

Part III. Science and Nation

7. The platypus frontier: eggs, Aborigines and empire in 19th century Queensland

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On 19 February 1971, Professor Rick Beidleman of the Department of Biology, Colorado College, USA sent a letter to Dr Michael Hoare, Research Fellow at the Academy of Science. The letter sought advice on a sabbatical project on the 'impact of Australian historic frontiers on the development of Australian natural science'. Beidleman had undertaken a study of the relation between the American frontier and natural science in the 1950s, and saw Australia as a logical extension: 'The comparison is so similar, indeed, that one finds the same people carrying out natural science exploration in the two countries, as you appreciate', he wrote.¹

Hoare's response to the question of 'frontier science' was to translate it as 'colonial science'. His 'futuristic dream is to do a study of the science in the old "Empire" New Zealand, Australia, Canada, S. Africa, India, etc, etc. (I guess, too, the USA before it was such!)'. He was interested in the influence of places at the margins of empire on 'ideas and the advancement of knowledge', whilst Beidleman is actually pursuing a notion of 'national science' in America itself. The idea of a 'national frontier', well-developed in the United States since the Frederick Jackson Turner era late last century, did not, in fact, translate as easily to the Australian context as Beidleman had hoped. The empire got in the way. The place of science in empire was an ongoing concern of both science and history of science well into the 20th century in Australia.² The land itself also got in the way. The frontier in Australia never closed.³ Hoare was afraid for the American who claimed he wanted to take 'field trips' following explorers. '[I] must ask you whether you know just how merciless and hard the Australian interior can be even nowadays', he cautioned. In 1971 Australia was a nation that had turned back to its coasts, never closing the frontier. It was a land where the Great Australian Silence about the violence of the Aboriginal past still

¹ Beidleman and Hoare correspondence is held in the Australian Academy of Science Archives (AAS 352). RGB to MEH 19 February 1971; MEH to RGB 14 March 1971. The file also contains letters from Beidleman to Miss E. Newman, the AAS Librarian (20 March 1971) and a reply from J. Deeble to RGB (7 April 1971).

² Libby Robin, 'Ecology: A Science of Empire?'

³ Tom Griffiths, 'Ecology and Empire: Towards an Australian History of the World', pp. 10-11.

reigned.⁴ While Hoare and Beidleman have in common an interest in 'pioneering' natural science in new lands, the 'frontier' only works in America.

The cross-cultural dimensions of Australian history have exploded in the past 30 years, and the idea of 'frontiers' has taken on new meaning in the Australian context. The role of Aboriginal people in science has remained under-studied, however. The other question also remains of the relation between science and nation. The uncomfortable suspicion persists in Australia that the 'frontiers of knowledge' are somewhere else. The American Professor never had that doubt. 'National science' meant 'world science' for an American. In Australia, the attachment to Empire was essential to making an impact on the frontiers of knowledge. That attachment meant clinging to the coast and looking outward again, not resolving the issues of place and people at the heart of the continent, not using the resources of this very different land to ask different questions about the world.

The parable of the platypus, a famous moment in 19th-century Australian scientific history, was about empire, knowledge (eggs, in this case) and Aborigines. It is also about the anxiety of local science, left out of the loop. The people who lived with the exceptional material lacked the scientific institutions of the old country, and the people with the institutions carried northern hemisphere expectations and values, and tended to carry away the specimens to work on elsewhere. The silence of the frontier worked to prop up Empire and to support a long cultural cringe. The rhetoric of 'frontiers' and 'colonials' captures some of this confusion.

When the rhetoric of 'frontier' reached Australia, the frontiers were not of battles but of settlement, with implicit rather than explicit wars. Studies of the imaginative space of the settler frontier explore encounters between colonising people, indigenous inhabitants and contested land.⁵ In science however, we find another frontier. The scientific frontier is perhaps about war on ignorance. The divide between civilised and savage, so important to the settlement frontier is present again in muted form: scientific knowledge civilises; to remain ignorant is savage. The imperative to *know* clearly motivated much of the exploration that made settlement/invasion possible. In this chapter, I will explore some episodes of science on the frontier, which open up the interplay between frontiers of settlement in Queensland and frontiers of science.

The complexity of mixing frontier metaphors is immediately apparent. The frontiers are different shapes and textures, if you like. The frontiers of settlement concern a (sometimes bloody) commingling on the plain. The scientific frontier

⁴ W. E. H. Stanner coined this term in his Boyer lectures in 1969. See *After the Dreaming; Black and White Australians – An Anthropologist's View*.

⁵ See Elizabeth Furniss, 'Imagining the Frontier: Comparative Perspectives from Canada and Australia', this volume.

is a (rarefied) mountaintop. Both are about meeting the unknown, discovery, and embracing/colonising the 'other'/unknown. Frontiers of knowledge apply in disciplines other than science. But the perceived cumulative nature of science, which builds 'up' knowledge, makes the gaining of scientific knowledge particularly rich with mountain and vertical metaphors. The most famous is Isaac Newton's statement that 'If I have seen a little further it is only because I have stood on the shoulders of giants'.⁶ Science is a story of effort-laden progressive steps towards 'the' answer. There may be many slips on the way, but the goal is to gain that mountaintop. The spread of settlement, by contrast, is a horizontal metaphor, the horizontality flattening the violence and oozing with inevitability.

The central story of the chapter is the 'discovery' by British scientist W. H. Caldwell that monotremes (platypus and echidna) lay eggs. The famous telegram 'monotremes oviparous, ovum meroblastic' (monotremes lay eggs of the same sort as reptiles), sent to the British Association for the Advancement of Science meeting in Canada in 1884, resolved a long debate about whether platypus laid eggs or had live young.⁷ The story reveals much about the imperial shaping of scientific knowledge – British settlers in the Australian colonies and Aboriginal informants had long asserted that platypus laid eggs, but they had been disbelieved. 'Discovery' was reserved for a British scientist of impeccable scientific lineage.⁸ Only certain sorts of people are allowed to declare that the top of the mountain has been reached.

The platypus debate

The platypus debate began in the 18th century. David Collins in 1797 saw 'an amphibious animal of the mole species'. 'The most extraordinary circumstance observed in its structure', Collins wrote, 'was its having, instead of the mouth of an animal, the upper and lower mandibles of a duck'.⁹ George Shaw of the British Museum described the dried specimen he had been sent in 1798 by a naturalist named Dobson as 'of all the Mammalia yet known ... the most extraordinary in its conformation; exhibiting the perfect resemblance of the beak of a Duck engrafted on the head of a quadruped'. The dried skin he received is still marked by the scissors that Shaw used to check that the beak had not

⁶ Newton's letter to Robert Hooke, 5 February 1675/6. I am grateful to Rod Home for this reference.

⁷ 'Meroblastic' actually means that the egg partly separates during development, but the significance of this is that it is like a reptile rather than a bird.

⁸ The literature on this is extensive. Examples include: Jacob W. Gruber, 'Does the Platypus Lay Eggs? The History of an Event in Science'; Kathleen Dugan, 'The Zoological Exploration of the Australian Region and its impact on Biological Theory'; Roy MacLeod, 'Embryology and Empire: The Balfour Students and the Quest for Intermediate Forms in the Laboratory of the Pacific'.

⁹ Charles Barrett, *The Platypus*, p. 12.

been stitched on by a taxidermist.¹⁰ The British Museum could ill-afford to become the butt of a cheap hoax.

Shaw named it *Platypus anatinus* in 1799, and the German anatomist Blumenbach, *Ornithorhynchus paradoxus* in 1800.¹¹ A genus of beetles already carried Shaw's name, it was later discovered, so the platypus today is scientifically known as *Ornithorhynchus anatinus*, using the rules of priority. Even the vernacular naming story is not simple – why was this animal not 'mallangong', (or another Aboriginal name)?¹² The kangaroo (cunquroo) had defied description, so an Aboriginal name had been borrowed. The wallaby, koala and others had all similarly needed 'new' names. But the platypus is known by its lost (Greek) scientific name, although until the mid-twentieth century 'duckbill' (a translation of *Ornithorhynchus* – literally, bird-nosed) was also popular.¹³ And the paradoxical, although lost to priority from the scientific literature, stuck in popular consciousness.

