various works in the German, French, Spanish, and English languages, the field of unacquired information before me is still inexhaustible, and becomes more and more interesting as I have ventured further and further within its boundaries' (Braché 1860b: 27 March).⁴⁶

From the youth of 19 years who set out to the Americas, Braché had developed into a practiced engineer with varied and wide-ranging immersions in the profession for periods

of some months to a year. This is ‘the talented young German’ who arrived in Melbourne two years into the Victorian gold rush.

DID THE ‘TALENTED YOUNG GERMAN’ REALISE HIS POTENTIAL?

From 1853 until just before his death in 1905, Braché was active in mining circles in Victoria and further afield. His own writings, public and private records and, in particular, countless newspaper articles and letters detail his activities. He was, however, a controversial figure and there are both positive and negative assessments of his contributions, as the following illustrate.

Positive assessments

Charles Ligar, Surveyor-General and President of the Mining Institute of Victoria, wrote in 1859 of Braché’s ‘indefatigable exertions’, ‘the painstaking zeal which has animated him’ and ‘the bold expression of what he considers right in the pursuit of truth’. He continued: ‘His efforts to establish a better mining system are well known in the colony through his writings. If he has expressed himself too severely on certain occasions, I have it from himself to say, that no one regrets it more than he does, now that the heat of the controversy has passed away’ (Braché 1859a: xx).

Another leading figure in mining circles, Alfred Selwyn, then Director of Mining and Geological Surveys, wrote in relation to an 1863 report by Braché on the Mining Survey’s progress, prepared at Selwyn’s request, that ‘although there are some opinions expressed in it, regarding matters of detail, in which I do not entirely concur, yet I consider that it contains much valuable information. In it are clearly pointed out the many defects of the existing Mining Survey system, and numerous suggestions are made for improvements, which, if adopted, would, I have no doubt, materially promote the development of our mineral resources’ (Selwyn 1863: 27).

Newspapers also recorded opinions in relation to Braché’s contributions. An 1863 report in *The Ballarat Star* stated: ‘We allude to the mining survey department over which Mr Braché seems to preside with a more or less genial influence’.⁴⁷ Sydney’s *Freeman’s Journal* of 1874 acknowledged Braché’s contributions with those of well-known geologist, Rev. W.B. Clarke, as follows: ‘geological science will come in to advantage, and such gentlemen as W.B. Clarke and Jacob Brache will be found indispensable in opening the mineral resources of this country’.⁴⁸

An exemplar of Braché’s work was reassessed in recent years. In 1861 he drew a map compiled from a

survey of Ballarat undertaken by mining surveyors from the Surveyor General’s Office (Figure 4). In 2015, the map was examined, together with other early surveys, as part of a consultancy to determine the site of the first Gold Commissioner’s camp in Ballarat. Contemporary surveyor Rodney Aujard found Braché’s map and the two other documents evaluated ‘to be reliable and prepared by highly reputable and competent surveyors’.⁴⁹

Negative assessments

Two matters related to the 1856 Mining Commission were controversial for Braché. He was criticised for his calculation of Victoria’s gold potential provided to the Mining Commission and which greatly overestimated the deposits (Select Committee 1856: 46–53).⁵⁰ His clash with McCoy, Commission chairman, over gold deposits at depth, mentioned above, gained media attention. Illustrative is a series of letters in *The Argus* published in early 1859 relating to the Mining Institute of Victoria and written alternatively by Braché and McCoy.⁵¹

Braché’s dispute with McCoy over the occurrence of deep vein deposits of gold reflected the divergent views of the time. McCoy’s opinion was shared by the then most eminent geologist in the world, Sir Roderick Murchison. Governor Sir Henry Barkly, aware of the increasing prospects for mining at depth in the Colony, expressed concern in 1858 that Murchison’s theory of payable gold decreasing with depth would impact negatively on investment in the local industry (Barkly 1860). Other professionals were able to present their case more dispassionately than Braché. For example, Swedish mining engineer Pedro Nisser (1799–1878) who, like Braché, had South American mining experience, in 1859 delivered a lecture to the Philosophical Institute of Victoria, entitled ‘On the Geological Distribution of Gold with Special Reference to Some Auriferous Rocks in South America’. This lecture was subsequently published to inform a wider audience (Nisser 1859).