Naming and renaming are events of colonisation, but in this case the naming of the platypus did not resolve the matter of where it belonged in the citadel of knowledge. Everard Home dissected a specimen preserved in spirits sent to Sir Joseph Banks by Governor Hunter in 1802, and was able to give a full internal description. Home noted its likeness to the echidna in having a common cloaca for reproduction and excretion: 'this tribe [has] a resemblance in some respects to birds, in others to the Amphibia'.¹⁴ Until 1824 evidence of mammary glands, the distinguishing feature of mammals, had been undiscovered.¹⁵ But even when they were, the matter of whether the platypus and echidna gave birth to live young was unresolved, and this was seen to be critical to their place in the 'natural' world. It also became a question of nationalism. The French evolutionary thinker, Étienne Geoffroy Saint-Hilaire, ignoring the evidence of milk glands,

¹⁰ Harriet Ritvo, *The Platypus and the Mermaid and other Figments of the Classifying Imagination*, p. 4.

¹¹ George Shaw, *The Naturalist's Miscellany: or Coloured Figures of Natural Objects Drawn and Described Immediately from Nature*, vol. 10, June 1799 Fascicle, near plates 385 and 386. Johann Blumenbach, *Abbildungen*, vol. 5, Part 41, April 1800.

¹² George Bennett (1860) noted that *Mallangong* and *Tambreet* are used in 'the Yas, Murrumbidgee, and Tumat countries' and '*Tohunbuck*' at Goomburra, Warwick near Darling Downs in *Gatherings of a Naturalist in Australasia*, p. 97. Neither Richard Semon nor W. H. Caldwell records the Burnett River Aboriginal name for platypus (but since it was not eaten by them, it may not have been important).

¹³ The over-determined 'Duck-billed platypus' still seems popular in Britain. This was observed, for example, in captions in the Royal Scottish Museum and the British Museum of Natural History (South Kensington and the Rothschild Collection at Tring in 1999).

¹⁴ Cited in Ritvo, p. 7.

¹⁵ J. F. Meckel had dissected mammary glands in 1824, but it was George Bennett's account of 'actual observation that milk is secreted from it' (letter to Owen, 4 February 1833) that was the basis for Owen's account of the glands to the Zoological Society of London in 1834. See Elizabeth Dalton Newland 'Dr George Bennett and Sir Richard Owen: A Case Study of Early Australian Science' pp. 55–74, esp. p. 68.

separated the Order Monotremata, from 'true' mammals. He placed them halfway between mammals and reptiles. The British anatomist Richard Owen, disagreeing with the Frenchman's theories of evolution, saw them as definitely mammals, and therefore, he argued 'ovoviviparous' (the eggs were hatched inside the mother and the young born alive). The classification of platypus and echidnas as mammals remained a problem, and the question of egg-laying contested for nationalistic as well as scientific honour. Perhaps this was partly why neither Aboriginal nor colonial evidence had been regarded as valid. Caldwell records three letters from colonial observers: John Jamison (1818), John Nicholson (c. 1865) and George Rumby (1864), who claimed they had seen platypus eggs.¹⁶ The nations concerned were both of the European world, far from the specimens concerned. But the bitter rivalry between the English and the French permeated the status in science of the little faraway swimming monotreme. Stephen Jay Gould has observed that the language of taxonomy still reveals to some extent the Eurocentrism of classification: Prototheria (monotremes) are 'pre-mammals'; Metatheria (marsupials) are 'middle mammals – not quite there'; and 'Eutheria' (the warm-blooded animals of the north) are 'true mammals'.¹⁷

The platypus was the archetype of Australian otherness in the popular British imagination. The title of Umberto Eco's 1999 book, *Kant and the Platypus*, which has very little to say about platypuses and a great deal about enigmas, suggests that this may still hold. Although scientists were doubtful about its egg-laying habits, at least some of the general public accepted this as one among so many Antipodean oddities.¹⁸ The anonymous illustrated poem, *The Land of Contrarities*, published in 1860 in Britain begins with the platypus:

*There is a land in distant seas
Full of all contrarities.
There beasts have mallards' bills and legs,
Have spurs like cocks, like hens lay eggs.*¹⁹

¹⁶ W. H. Caldwell 'The Embryology of Monotremata and Marsupialia – Part I', pp. 463–85, esp. pp. 467–8. He does not mention here that George Bennett also initially thought monotremes were oviparous. (See note 14.)

¹⁷ Stephen Jay Gould, 'Sticking up for Marsupials' pp. 240–5, esp. pp. 241–2. Not all the Eurocentric thinking originated in Europe. For example, see the evolutionary 'trees' in T. Thomson Flynn (Professor of the University of Tasmania) 'The Phylogenetic Significance of the Marsupial Allantoplacenta' pp. 541–4.

¹⁸ George Bennett changed his position on the subject: in 1834 he wrote to Owen that his samples proved that the platypus was oviparous, but later writings (e.g. *Gatherings of a Naturalist*) supported Owen's position that they were 'ovoviviparous'. See Newland, 'Bennett and Owen', p. 69. The public was clearly divided on this issue. Even after eggs were discovered by science, the *Illustrated London News*, commenting on the Australian pavilion at the Colonial and Indian Exhibition in 1886, reported that 'fables were formerly told of this queer creature, as that it laid eggs'. (Cited in Ritvo, p. 15.)

¹⁹ This theme is developed in the exhibitions at the National Museum of Australia. I have drawn here on Nick Drayson's 1999 workbook (0412-50.04 Hoax to Enigma), which provides a curatorial basis for exhibition design.

In the Australian colonies, meanwhile, people were becoming more familiar with platypus – no longer was it perceived wet – camouflaged as ‘a lump of dirty weeds’, but increasingly its lovely fur was noticed. George Bennett the Sydney doctor, in his *Gatherings of a Naturalist in Australia 1860*, describes the thick fur as ‘a beautiful adaptation to both the burrowing and aquatic habits of the animal’.²⁰ Bennett celebrated the personality of the animal, speaking of the ‘playfulness’ of his captive platypus twins. He was also reluctant to shoot the animal, trying to capture it to watch its behaviour. But there was no money in the maturing colonial economy (gold rushes notwithstanding) for ‘pure’ research. Bennett’s research was constantly interrupted by the need to earn money (as a medical doctor), much as he would have preferred to explore the life of the platypus and other matters of natural history.²¹

I will return to Bennett’s platypuses later, in connection with W. H. Caldwell, but in order to understand the story of the platypus frontier, it is necessary to locate the particular place for this scientific and colonial encounter. The question of *whose country* yielded up the mystery of the platypus was not determined by the platypus, but by another ‘missing link’ in the evolutionary story.

Ceratodus (The Queensland Lungfish)

One of the last ‘freaks’ of Australian natural history to come to the attention of European science was Ceratodus, the Queensland lungfish (known today as *Neoceratodus forsteri*). It normally breathes through gills like other fish, but, when the oxygen levels in the water fall, it can rise to the surface and gulp air straight into its lung, an organ that other fish do not possess. The Australian lungfish is unlike lungfish in Africa and South America, in that it can live both underwater and on land. Fish with lungs were known only as fossils in the northern hemisphere at the time of the naming of Ceratodus, so the Queensland specimen was immediately dubbed a ‘living fossil’.

Ceratodus had an immediate place in the history of ideas. Its relevance to debates about Darwinian evolutionary theory, debates that had been heated since the publication of *The Origin of Species* in 1859, was obvious. Natural selection depended on continuities, but the classes of animals lacked ‘missing links’. Classes of fish, amphibians, reptiles, birds and mammals seemed discrete (apart from such absolute anomalies as the paradoxical platypus). Ceratodus, however, as a lung-breathing fish, was clearly halfway between fish and amphibian. It was of course, also intriguing because it was halfway between *dead* (fossilised, like its nearest relatives) and *alive* (known to science). It was also interesting

²⁰ Bennett, p. 97.

²¹ Australian Museum Archives: Series 37, Papers of George Bennett; Bennett’s correspondence with Owen often refers to financial stringencies. (e.g. p. 54 – ‘the Museum appointment has been made only £100 per annum & therefore anything but lucrative’).

because it was not unknown – only unknown to science. Not only Aboriginal people, but also the Mary River and Wide Bay district squatters ate it, calling it 'Burnett Salmon' for its pink flesh.

'Considering that the fish is not uncommon and has for some years been used as an article of food,' wrote Alex M. Thomson, Professor of Geology at Sydney University to Sir Richard Owen in 1870, 'it is surprising that it had not fallen into scientific hands much earlier'.²² Owen, as Superintendent of the Natural History Collections at the British Museum, was in a position to dissect the fish and determine its place in the citadel of knowledge. Only at the heart of Empire were there sufficient type specimens of fish to decide where this one fitted. Gerard Krefft's independence in publishing in Australia – in the *Sydney Morning Herald*, of all places – suggested a growing bloody-minded independence in the hearts of colonial scientists at arms' length from good specimens.²³ Ronald Strahan records that Gerard Krefft, the Director of the Australian Museum, had identified the fish as interesting when seeing so-called 'Burnett Salmon' being prepared for the table at the home of Mary River squatter and later New South Wales Minister for Lands, William Forster.²⁴ Thomson's letter accompanied a specimen of the fish taken from a tributary of the Mary River and sent to England within months of Krefft's announcement. The specimen was chosen for Owen and his staff because it had 'not been cut in the least, so that I trust it will reach you in a fit state for dissection'.²⁵

Edward Smith Hill prepared the field notes for the Australian Museum file, dated 30 June 1870. Hill was a retired wine and spirit merchant, best known for his work on flora and geology. He was also a trustee of the Museum, an anti-Darwinian and no friend of Krefft's. It was possibly he who arranged for the fish specimen to be collected for Owen at the British Museum. In his description, Hill noted that some Aboriginal people called the fish 'Barramundi'. Hill was known as a defender of Aboriginal rights and clearly had regular dealings with Aboriginal people. Aboriginal collectors may have been essential to collecting a specimen in such good condition.²⁶ If Aborigines were involved, then the Australian Museum's was the first of a number of significant international scientific/colonial frontier encounters in the very limited part of Queensland where *Ceratodus* can be found. Only certain sections of two rivers,

²² Australian Museum Archives: Series 48, Thomson to Owen 6/9/1870.

²³ Gerard Krefft, *Sydney Morning Herald*, Fig. 1-3; Krefft also published the description in the *Proceedings of the Zoological Society of London*, but the *SMH* was first.

²⁴ Ronald Strahan, *Rare and Curious Specimens*, p. 29.

²⁵ AMA 48, Thomson to Owen 6/9/1870.

²⁶ AMA 48: Memo E. S. Hill 30/6/1870; Hill's memo identifies the Aboriginal people naming the fish as from the Fitzroy River area, but this is clearly a mistake as *Ceratodus* does not live that far north. 'Barramundi' may of course have applied more broadly than just to *Ceratodus*. The fact that Burnett River people called the fish 'Djellah' suggests that Hill's collectors, if they were Aboriginal, were from a different language group.

the Mary and the Burnett, were suitable for the fish, the temperature and balance between salt and fresh water being critical to their survival.²⁷

Albert Günther undertook a full anatomical analysis of *Ceratodus* at the British Museum. Gerard Krefft's use of the name *Ceratodus* showed that he was well aware of the fossil fish of the northern hemisphere and recognised that the 'new' fish had an ancient lineage. Even so Günther's anatomical description of the fish as an 'intermediate form' between fish and amphibians excited Krefft very much. In July 1870 (some time before Günther's paper on the anatomy of the fish was published), he wrote 'your *Ceratodus forsteri* if true a greatest discovery ...[I am] amazed at it.'²⁸ Krefft, an evolutionary sympathiser, wrote regularly to Günther, mostly in German. Although Krefft had given the fish its name, his use of the pronoun 'your' suggests that he was giving Günther credit for seeing additional significance in the specimen. The warm tone might have been attributable to Krefft's and Günther's common German background, but it is more likely that this correspondent allowed Krefft to sidestep the more senior anti-Darwinian, Richard Owen.

The anti-evolutionary bias of the senior scientists of the Australian colonies at the time delayed local work on the lungfish after its discovery. Mulvaney and Calaby commented of this period that: 'It was rather remarkable that the members of the Australian scientific establishment almost to a man ... were vocal opponents of Darwin's ideas on the origin of species by means of natural selection.'²⁹ Krefft himself ran foul of anti-evolutionary forces with his trustees. In 1874, he was physically removed from the Museum from which he refused to resign – ignominiously carried out onto the footpath outside by two prizefighters employed by the Trustees.³⁰ The bitter battle that ensued after Krefft's dismissal put paid to further research papers from the Australian scientist most sympathetic to Darwinian evolution.³¹

I want to leave the hypothetical might-have-beens and return to the reasons for 'discovering' *Ceratodus* in 1870. The limitations of its habitat and the narrowness of its geographical distribution made its discovery by a scientifically-literate observer improbable. The relevant part of Queensland could hardly be said to be new to European eyes at this time, but it was probably still fair to call it frontier country. Indeed the idea of a continuing frontier in Queensland dies

²⁷ They have since been successfully introduced into the Brisbane River, the Stanley River and the North and South Pine Rivers but further south the water is too cold and further north the competition with crocodiles makes introduction impossible. See David McGonigal, 'The Lungfish: Australia's Living Fossil'.

²⁸ AMA 48, Krefft to Günther 13 July 1870. This is the only sentence in English in the letter.

²⁹ D. J. Mulvaney and J. H. Calaby, '*So Much that is New*': *Baldwin Spencer 1860-1929*, p. 146.

³⁰ Strahan, *Rare and Curious Specimens*, pp. 33–34. George Bennett and W. B. Clarke resigned from the Museum over this. E. S. Hill was the Trustee who employed the prizefighters.

³¹ G. P. Whitley and Martha Rutledge, 'Johann Ludwig (Louis) Gerard Krefft (1830-1881)'.

hard. As David Trigger has observed, Queensland premiers were still talking about the state as a 'a new frontier' bound to create an 'era of prosperity' in the 1990s.³² Wide Bay had been surveyed in 1848, and there had been 'settlement' up both rivers. This perhaps masked the area's scientific interest. Once exploration finished, good scientific observers may have had a tendency to move to other unsettled/pristine sites, leaving the settlement frontier to squatters and adventurers, who may or may not have been good natural history observers. When the squatters at the frontier did make an observation, the scientists were slow to believe them. William Forster, had described *Ceratodus* but had been disbelieved by Gerard Krefft until 1870, a point Krefft confessed in his letter to the *Sydney Morning Herald*. The species name *forsteri* was a belated attempt to make amends to the now important Forster.

Gold and adventure seeking

The Gympie gold rushes of 1867 attracted a large population of adventurers. 'Gold upheaves everything, and its disruptions are like that of an earthquake', wrote Anthony Trollope travelling in Queensland in 1873.³³ Trollope was as much concerned about the upheaval of morality, as of the Queensland soil. The attractions of what we might call now 'boys' own adventures', were celebrated by the Englishman, Arthur Nicols in his fictionalised account *Wild Life and Adventure in the Australian Bush: Four Years Personal Experience*. Writing eloquently of the 'noble territory of Queensland', Nicols boosted the frontier as a place for personal and financial development. 'These resources are waiting development at the hands of vigorous manhood which the upper and middle classes can contribute in abundance towards the making of this part of the Queen's realm'.³⁴ His natural history observations were excellent and he displayed a high level of curiosity about the platypus and echidna specimens he shot (including dissecting them, preserving the skins – and eating them). Nicols's hero, Harold, told a hunting story all about a man and his dog, Don. His prose captured the thrill of the hunt:

what was that strong boil of water just now near the lilies? ... There it is again, and a strangely shaped animal crawls over the leaves, dives in and out among them with the easy gliding motion of an otter, and disappears ... suddenly, the surface breaks into a turmoil ... and two long brown bodies are seen rolling over and over, playing or fighting ... showing beaver-like tails and duck-like bills ... The hoarse roar of the gun breaks the stillness of the scene. He is stripped in a few moments and eagerly swimming around the spot where the charge rippled along

³² The Premier was Wayne Goss in 1992. Quoted in David S. Trigger 'Mining, Landscape and the Culture of Development Ideology in Australia' pp. 161–80, esp. p. 164.

³³ Quoted in J. W. McCarty, 'Gold Rushes', p. 284.

³⁴ Arthur Nicols, *Wild Life and Adventure*, p. vii.

the water ... Don hearing the report, hurries up ... [and] sees a dusky object crawling through the reeds, and secures it before it can regain the deep water; and Harold soon stands on the bank, triumphantly holding his first platypus.³⁵

Because he is working within a particularly British sort of hunting ethic, Harold does not use Aboriginal collectors.³⁶ The heroics of catching the platypus made it a worthy 'trophy', despite the fact that its size was not as clearly respectable as a lion or an elephant. The platypus for Nicols is working as the drawcard for young men of the Empire with hunting aspirations. Australia's kangaroos and other marsupials did not generally carry the excitement of the wild animals of Africa. Nicols is suggesting that here is one that might arouse the sort of excitement where 'away flies conscience, philosophy and all such abstract considerations', in short, a manly challenge for the imperial hunter.³⁷

Science and frontier life

The difficulty for scientists working in Queensland was, perhaps, to make it clear that their task was different from that of frontier-adventurers, morally more worthy and more important to the glory of empire. Whether they were visitors from Europe, or aspiring Australian scientists, they would have been largely sympathetic with the evocation of empire, class and gender portrayed by Nicols, but would have seen all of these as in service to science. The glory of Australia in empire through science was perhaps more important to locals, and the booty of Australia for a glorious scientific empire more the concern of visiting Europeans, not all of whom were British. The visitors, in particular, were clearly fearless about taking very large numbers of specimens. But the scientists' virility was tied to hunting for knowledge rather than hunting for trophies. Such hunting demanded that they tap into the best local knowledge sources, including Aboriginal ones.