Negative commentaries were published in relation to some of Braché’s assessments of prospective mines, but here, potentially, either Braché or the critic may have had a conflict of interest. By way of illustration, he had a letter published in March 1860, responding to an anonymous critic of his involvement with the Bank Vale Mining Company near Donnybrook.⁵² He had written a report on its prospects, and the company directors had also engaged John Philips, ‘another competent mining engineer and surveyor ... to survey the land, and report on the best mode of proceeding’.⁵³ Braché advised that the company, established during his absence in the country, had included in its prospectus an ‘unauthorised statement ... which had nothing to do with my report’. The company was to



Figure 4: Map of the Ballarat region, showing auriferous leads and quartz reef and outcrops, compiled and drawn by Braché in 1861 (accessed from the University of Melbourne digitalised collection: <http://hdl.handle.net/11343/23725>).

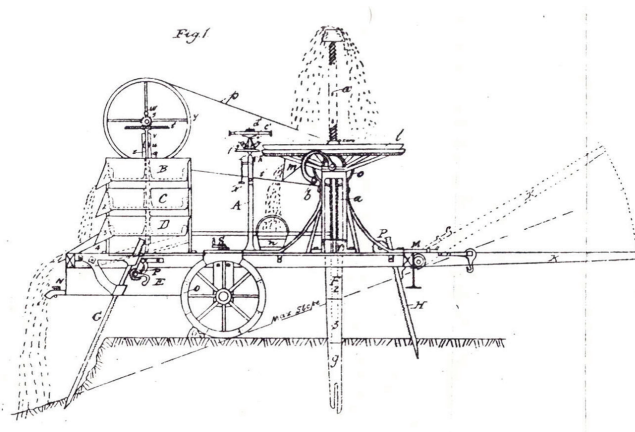


Figure 5: Illustration of Braché's machine for searching in alluvial and other deposits for gold (Department of Patents, Commonwealth of Australia, 1912. Reference No. V12 (Braché), C8590. A.J. Mullett, Melbourne).

be dissolved and Braché informed readers: 'Although I have no interest whatever in the Bank Vale Company, I have taken steps to inforce [*sic*] a measure by which the shareholders will receive back at least 19s and 4d in the pound'. His correspondence continued: 'My letters to the Press on various mining company swindles are still extant ... I made it a condition, that my reports on any mining

property should not be made use of by any projectors of companies unless they agreed to adopt the course of operations suggested and mention it in their prospectus. This I believe every professional ... should insist upon'.⁵⁴

Braché's unapproved departure from an 1864 Geological Survey of Victoria party under field geologist Norman Taylor was also controversial, and led to his resignation and/or dismissal from the Survey branch, as variously reported.⁵⁵ The criticism was that he left without permission and, it would seem, for private mining pursuits (McQueen 2009: 76–78). The party had been surveying in east Gippsland near the New South Wales–Victorian border. Taylor noted enormous challenges during the survey — very severe weather conditions, heavy floods, impenetrable vegetation 'full of snakes', difficult terrain ranging from mountainous country to swamps and bogs, plagues of insects, inadequate horses, and very poor supplies, including intervals without meat. The party's instruments were damaged and mineral samples collected washed away. Taylor himself nearly drowned and spent periods confined to bed with chills, while Braché injured his wrist severely (Taylor 1866). Under the circumstances, Braché's departure from the survey is perhaps unsurprising and potentially justified.⁵⁶

A particular catalyst of negative critique can be gleaned from the Ligar quote above. While said to be small of stature,⁵⁷ Braché was a confident, astute, industrious, ambitious and outspoken young man. Braché wrote in a job application in 1856: 'I prefer an independent straightforward style' (Braché 1856: 25 March). His earnest and forthright Germanic manner was a source of friction with some of his colleagues, especially his British superiors. This led ultimately to the loss of his civil service roles and some of the hefty criticism in the media by those whom he had 'rubbed up the wrong way'.

In his writings and evidence to the mining commissions, Braché himself highlighted the breadth of his experiences in the Americas rather than depth gained from a long period of engagement in a particular role. However, his German education and diverse experiences in the Americas gave him a capacity to contribute to developing Victoria's mining potential that few others had, at least in the early years of the Colony. Further, he was enthusiastic and entrepreneurial, and had plenty of confidence. Braché noted in writing of himself that he had 'visionary propensities' (Braché 1859b: 86).

Braché's private life

Braché married a Scot, Hannah Campbell (1836–1912), in 1862. They had seven children: Jacob Campbell (1856), Charles Allan Campbell (1860), Anthony (1863), Hermann Humffray (1865),⁵⁸ Hannah Elizabeth (1867), Adolf Frederick (1870) and Ellen Bertha (1873). Three died tragically in childhood: Jacob was accidentally drowned in a waterhole in 1866 and Hannah and Adolf died of scarlet fever in 1875.⁵⁹ Braché's numerous mining excursions were interspersed with the demands of a growing family and the tragedies of losing three of his children.

With a number of other civil servants of his day, Braché made his home in Northcote from about 1860. He lived there until his death on 2 September 1905 at 78 years of age and was buried in the German Cemetery in Separation Street, Northcote. *The Northcote Leader* noted the passing away of 'another very old and respected townsman, in the person of Mr. Brasche [*sic*] of Merri-street'.⁶⁰

CONCLUSION

Cusack described Braché as 'the itinerant German engineer' (Cusack 1973: 58) and it was probably a tension between the lifestyles of entrepreneur and of civil servant which best reflects the disparities in Braché's contributions. His inclination, after years 'on the road' in the Americas and perhaps by temperament, was the freedom of the consulting engineer's lifestyle and the lure of mining prospects. His abilities and experience could have enabled

him to contribute much more to the development of mining administration and progress in Victoria, but the British customs and behaviour of the civil service or other such bureaucratic roles did not suit him. He wrote that the German civil service allowed more independence (Braché 1859b: 80–82). The negativities noted above have probably led to an undervaluing of the contribution that he made to the development of mining in Victoria.

Some others of German background, such as Baron Ferdinand von Mueller and Gustav Thureau, similarly had difficulty fitting into generally British 'moulds' in executing their duties. In Mueller's case, this related to his role as Director of the Botanical Gardens in Melbourne, from which he was dismissed in 1873 (Morris 1974). Thureau was Inspector of Mines in Tasmania and there are similarities between his and Braché's experiences of, and responses to, colonial civil service (McMullen 1996: 165, 167–170).⁶¹

In a paper highlighting the lack of attention to non-British scientists' contributions to the Pacific region, Branagan acknowledged the significant number of Germans who settled in the region and 'livened up the essentially British character of the colonists' (Branagan 1983: 112). That representation captures well the approach of the 'talented young German', Jacob Braché.