The young German embryologist, Richard Semon in his popular account of his travels in Queensland, goes out of his way to make it clear that the purposes of his journey are purely scientific:

³⁵ *ibid.*, pp. 347–8. The place of this platypus is probably southwest Queensland, not the Gympie area, but it is unclear, and because it is all 'fiction', conflation of places and events is possible. On the hunting ethic, see John MacKenzie, *The Empire of Nature: Hunting, Conservation and British Imperialism*, esp. pp. 25–53.

³⁶ The chief role of the one Aboriginal personality in Nicols' tale, Murray Jack, is to lead (and die in) a revenge battle against the Warrego people following the murder of a shepherd at an outstation. The 'cowboys and indians' stylism and the laundered clarity of the ethics of the account gives the reader clues about the purposes of fictionalising in Nicols' so-called 'adventure' writings (see pp. 315–339).

³⁷ Harriet Ritvo, *The Animal Estate: the English and Other Creatures in the Victorian Age*, p. 267.

In June 1891, when I set out on my scientific journey, nothing whatever had been recorded with regard to the development of *Ceratodus*. Concerning oviparous mammals [there were] no developmental facts but that of their laying eggs, and an interesting observation about the teeth of young *Ornithorhynchus*... Thus it was that I chose Australia as my first and my main field of action, and within Australia those quarters which harboured the animals chiefly exciting my interest.³⁸

The book's dedication to the eminent scientists Ernst Haeckel and Paul von Ritter, alerts us to the fact that it is an account of 'an expedition' [not for mere adventure but] 'destined to bring some Phylogenetic Problems nearer their solution'. Semon's geographical research was as thorough as his zoological. Before leaving Jena, he had precisely identified the *Ceratodus* territory where he would make his home in Australia:

[O]nly a brother naturalist will sympathise with me, when I own that an almost solemn feeling overcame me, on starting from the little station of Maryborough on the morning of 24th August, I began my pilgrimage to land sacred to the zoologist.³⁹

W. H. Caldwell had made the scientific expedition internationally famous for this region, and Semon wasted no time in directing his attentions to the area where Caldwell's collecting had been most successful.

I now want to turn to the central story of this scientific frontier, the *Ceratodus*-driven collecting expeditions of Caldwell and his Aboriginal companions in the 1880s, which resulted in the famous telegram to the British Association about the platypus. It is very difficult to infer the Aboriginal perspectives from Caldwell's brief account alone. The fact that Semon went to precisely the same area only seven years later, however, and was introduced to Aboriginal collectors by the same squatter (W. F. McCord), allows us to draw on his much fuller account of the Aboriginal people to supplement Caldwell's remarks.

Mr Caldwell's travels

William Hay Caldwell's Cambridge lineage was impeccable. The department he came from was leading the world in embryological research. He distanced himself from the 'early days of Darwinism' where 'it was hoped to get a pedigree for every animal'. 'Now that all biologists are Darwinists,' he declared to the Royal Society of New South Wales on 17 December 1884, (where in fact there would

³⁸ Richard Semon, *In the Australian Bush and on the Coast of the Coral Sea. Being the Experiences and Observations of a Naturalist in Australia, New Guinea and the Moluccas*, p. 2.

³⁹ *ibid.*, p. 15.

have been very few Darwinian sympathisers!), 'pedigree-hunting has gone out of fashion'.⁴⁰ Perhaps he was aware of the lack of sympathy to Darwinian biology in Australia and letting the colonials know they were out of touch with the action. It is significant that he did not bother to write up this extempore talk. He left it to someone else (in all probability a colonial not sympathetic to Darwinian biology) to prepare a publication from his notes. Caldwell ultimately published so little that this account is crucial to gaining an idea of the state of his mind when in Australia. His work in morphology was to observe the minute differences between organic beings at various stages of development, in the belief that the patterns of evolution may be reflected in the patterns of individual development. His teacher at Cambridge, Professor Francis Maitland Balfour, had suggested in 1882 that Caldwell should consider travelling to Australia to work on the development of *Ceratodus* and 'the peculiar Australian mammalia'. Balfour, elected to a Fellowship of the Royal Society aged only 27, was taught by Professor Michael Forster (no relation to the Forster of the fish, but an active member of the British Association, and Secretary of the Royal Society). Forster in turn, was taught by T. H. Huxley, Darwin's most outspoken advocate. Caldwell benefited from the strong Darwinian lineage of Forster and Balfour at Cambridge, but it was also a burden to him.⁴¹ In 1882, Balfour, aged only 31, was killed in a mountaineering accident, and a travelling studentship was endowed in his memory. Caldwell, Balfour's own student, working on a task assigned by Balfour, was the obvious first recipient of an 'instrument by which [Balfour's] memory was to reach beyond Cambridge and encompass the world for Darwinian biology'.⁴² Caldwell's mission was well funded. In addition to a personal salary from the Balfour Trust, he brought with him grants totalling £500 from the Royal Society (of London) towards the cost of equipment. Both Cambridge University and the Royal Society eagerly awaited results.

George Bennett had studied the platypus mostly in New South Wales, and Caldwell, guided by this, determined to start in Sydney on his arrival in Australia in September 1883 and work over the platypus country inland. He had not counted on the skin-hunters. The trade in platypus skins had escalated dramatically in the two or three decades since Bennett's trips. By late in the 19th century, platypus rugs of 40 or more pelts were being stitched together.⁴³ 'I wasted a fortnight trying to obtain information in Sydney as to where the animals were to be found in sufficient numbers for my purpose'.⁴⁴ By mid-October,

⁴⁰ W. H. Caldwell, 'On the Development of the Monotremes and *Ceratodus*', pp. 117–22.

⁴¹ MacLeod, 'Embryology and Empire'.

⁴² *ibid.*, p. 148. MacLeod records that £8,446 was subscribed to the scholarship, a phenomenal amount at the time.

⁴³ See Barrett, *The Platypus*, pp. 17–19. The National Historic Collection of the National Museum of Australia has such a rug.

⁴⁴ Caldwell, 'Embryology of Monotremata and Marsupialia', p. 464.

Caldwell had given up on platypus, and moved his attention to koala and wallaby, which were just beginning to breed. This material gave Caldwell new information on foetal membranes, and he sent home an account that was published in 1884 in the *Quarterly Journal of Microscopical Sciences*.

In April, Caldwell went north to the Burnett River district to find *Ceratodus*, and noticed when he arrived that as well as *Ceratodus* with ripe spermatozoa, both echidna and platypus were numerous in the area. He decided to stay there for the monotreme breeding season to try to get both *Ceratodus* and monotremes in the same year. 'The Burnett district', he wrote, 'presented the further advantage of possessing a considerable number of black natives. I afterwards found that without the services of these people I should have had little chance of success'.⁴⁵

He set up under canvas out of Gayndah, realising that in order to work with Aboriginal people, he would have to create an independent camp with provisions, away from the town and stations, near the river where *Ceratodus* lived. This was probably on the advice of district squatters such as W. F. McCord, who gave similar advice to Semon seven years later. It was McCord who recommended 'Frank' an Aboriginal from Gayndah to Semon as 'best adapted to act as an agent between me and the blacks, to explain my wishes to them, and to be of help in my searches for the desired animals'.⁴⁶

The curious travelling-scientist circus was appreciated by both blacks and whites in these districts where the economy was in a downward spiral. The wool industry was failing as the first good pastures had degenerated, and it was no longer possible to run sheep on the inferior regrowth pastures: 'the survival of the unfittest', wrote Semon wryly.⁴⁷ Any new industry – even a passing science industry was embraced. It was probably no coincidence that the enterprising Frank recommended by McCord turned up on Semon's coach from Biggenden to Gayndah, and became 'the first black who crossed my path'. Semon came to have reservations about Frank, however, and 'refused his services during my second stay in the Burnett'.⁴⁸ The majority of workers in the new industry were Aboriginal, because of the particular skills required, but Caldwell reports that he employed some 'white navvies' to dig up platypus burrows (because the Aboriginal team was reluctant to do so). Semon also employed one of the local German farmers of the area to accompany him in the bush.

Caldwell revealed that his purse was well filled with his opening offer of £10 to 'anyone who would show me *Ceratodus* spawn'. Once he had camp set up, he

⁴⁵ loc. cit.