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Endnotes

- 1 This description of Jacob Braché is from an article about his appointment as Secretary and Mechanical Draughtsman to the 1856 Victorian Mining Commission (*The South Australian Register* 12 May 1856: 2).
- 2 National Museum Australia, 2020. Gold Rushes. Accessed at <http://www.nma.gov.au/defining-moments/resources/gold-rushes>.
- 3 The Cultural Heritage Unit, The University of Melbourne, 2015. Immigration and Ethnicity: Overview. Accessed at <http://www.egold.net.au/biogs/EG00006b.htm>.
- 4 For example, August Abel (1802–1882) took half his usual fee for an analysis which showed a discouraging prospect (McMullen 1998: 190).
- 5 Royal Society of Victoria, 2001. *Science and the Making of Victoria*. Accessed at <https://www.austehc.unimelb.edu.au/smv/150.html>; *The Argus* 17 May 1856: 10; *Transactions and Proceedings of the Victorian Engineers Association*, Vol. I, 1883–1885, respectively.
- 6 Sandhurst was the former name for Bendigo.
- 7 See endnote 1. Melbourne newspapers, *The Age* and *The Argus* of 7 May 1856 (pages 2–3 and 5, respectively), re-published the statement about the Mining Commission from the *Victoria Government Gazette*, which did not include the description of Braché as ‘a talented young German’. The latter seems to have been an addition by *The South Australian Register*’s correspondent for his Colony with its substantial German population.
- 8 *Victoria Government Gazette* 88: 25 July 1862, 1281.
- 9 *The Age* 15 January 1857: 5–6; *The Argus* 31 January 1859: 6; 2 February 1859: 5; 3 February 1859: 5; 5 February 1859: 4; and 7 February 1859: 6; Darragh 1987: 17.
- 10 *The Argus* 18 January 1866: 4; *The Gippsland Times* 4 June 1880: 3, respectively.
- 11 *The Argus* 6 November 1877: 5; *The Hamilton Spectator* 15 November 1877: 2, respectively.
- 12 The Editors of *Encyclopaedia Britannica*, 2020. Sir Roderick Impey Murchison. Accessed at <https://www.britannica.com/biography/Roderick-Impey-Murchison>.
- 13 *The Bendigo Advertiser* 6 April 1897: 2.
- 14 Stadtarchiv Koblenz, *Zivilstandsregister Koblenz, Geburten* 1827/291.
- 15 *Handbuch für die Bewohner der Stadt Koblenz*. Heriot, Koblenz, 1828, p. 11.
- 16 *Wine and Spirit News and Australian Vignerons* 25 October 1915: 430–433.
- 17 Stadtarchiv Koblenz, *Zivilstandsregister Koblenz, Heiraten* 1826/74; *Geburten* 1835/130 and 1837/699; *Einwohnerliste von 1841 Koblenz*, Best. 623, Nr. 2172.
- 18 Records from the Stadtarchiv Koblenz were accessed through a visit on 29 December 1998 and subsequent communications with Michael Koelges, to whom I express my appreciation for his assistance. Neither in the Stadtarchiv nor the Landeshauptarchiv Koblenz were any records of Braché’s schooling available.
- 19 Contact was made with the following: Deutsches Bergbau-Museum Bochum, Sayner Hütte Bendorf, Nordrhein-Westfälisches Hauptstaatsarchiv Düsseldorf, and Hessisches Hauptstaatsarchiv Wiesbaden.
- 20 *Official Catalogue of the Melbourne Exhibition, 1854 in Connexion [sic] with the Paris Exhibition, 1855*. F. Sinnett & Co., Melbourne.
- 21 Heritage Victoria, 2019. Geelong Town Hall, 7. Accessed at <https://heritagecouncil.vic.gov.au/wp-content/uploads/2019/05/ED-REPORT-AMEND-GEELONG-TOWN-HALL-FINAL-FINAL.pdf>; CassandraJoy, 2014. Geelong Town Hall. *Weekend Notes*. Accessed at <https://www.weekendnotes.com/geelong-town-hall>.
- 22 *The Age* 17 October 1854: 7.
- 23 The Melbourne Exchange Company ‘was formed to build a warehouse and provide meeting facilities for merchants alongside the Customs House’ (Hall 1968: 9).
- 24 *The Argus* 13 February 1854: 5.
- 25 *The Argus* 1 April 1854: 6.
- 26 I contacted the Technische Universität Berlin, as the successor of the Königliche Bauakademie zu Berlin, to ascertain if records from Braché’s student years still existed. I was informed on 27 January 2021 by Dagmar Spies of the Universitätsarchiv that the records had been destroyed in World War II.
- 27 Some details of studies at the *Bauakademie* in Braché’s student years are available. Winter semesters were focused on classroom activities with surveying and building projects occurring in summer. Fourteen subjects were offered in winter semester and seven in summer semester with classes held from 8am to 4pm Monday to Saturday and including 21 hours a week devoted to architectural and mechanical drawing. Subjects included fine arts, history of architecture, physics, arithmetic, geometry, statistics, aerodynamics, hydraulics, hydrostatics, mechanics, optics, surveying, practical construction subjects (e.g. road, bridge, canal, weir, dyke and harbour construction), urban architecture, technical drawing and drafting. Two strands of studies were offered — road and rural construction or building inspector, the latter focused on hydraulic and mechanical engineering or urban architecture and construction (Schneider 1998: 80; Mislin 1999: 914, 917).
- 28 Koblenz, where Braché grew up, is situated in a major wine-producing region at the confluence of the Rhine and Moselle rivers. Braché would have had some knowledge of viticulture from his youth. Further, his brother Charles (1837–1915) who migrated to Australia in 1862, together with Braché’s parents and his sister Elise, became a successful Victorian wine merchant and vineyard proprietor (see endnote 16; TheShipsList: SA German Passenger Lists, 2012. Grasbrook. Accessed at <http://www.theshipslist.com/ships/australia/grasbrook1862.shtml>).
- 29 Personal communication from Braché family members in Melbourne, 2000.
- 30 In the 1830s *Oberbaudeputation* Director Karl Friedrich Schinkel (1781–1841), a former *Bauakademie* student, and subsequently his associates, some of whom taught at the