⁴⁶ Semon, *In the Australian Bush*, p. 17.

⁴⁷ *ibid.*, p. 19.

⁴⁸ *ibid.*, p. 17.

spent 'many hours in the water' in June and July hunting everywhere for the eggs of *Ceratodus*. Meanwhile:

the blacks began to collect *Echidna* and very soon I had segmenting ova from the uterus. In the second week of August I had similar stages in *Ornithorhynchus*, but it was not until the third week that I got the laid eggs from the pouch of *Echidna*. In the following week (August 24) I shot an *Ornithorhynchus* whose first egg had been laid; her second egg was in a partially dilated *os uteri*'.⁴⁹

This he described as 'a lucky chance'.⁵⁰ To kill a female platypus (which lay eggs in twos) at the point *between* laying eggs gave him the crucial information about the stage of development at which the eggs were laid – a stage he describes as 'equal to a 36-hour chick'.⁵¹ The capture of this specimen is so absolutely crucial to the story, that it is interesting that he claims to have shot it himself. Perhaps he did. His timing was impeccable. On 29 August he sent in the telegram 'Monotremes oviparous, ovum meriblastic' to a neighbouring station. The telegram was delivered to Professor Archibald Liversidge at the University of Sydney, who in turn sent it to the British Association at Montreal. Less than a week later, on 2 September, Dr William Haacke from the South Australian Museum was able to give evidence of egg-laying in monotremes, displaying an egg from an echidna's pouch, at a meeting of the Royal Society of South Australia.⁵² The Norwegian, Carl Lumholtz also claims to have heard reports of echidna's eggs, and was in pursuit of them at the time he had to leave Australia, being convinced that 'the reports I had received from the blacks corresponded with the facts'.⁵³ Caldwell's ability to tap the very consciously international audience in Canada – this was the first time that the British Association for the Advancement of Science had met outside Britain – was critical to his fame. The mystery was ripe for solution, but the telegram gave Caldwell a dramatic edge.

Caldwell himself hardly celebrated this historic moment. He was still anxious about that fish, and one can read in his words the pressure and burden that the Cambridge expectations and financial support had given him 'Meanwhile I had never relaxed my efforts to find *Ceratodus*; but after four months I was beginning to despair of success'.⁵⁴

⁴⁹ Caldwell, 'Embryology of Monotremata and Marsupialia', p. 464.

⁵⁰ Caldwell, 'On the Development of Monotremes and *Ceratodus*', p. 120.

⁵¹ Caldwell, 'Embryology of Monotremata and Marsupialia', p. 464.

⁵² William Haacke, 'Exhibits', p. 81.

⁵³ Carl Lumholtz, *Among Cannibals: An Account of Four Years Travels in Australia and of Camp Life with the Aborigines of Queensland*, p. 329. Lumholtz was aware of Caldwell's work, so there may be some hindsight in this observation.

⁵⁴ Caldwell, 'Embryology of Monotremata and Marsupialia', p. 464.

He finally found his *Ceratodus* eggs in September, and at this time employed some fifty 'black retainers'. It was the women who were given the responsibility of trawling the river weed for *Ceratodus*, whilst the men collected echidna, a favourite food. 'It was only occasionally, and then with great difficulty, that I persuaded them to dig for *Ornithorhynchus*. Not only the blacks, but their dogs, refused to eat the animal.'⁵⁵ It is yet another paradox of the platypus that the mystery of its egg-laying habits was solved with the assistance of Aboriginal collectors who themselves had no reason to hunt for the animal. This contrasts sharply with the earlier experience of George Bennett with Goulburn Aboriginal collectors. Bennett writes:

The eyes of the aborigines, both young and old, glistened, and their mouths watered, when they saw the fine condition of the young Mallangongs. The exclamations of 'Cobbong fat' (large, or very fat), and 'Murry budgereee patta' (very good to eat), became so frequent and earnest, that I began to tremble for the safety of my destined favourites... But I was wrong in my calculation of the natives' power of resisting temptation, for they brought them all home safe, and were delighted with the reward of tobacco which was given for their trouble.⁵⁶

But the Aborigines of the upper Burnett District, whose interest in platypus was minimal were the ones who assisted not only Caldwell, but also Semon in obtaining long embryological series critical to the debates in anatomy and morphology in the late 19th century.

Scientific and settlement frontiers in tension

There are two points to this story: the first is the contingency of scientific discovery. Caldwell was climbing the *Ceratodus* mountain when he seized the solution for the platypus puzzle. Frontiers may be unexpectedly contiguous. The fact that both questions interested the Cambridge embryological school made an opportunistic leap possible – but the coincidence was not really predictable. Despite the 'pinnacle' rhetoric, the discovery of platypus eggs by an uncontested source, was to some extent an accident of circumstance. Caldwell was almost an accidental scientist, empowered (and burdened) by a large purse and high expectations. He was essentially charged with tasks of the post-Darwinian era, but his contribution to science was a final response to the challenge issued by Everard Home in 1825 to W. S. Macleay as he left for New South Wales: 'what is principally wanted is the ova'.⁵⁷ It is interesting that when Caldwell returned to Britain in 1887 with a Sydney-born wife, he maintained his Fellowship at Caius College Cambridge only nominally, and only

⁵⁵ *ibid.*, p. 465.

⁵⁶ Bennett, *Gatherings of a Naturalist in Australasia*, p. 132.

⁵⁷ Ritvo, *Platypus and the Mermaid*, p. 14.

until about 1889. He published very little and made his way as a successful Scottish paper-manufacturer in the family firm. It was left to others to undertake the anatomical work on his huge collections. Richard Semon in 1891, realising that Caldwell had barely begun this task, decided to make his own trip. Semon, by contrast, analysed all his specimens and published several important scientific papers as well as his popular book.⁵⁸ But he too had great difficulties finding *Ceratodus* roe, because the part of the river he had chosen lacked the weed where the spawn is found. He found plenty of full grown 'Djellah', as the local Aborigines called them, and established that *Ceratodus* was no vegetarian, taking happily to meat and mollusc baits.⁵⁹ Semon's published scientific work, however, focused on the monotremes and marsupials, because he had successfully collected developmental series for these. There is no evidence that he observed the stages of growth in the living lungfish. Caldwell, by contrast, bred and displayed a young lungfish to the Royal Society of New South Wales in December 1884, but wrote no more about it after he returned to Britain.

The second story relates to the emergence of an opportunistic local Aboriginal science industry that underpinned the success of both Caldwell and Semon. Aboriginal collectors assisted many other scientific travellers including George Bennett around Yass and the Norwegian, Carl Lumholtz in Coomoboolaroo further west in Queensland, but on nothing like the scale required by both Caldwell and Semon. The demand for embryological series (collections with representatives of all stages of the growing animal) meant absolute carnage. For example, in a single season Caldwell's team collected 1300-1400 echidnas 'from which a fairly complete series of stages was obtained'.⁶⁰ Such a vast exercise demanded a whole economy. Caldwell's second season required 150 Aborigines working flat out for two months: 'A skilful black, when he was hungry, generally brought in one female *Echidna* together with several males, every day ... The blacks were paid half-a-crown for every female, but the price of flour, tea and sugar, which I sold to them, rose with the supply of *Echidna*. The half-crowns were, therefore, always just enough to buy food to keep the lazy blacks hungry'.⁶¹

Semon tried to set up a base close to Gayndah, like Caldwell, but moved further upstream to a place outside Mundubbera, to get away from the pressures of the town. By contrast to Caldwell, Semon determined to pay his Aboriginal collectors fairly in cash at the end of each week:

⁵⁸ Semon's studies are published in F. Romer (ed.) *Monotremata und Marsupialia*. The National Library of Australia copy is the one from the library of the *SS Discovery* of the Antarctic Expedition of 1901-4. The adventures of Semon thus went far south with other adventurers.

⁵⁹ Semon, *In the Australian Bush*, pp. 87-8.

⁶⁰ Caldwell, 'Embryology of Monotremata and Marsupialia', p. 466.

⁶¹ *ibid.*, p. 466.

All this brought about a very lively competition during the first week. I received material in such abundance that I had difficulty in finishing its preparation during the day, in dissecting the animals brought to me, conserving their organs, eggs and young, and preparing them for a more thorough examination which was to take place in Europe. On 10 September, I received no less than eight female Echidnas, two of which bore eggs in their oviduct, whilst two of them carried eggs, and three other young ones in their pouch. Besides this, I received a quantity of marsupials on the same day. On settling my accounts on Saturday the 12th September, I found that every black had to receive a considerable sum... and I began to consider whether my means would suffice if things went on in this style.⁶²

They didn't. 'Never again in the whole of my campaign did I attain the good results of the first week'.⁶³ Semon had reckoned without the opportunism of the frontier settlers. Mrs Corry, in that same week, set up an illegal operation to sell the cashed-up Aboriginal collectors booze. Despite the fact that she told Semon she was 'very sorry and promised never to do it again', he felt 'ethically obliged' to prohibit intemperance 'at the cost of my own success, for I should certainly have been more prosperous had I kept to my first system of payment'.⁶⁴ But Semon's 'fear of getting involved in serious difficulties', and unwillingness to risk the 'peaceable' temperament of his Aboriginal team members, drove his decision to settle accounts at the end of the season. This was hardly humane concern for Aboriginal people, but rather a wish to protect the good name of science, to keep science on the civil side of the frontier. There is no doubt that both Caldwell and Semon were well aware that the quality of their science depended on the quality of their relations with the local Aboriginal communities. George Bennett, too, whose relations with his collectors in New South Wales were generally cordial by his own account, was conscious that 'good Aborigines' corresponded with good science. Bennett wrote in frustration to Richard Owen about the success of Caldwell, the young professional, in solving in a few months the mystery to which he had devoted half his life. 'I had only two lazy aborigines', Bennett complains 'and Caldwell succeeds ... encamped on the banks of the river ... with the aid of a large number of aborigines. It is certainly the only way to insure success'.⁶⁵ Bennett himself was not to blame for coming up with the 'wrong answer'—only his 'lazy' Aborigines.

There is almost an intriguing suggestion here that where the scientific and settler frontiers coincide, the quality of the European observer is second in importance

⁶² Semon, *In the Australian Bush*, pp. 46–7.

⁶³ *ibid.*, p. 56.

⁶⁴ *loc. cit.*

⁶⁵ Bennett to Owen 1888, quoted in Gruber, 'Does the Platypus Lay Eggs?', p. 51.

to the quality of Aboriginal assistance. This contradicts Kathleen Dugan's contention that 'the system of colonial science left scientists unable to collect biological information from the people best qualified to provide it'.⁶⁶ The system veritably depended upon such people. The problem was the credibility of the brokers of the information, the settler naturalists. European science before Caldwell disbelieved Aboriginal and settler Australian voices alike. Settler Australian naturalists were deeply discomfited to find that their observations were worth no more than an Aboriginal's. Indeed, the fact that Caldwell fresh from Cambridge with his well-paid Aboriginal team had established the 'right answer' without assistance from colonial scientists must have added to settler anxiety. This anxiety is manifest in the strategy of blaming Aboriginal assistants for wrong answers; settler naturalists wanted to be with civilization, on the side of empire and new knowledge, not with the colony, in error, and degenerating.

The telegram that closed a frontier

Not all settler scientists shared Bennett's angst. Liversidge, the chemistry professor who had aligned himself with the 'right answer' by mediating the famous telegram's successful transmission to Canada, immediately seized on its value in attracting the attention of British science to Australia. In a letter published in the Sydney papers on 16 September 1884, and reproduced soon after in England and other colonial papers, Liversidge wrote:

During the past fortnight we have received several telegrams from London, respecting the late meeting of the British Association, at Montreal, and in some of them references are made to suggestions that a future meeting be held in Australia.

As far as one can judge, the idea seems to have been thrown out when Professor Moseley, FRS, announced Mr Caldwell's discovery of the oviparous nature of the platypus and Australian porcupine. [footnote: sent from Sydney by cable]. The news seems to have created or rather reawakened interest in the peculiarities of Australian Natural History, and on the spur of the moment some of the more enthusiastic members appear to have proposed that a subsequent meeting of the British Association should be held in Australia.

The text of this letter was also reproduced in the proceedings of the first meeting of the Australasian Association for the Advancement of Science (AAAS), held in Sydney in 1888. It was the first salvo in Liversidge's energetic campaign to bring the British Association to Australia, a campaign that was finally successful some thirty years later.⁶⁷ Perhaps the telegram's most immediate contribution

⁶⁶ Dugan, 'The Zoological Exploration of the Australian Region', p. 92.

⁶⁷ Archibald Liversidge, appendix to President's Address, *Proceedings AAAS*, Sydney, 1888, p. 15. The BAAS came to Australia finally in 1914.

was to draw the leading evolutionist Walter Baldwin Spencer to Australia. Spencer, whilst in Britain in 1884, wrote the note in *Nature* about the significance of Caldwell's work. Three years later he took up the Chair in Biology at the University of Melbourne.⁶⁸ Liversidge and Spencer, promoters of the monotreme mountain, both went on to be very significant in scientific affairs in Australia, especially the AAAS. But they also created closure – a sense that the platypus frontier had closed, and moved Australian science to focus on other things.

Postscript

After the Caldwell era, the platypus was neglected for many decades by mainstream science. It was energetic natural history amateurs of independent means who pressed on with platypus studies – the most notable being Harry Burrell, whose twenty years' research resulted in the publication of *The Platypus* in 1927, in which he speculated that the platypus had a 'sixth sense'. Burrell was known affectionately as 'Duckbill Dave'. He was responsible for designing the platypussary that took five platypuses to the New York Zoo in 1922. Charles Barrett's popular book of 1944, also titled *The Platypus*, included summaries of Burrell's work and the work of the other Platypus Man, Robert Eadie, who kept platypuses at Healesville, near Melbourne. Perhaps it was Barrett who kept alive the 'platypus frontier', by reminding scientists that the 'cairn of knowledge that they commenced to build with small pebbles [was] ... still uncompleted, but high and firm now, because of the work of such patient, masterly observers as Robert Eadie and Harry Burrell'.⁶⁹ Science did return to the platypus, in the 1960s, with some CSIRO studies of their milk glands confirming the similarity of the monotremes to other marsupials.⁷⁰ In the 1980s and 1990s, confirmation was found for Burrell's 'sixth' – electromagnetic – sense.⁷¹

The local Aboriginal communities were not the only beneficiaries of scientific (later eco-) tourism. In the upper Burnett River area over a hundred years later, there is great pride in the local curiosity and active conservation work towards the preservation of the slow-moving lungfish.⁷² In a quaint tribute to the old scientific frontier, there is still a railway siding called 'Ceratodus'.

⁶⁸ 'Walter Baldwin Spencer, 'The Eggs of Monotremes', pp. 132–5. See also Mulvaney and Calaby, 'So Much that is New', esp. pp. 143–5.

⁶⁹ Barrett, *The Platypus*, p. 16; Harry Burrell, *The Platypus: Its Discovery, Zoological Position, Form and Characteristics, Habits, Life History, etc.*

⁷⁰ A film: 'The Comparative Biology of Lactation' was also made through CSIRO and The Australian National University. See CSIRO Division of Wildlife and Ecology, *Biannual Report*, pp. 36–7.

⁷¹ Ian Anderson, 'Sixth Sense is the Platypus's Secret (sensors for electrical signals)', p. 39. K. H. Andres and M. Von Duerning, 'Two types of electrosensory organs of the platypus', p. 745.

⁷² McGonigal, 'The Lungfish'.

References

- Anderson, Ian 1988, 'Sixth Sense is the Platypus's Secret (Sensors for Electrical Signals)', *New Scientist*, vol. 118, no. 1612, p. 39.
- Andres, K. H. and M. Von Duerning 1993, 'Two Types of Electrosensory Organs of the Platypus', *Ornithorhynchus paradoxus*. [sic] *Journal of Comparative Physiology*, vol. 173, no. 6, p. 745.
- Barrett, Charles 1944, *The Platypus*, Robertson and Mullins, Melbourne.
- Bennett, George 1860, *Gatherings of a Naturalist in Australasia*, London (republished 1982. Milson's Point: Currawong).
- Burrell, Harry 1927, *The Platypus: Its Discovery, Zoological Position, Form and Characteristics, Habits, Life History, etc.*, Angus & Robertson, Sydney.
- Caldwell, W. H. 1884, 'On the Development of the Monotremes and Ceratodus', *Proceedings of the Royal Society of New South Wales*, vol. 18, pp. 117–22.
- Caldwell, W. H. 1887, 'The Embryology of Monotremata and Marsupialia – Part I', *Philosophical Transactions of the Royal Society (B)*, vol. 178, pp. 463–85.
- Dugan, Kathleen 1987, 'The Zoological Exploration of the Australian Region and its Impact on Biological Theory' in Nathan Reingold and Marc Rothenberg (eds) *Scientific Colonialism*, pp. 79–100, Smithsonian Institution Press, Washington.
- Flynn, T. Thomson 1922, 'The Phylogenetic Significance of the Marsupial Allantoplacenta' *Proc. Linnean Soc. NSW*, vol. 47, pp. 541–4.
- Gould, Stephen Jay 1980, 'Sticking up for Marsupials' in *The Panda's Thumb More Reflections in Natural History*, pp. 240–5, Norton, New York.
- Griffiths, Tom 1997, 'Ecology and Empire: Towards an Australian History of the World', in Griffiths and Robin (eds) *Ecology and Empire*, pp. 1–16.
- Griffiths, Tom and Libby Robin (eds) 1997, *Ecology and Empire: Environmental History of Settler Societies*, Keele University Press, Edinburgh.
- Gruber, Jacob W. 1991, 'Does the Platypus Lay Eggs? The History of an Event in Science', *Archives of Natural History*, vol. 18, no. 1, pp. 51–123.
- Haacke, William 1884–4, 'Exhibits', *Transactions of the Royal Society of South Australia*, vol. 7, p. 81.
- Home, R. W. and S. G. Kohlstedt (eds) 1991, *International Science and National Scientific Identity: Australia between Britain and America*, Kluwer Academic Publishers, Holland.
- Liversidge, Archibald 1888, 'Appendix' to President's Address, *Proceedings Australasian Association for the Advancement of Science*, p. 15, AAAS, Sydney.