- Bauakademie*, had a profound influence on the style of new churches in Prussia (Curran 1988: 361–364). Their influence on Braché's studies may reflect the origin of his plans for a cathedral previously in the Braché family's possession. The work of the Schinkel school is recorded in a major volume entitled *Entwürfe zu Kirchen, Pfarr- und Schulhäusern* (*Designs of Churches, Parish Houses and Schools*), published by the *Königliche Technische Bau-Deputation* (Berlin, 1844–1862).
- 31 The revolution in question was presumably the Venezuelan civil war of 1848–1849 (Dallett 1960; The Editors of *Encyclopaedia Britannica*, 2021. The Independence Movement. Accessed at <https://www.britannica.com/place/Venezuela/The-independence-movement>).
- 32 Depending on the route to California, the journey could be very expensive. For example, the 3–6-month voyage around Cape Horn would cost \$(US)100–300. Two sea passages combined with the Panama land route reduced the journey by 8000 miles and some months but cost \$(US)600–1200. For the 100-day overland route, the cost for a family of four is reported to have been \$(US)600–700 (By Sea, through Panama and by Sea Again, n.d. *The Californian Gold Rush*. Accessed at <https://goldrush49.weebly.com/panama-short-cut.html>).
- 33 Braché's stay in Washington was presumably only of some months. This description 'long residence' may reflect the 'nomadic' nature of his American years and a relatively longer period in Washington than in other locations.
- 34 Braché specifically mentioned visiting the Marmota Mine in North Carolina (Braché 1858a) but I have not been able to locate American records related to this particular mine.
- 35 The New Orange and Alexandria Railroad Historical Society, n.d. *A New Look on an Old Railroad That Helped Build a Nation*. Accessed at <http://thenewoanda.weebly.com/>.
- 36 Board of Public Works, 1850. *Thirty-fifth Annual Report of the Board of Public Works to the General Assembly of Virginia*, Virginia, 82. Accessed at <https://archive.org/details/annualreportboa02virggoog>.
- 37 *1850 United States Federal Census*. Roll: 932, Page: 387B. Accessed at <https://www.ancestrylibrary.com.au>.
- 38 The Maritime Heritage Project, 2018. Passengers at the Port of San Francisco: 1800s. Accessed at <http://www.maritimeheritage.org/passengers/no030552.htm>.
- 39 For background on early exploration of Isthmian canal construction, see Hardy 1939; Van Alstyne 1939.
- 40 Panama Railroad, n.d. History of the Panama Railroad. Accessed at <http://www.panamarailroad.org/history1.html>. For further background on construction of the Panama Railroad, see Gause & Carr 1912.
- 41 Gold is widely distributed on the Isthmus, in both alluvial deposits and quartz veins, and gold ornaments of the native inhabitants had been noted by early explorers. However, much of the country has impenetrable terrain and an inhospitable climate, which inhibited mining initiatives in the mid-nineteenth century.
- 42 Immigrant Ships Transcribers Guild, 2018. Steamship Georgia. Accessed at <https://www.immigrantships.net/v17/1800v17/georgia18530302.html>.
- 43 *The Argus* 17 August 1853: 4; Ozships, 2008. Australian Shipping 1788–1968: Passengers and Crew, Alphabetically, Index File 31. Accessed at <http://www.blaxland.com/ozships/alpha/pass/s31.htm>.
- 44 *The Ovens and Murray Advertiser* 13 March 1860: 2.
- 45 Braché published two papers related to the founding of the Mining Institute of Victoria and its rules and by-laws (Braché 1858b; Braché 1859a: 1–23).
- 46 The source of this quotation is one of a series of articles that Braché wrote in 1860 on the establishment of a mining department (Braché 1860b).
- 47 *The Star* 29 June 1863: 2.
- 48 *The Freeman's Journal* 1 August 1874: 15.
- 49 Kellehers Australia, 2016. *Ballarat's First Gold Commissioner's Camp*, 46–47, 51. Accessed at <http://kellehers.com.au/wp-content/uploads/Gold-Commissioners-Camp-Booklet.pdf>. Braché had a failed mining venture in Ballarat, where a small roadway off Alfred Street South, Braches Lane, is named in his honour (City of Ballarat, 2016. *Roads and Open Space Historical Index*, 11. Accessed at <https://data.gov.au/data/dataset/ff7dd389-0c72-441e-8776-5490858ef1c9/resource/11fd7fe6-67a4-4fc1-8b28-13cc49660217/download/roadsandopenspacehistoricalindex.pdf>). He spent September–November 1855 in the Magpie Gully area of Ballarat (Braché 1859b: 55; Select Committee 1856: 7). Of his Ballarat venture, Braché wrote: 'During several months I tried to organise a company on that gold field, having for its object to reduce mining to a more regulated system, connected with less speculative risks ... by surveying the ground prior to the sinking of shafts ... I was surprised to meet with so much support from the more intelligent miners, but the enterprise failed for the time being, on account of several rushes to other gold fields, which took the mining population from Ballarat [*sic*]' (Select Committee 1856: 3).
- 50 In his supplementary evidence to the 1856 Mining Commission with these calculations, Braché estimated and compared annual gold production in Victoria and California. In relation to his overestimate, it is noteworthy that *The Bendigo Advertiser* reproduced part of his submission, stating it had 'taken some trouble to ascertain the truth of the figures set down by that gentleman, and find them in the main correct' (*The Bendigo Advertiser Supplement* 4 October 1856: 1).
- 51 *The Argus* 1859: 31 January, 6; 2 February, 5; 3 February, 5; 5 February, 4; 7 February, 6.
- 52 See endnote 44.
- 53 *The Argus* 5 March 1860: 6.
- 54 See endnote 44.
- 55 See endnote 9.
- 56 Braché reportedly had malaria in Panama (personal communication from Braché family members in Melbourne, 2000). On occasions he noted, in correspondence, absences from duty due to illness. He may have had a recurrence of malaria under the gruelling conditions of the Taylor expedition.
- 57 Personal communication from Braché family members in Melbourne, 2000.

- 58 In his efforts to reform Victorian mining practices, Braché gained the support of Ballarat Member of Parliament John Humffray (1824–1891), Minister for Mines in 1860–1861 (Langmore 1972). The naming of Braché's son presumably indicates his appreciation of Humffray's support.
- 59 Births Deaths and Marriages Victoria, marriage: 3324/1862; births: 292/1857, 18491/1860, 1512/1863, 23998/1865, 23744/1867, 4308/1870, 4638/1873; deaths: 11560/1866, 14530/1875, 14531/1875, 7301/1912; *The Herald* 14 November 1866: 3.
- 60 Darebin Libraries, n.d. Darebin Heritage. Accessed at <https://heritage.darebinlibraries.vic.gov.au/article/179>; Births Deaths and Marriages Victoria, death: 10261/1905; *The Northcote Leader* 9 September 1905: 2.
- 61 Not all of the pioneering German scientists and technologists failed to 'fit in'. Georg Heinrich Friedrich Ulrich (1830–1900), as mentioned above, arrived in Victoria contemporaneously with Braché. He anglicised his forenames to George Henry Frederick and was appointed, after Braché, to the Geological Survey and successfully pursued civil service roles. He has been described as 'modest and kindly, highly respected throughout Australasia by colleagues and students alike' and in 1877 was appointed foundation Director of the School of Mines and Professor of Mining and Mineralogy at the University of Otago in New Zealand (Hoare 1976).
- 62 This article is a copy of Braché's essay entitled 'The Water-Supply of Our Gold-Fields, and How It Can Be Effected by a National System', for which he won second prize in the Royal Society of Victoria (RSV)–Victorian Government's 1860 competition (*The Argus* Supplement 11 February 1860: 1; 19 January 1861: 5).
- 63 The sample of blue and green carbonate of copper was collected from an 'outcrop of a copper lode in the Upper Murray, about seventeen miles from Lake Omeo' (*The Herald* 2 January 1867: 2). The photo was kindly supplied by Dr Bill Birch, Museums Victoria.