- Lumholtz, Carl 1889, *Among Cannibals: An Account of Four Years Travels in Australia and of Camp Life with the Aborigines of Queensland*, John Murray, London.
- Kreffft, Gerard 1870, in *Sydney Morning Herald*, 18 January, no. 65, col. 5.
- 1870, description in *Proceedings of the Zoological Society of London*, pp. 221–4.
- MacKenzie, John 1988, *The Empire of Nature: Hunting, Conservation and British Imperialism*, Manchester University Press, Manchester.
- MacLeod, Roy 1994, 'Embryology and Empire: The Balfour Students and the Quest for Intermediate Forms in the Laboratory of the Pacific', in MacLeod and Rehbock, *Darwin's Laboratory*, pp. 40–165.
- MacLeod, Roy and Philip Rehbock (eds) 1994, *Darwin's Laboratory: Evolutionary Thought and Natural History in the Pacific*, University of Hawa'ii Press, Honolulu.
- McCarty, J. W. 1998, 'Gold Rushes', in Graeme Davison, John Hirst and Stuart Macintyre (eds), *The Oxford Companion to Australian History*, p. 284, Oxford University Press, Melbourne.
- McGonigal, David 1987, 'The Lungfish: Australia's Living Fossil', *Australian Geographic*, no. 6 April-June, pp. 46–57.
- Mulvaney, D. J. and J. H. Calaby 1984, *'So Much that is New': Baldwin Spencer 1860-1929*, Melbourne University Press, Melbourne.
- Newland, Elizabeth Dalton 1991, 'Dr George Bennett and Sir Richard Owen: A Case Study of Early Australian Science' in Home and Kohlstedt (eds) *International Science and National Scientific Identity*, pp. 55–74
- Nicols, Arthur 1887, *Wild Life and Adventure in the Australian Bush: Four Years Personal Experience*. Richard Bentley, London.
- Reingold, Nathan and Marc Rothenberg (eds) 1987, *Scientific Colonialism: A Cross-Cultural Comparison*, Smithsonian, Washington DC.
- Ritvo, Harriet 1987, *The Animal Estate: The English and Other Creatures in the Victorian Age*, Harvard University Press, Cambridge, Mass.
- 1997, *The Platypus and the Mermaid and Other Figments of the Classifying Imagination*, Harvard University Press, Cambridge Mass.
- Robin, Libby 1997, 'Ecology: A Science of Empire?' in Tom Griffiths and Libby Robin (eds) *Ecology and Empire: Environmental History of Settler Societies*, pp. 63–75.
- Romer, R (ed.) 1894, *Monotremata und Marsupialia*, Gustav Fischer, Jena.

- Semon, Richard 1899, *In the Australian Bush and on the Coast of the Coral Sea. Being the Experiences and Observations of a Naturalist in Australia, New Guinea and the Moluccas*, Macmillan & Co., London.
- Shaw, George 1799-1800, *The Naturalist's Miscellany: or Coloured Figures of Natural Objects Drawn and Described Immediately from Nature*, F. P. Nodder, London:
- Spencer, Walter Baldwin 1884, 'The Eggs of Monotremes', *Nature*, vol. 31, pp. 132–5.
- Stanner, W. E. H. 1969, *After the Dreaming: Black and White Australians – An Anthropologist's View*, Australian Broadcasting Commission, Sydney.
- Strahan, Ronald 1979, *Rare and Curious Specimens*, The Australian Museum, Sydney.
- Trigger, David S. 1997, 'Mining, Landscape and the Culture of Development Ideology in Australia', *Ecumene*, vol. 4, no. 2, pp. 161–80.
- Whitley, G. P. and Martha Rutledge 1974, 'Johann Ludwig (Louis) Gerard Krefft (1830-1881)' in Douglas Pike (ed.) *Australian Dictionary of Biography*, vol. 5, K-Q, pp. 42–4, 1851–1890, Melbourne University Press, Melbourne.

Unpublished sources

- Australian Academy of Science Archives (AAS 352):
R. G. Beidleman and M. E. Hoare correspondence
- Australian Museum Archives:
Series 37, Papers of George Bennett. Series 48, Gerard Krefft
Correspondence 1861–78
- CSIRO Division of Wildlife and Ecology: Film:
'The Comparative Biology of Lactation' (as reported in Biannual Report, 1972–4, pp. 36–7)
- National Museum of Australia – Curatorial Workbooks (1999): Nick Drayson
Nick Drayson 0412-50.04 *Hoax to Enigma*

8. Frontiers of the future: science and progress in 20th-century Australia

Tim Sherratt

A hymn of the future

The glow of his campfire framed a simple tableau of pioneer life. Across this 'untenanted land', Edwin Brady mused, 'little companies', such as his own, sat by their 'solitary fires'. 'They smoked pipes and talked, or watched the coals reflectively'. Around them, the 'shadowy outlines' of the bush merged into the dark northern night, and 'the whispers' of this 'unknown' land gathered about. It seemed to Brady that this camp, this night, represented the 'actual life' of the Northern Territory as he had known it. But the future weighed heavily upon that quiet, nostalgic scene. The moment would soon fade, Brady reflected, as the 'cinematograph of Time' rolled on. It was 1912, and something new was coming.¹

Staring into the flames of the campfire, Brady imagined he heard 'the whistle of the Trans-continental Express'. The 'rumble of freight trains' followed, and the sound of water churning in the wake of 'fast coastal steamers'. The night was filled with movement as Brady perceived an end to the north's crippling isolation, the conquest of its 'lonesome distances'. New industries too! The 'chug-chug' of sugar mills, 'the buzzing of cotton jinnys', 'the clinking of harvesters', 'the hissing of refrigerators'—as Brady listened, 'the thousand homely sounds of human progress' joined in a triumphant 'hymn of the Future'. The night's subtle whispers were lost amidst the clamour of technology on the move. Not mere campfires, but 'young cities', electric lit and alive with enterprise', would soon arise to defeat the darkness.² This was Brady's dream. This was progress.

Edwin James Brady, poet and journalist, visited the Northern Territory in September 1912, gathering material for his ambitious compendium of Australian developmental opportunities, *Australia Unlimited*.³ Brady was travelling the country, charting the outlines of Australia's future with his typical optimistic zeal. His trip north was drawing to a close and, as he relaxed by his last campfire, he began to ponder the transformation of the Territory. The sounds and images conjured from the night reveal much about the spirit that invigorated his work. He imagined an end to isolation and emptiness, the growth of both population and production. The future was rising like a flood, lapping at the frontiers of

¹ Edwin James Brady, *Australia Unlimited*, p. 570.

² *ibid.*, pp. 570–1.

³ *ibid.*, p. 515ff.; Some details of Brady's travel arrangements, facilitated by the Commonwealth, are contained in National Archives of Australia (NAA): A659/1, 1943/1/3907.

settlement, ready to redeem Australia's waste lands with the regenerative flow of human ingenuity and enthusiasm. Australia's unlimited prospects lay both in the conquest of space and the fulfillment of time. Plotted against these two axes, the upward course of progress was clear.

The 'cinematograph of Time' was an apt metaphor. It portrayed the unfolding story of Australia's national progress as a product of the latest technology, presented with an assured sense of inevitability – frame follows frame follows frame. In the early years of the century, confidence in the transforming power of science and technology was high. 'The wealth of today', Brady argued, 'is but a beggar's moiety of the unlimited wealth of the future which will be won by the application of modern knowledge to local conditions'.⁴ His optimism is echoed still in the slogans of 'knowledge nation' and 'new economy'. Science and technology remain as engines for change, cascading revolution upon revolution. The weight of inevitability that threatened to extinguish Brady's isolated campfire continues to press upon our visions of the future – invigorating our hopes and intensifying our fears. We are all familiar with the story of progress, a compelling tale of growth and improvement that entwines national ambition with individual longing. But how are our journeys through life framed within this unrolling narrative? What choices do we have, and how do we make them?

For Brady, progress was measured in miles and acres, a story of continental conquest. Land figures less prominently in contemporary calculations of achievement, nonetheless, we continue to imagine progress in terms of distance travelled, as a journey, ever onwards through time. In a landscape of metaphors, amidst metaphors of landscape, the meaning of progress eludes easy analysis. Our future is constructed within the shifting space of time. This essay imagines an alternate journey, one that explores the terrain that separates the life of an individual from the destiny of Australia Unlimited; a journey that carries us from science, to nation, to citizen, venturing unsteadily along the boundary between hope and fear. If the topography remains unclear, the scale awry, we might at least hope to chart a few reference points along the frontiers of the future.

All this paraphernalia

In July 1909, the Minister for External Affairs, Littleton Groom, introduced legislation for the Commonwealth takeover of the Northern Territory. Groom, a methodical and well-educated liberal MP from Queensland, briefly surveyed the history of the Territory and presented to the House 'a few opinions of practical men', all of whom were optimistic about the region's potential. '[W]e have there', Groom concluded, 'some of the finest land in Australia'. Nonetheless,

⁴ *ibid.*, p. 53.

it was clear that the Territory's 'latent resources' would not be extracted without effort. The investment of capital and a dramatic increase in population were essential, but so too was an increase in knowledge. 'We are every year acquiring a better knowledge of our natural conditions and a better understanding of the laws of production', Groom argued. It was through such an understanding, he continued, that 'much of the land which is now despised will ultimately become very productive'. Where would this knowledge come from? Groom looked to a scientific agency whose establishment he had advocated since his entry into politics—a Federal Bureau of Agriculture.⁵

Littleton Groom embodied much of the spirit of 'new liberalism', or 'progressive liberalism' as he termed it.⁶ By the late 19th century, traditional laissez faire policies seemed increasingly impotent in the face of growing threats to social cohesion and unparalleled opportunities for accelerated development. Responding to this challenge, new liberals sought to wield the power of the state to claim progress as their own, to enrich the character of their citizens, and to ensure the prosperity of their nation.⁷ 'I want to see the individual and individuality developed to the full', Groom argued, and wherever the state 'can be used for the purpose of doing good for the people as a whole, then I believe in the State exercising its powers accordingly'.⁸ It was a creed carried into the first federal parliament under the banner of protectionism, defended most eloquently by Groom's friend and colleague, Alfred Deakin.

The idea of a federal bureau to foster agricultural improvement was emblematic of the new liberals' cause, a clear example of how government could employ 'direct agencies' in the manufacture of progress.⁹ Fashioned after the US Department of Agriculture, the proposed Australian bureau was expected to coordinate scientific investigations and collect 'the very best and latest information' for dissemination to primary producers.¹⁰ Such 'intelligent legislation', Groom maintained, brought 'greater liberty' to the farmer, while

⁵ *Commonwealth Parliamentary Debates (CPD)*, vol. 50, 30 July 1909, pp. 1878–1891. For more on Groom see: Jessie Groom, *Nation Building in Australia: The Life and Work of Sir Littleton Ernest Groom*; David Carment, 'Groom, Sir Littleton Ernest'.

⁶ *Toowoomba Chronicle*, 21 Nov. 1906. For an examination of Groom's liberalism see David Carment, 'The Making of an Australian Liberal: The Political Education of Littleton Groom, 1867–1905'.

⁷ Rather than a comprehensive political doctrine, 'new liberalism' represented a constellation of ideas that also appeared under banners such as 'progressivism' and 'national efficiency'. See: Michael Roe, *Nine Australian Progressives: Vitalism in Bourgeois Social Thought, 1890–1960*, pp. 1–20; Tim Rowse, *Australian Liberalism and National Character*, pp. 38–9; John Docker, *The Nervous Nineties: Australian Cultural Life in the 1890s*, pp. xvii–xx. For more on the relationship with science, see Roy MacLeod, 'Science, Progressivism and Practical Idealism: Reflections on Efficient Imperialism and Federal Science in Australia 1895–1915'.

⁸ *Toowoomba Chronicle*, 21 Nov. 1906.

⁹ *Toowoomba Chronicle*, 29 August 1901.

¹⁰ *CPD*, vol. 2, 28 June 1901, pp. 1827–31.

also boosting the country's productive capacity.¹¹ Both individual and nation would grow. Deakin, who himself had made a special study of irrigation, was a keen supporter of the measure, as were a number of other prominent protectionists.¹² Isaac Isaacs argued passionately: 'All this paraphernalia ... is only the gold lace of the Constitution, unless we can make of it an engine for the promotion of the material, moral, and social welfare of the people'.¹³

The Bureau of Agriculture was invested with many of the attributes of an ideal, progressive society. Scientist and farmer would work together, melding knowledge and practice, intellect and endeavour. Their cooperative efforts promised both an enlightened citizenry and a wealthy nation. This presumed interdependence and its implicit sense of balance was at the core of Groom's liberalism. He quoted approvingly the Victorian Director of Education's assessment that an 'ideal education' concerned itself with 'physical fitness', 'mental fitness' and 'moral fitness'. 'So it was with national life', Groom added, 'Industrial and intellectual capacity must be developed'. The nation's greatest resources, he argued, lay in 'the hand power, the brain power and the heart power of our manhood and womanhood'.¹⁴ There was no simple formula for progress. It was a property both of individuals and of nations. In a good society the two were closely linked, proceeding apace. But this could be achieved only through a complex set of balancing acts, by constantly tweaking the levels of authority and freedom, duty and reward, ideals and practice, knowledge and control.

The modern hayseed

The life and work of Littleton Groom was memorialised by his widow Jessie, in a biography she compiled under the title, *Nation Building in Australia*.¹⁵ A tad grandiose, but the title perhaps speaks more of Groom's compelling sense of duty than it does of posthumous puffery. 'Nation building' was a commitment, an act of service, a life to be lived, not a victory to be won. However, the title also makes reference to one of the most significant periods in Groom's political life. From 1905–8, he served as a minister in Alfred Deakin's protectionist government. Although they were a parliamentary minority with a fragile hold on power, Deakin's protectionists nonetheless embarked upon an ambitious legislative program that did much to define the nature of Australian federalism.¹⁶

¹¹ Quoted in Groom, *Nation Building*, p. 56.

¹² For Deakin's interest in irrigation see: J. A. La Nauze, *Alfred Deakin – A Biography*, vol. 1, pp. 84–6; Walter Murdoch, *Alfred Deakin – A Sketch*, pp. 92–7. In 1901, John Quick noted that beside himself, William Groom (Littleton's father), Alfred Deakin (Ballarat), Hugh McColl (Echuca) and Allan McLean (Gippsland) had all campaigned on the issue, *CPD*, vol. 2, 28 June 1901, pp. 1827–8.

¹³ *CPD*, vol. 2, 12 July 1901, p. 2507.

¹⁴ *Toowoomba Chronicle*, 5 November 1906.

¹⁵ Groom, *Nation Building*.

¹⁶ J. A. La Nauze, *Alfred Deakin – A Biography*, vol. 2, pp. 407–8.

The achievements of this administration were eulogised by Groom himself in a pamphlet also entitled 'Nation Building in Australia'. It was a phrase that linked the personal and the political, a citizen's duty and a country's destiny.

As Minister for Home Affairs, and later Attorney-General, Groom contributed significantly to the government's tally of 'practical legislation'. But his achievements in areas such as meteorology, statistics and bounties were intended as part of a broader system of institutions and legislation, designed to manage Australia's productive resources through the rational application of scientific knowledge. At the heart of this system he imagined his Bureau of Agriculture.¹⁷ With Australia's economy heavily dependent upon primary industry, Groom argued that the establishment of such a bureau could 'be justified on financial considerations alone'.¹⁸ Not only would existing farms be made more efficient, the frontiers of land settlement would be advanced. Immigrants would be rallied to Australia's great nation-building crusade, inspired by the government's support for small landholders.¹⁹

But there was also a moral dimension to the promise of agricultural improvement. 'We may trust the cupidity of mankind to develop our mineral resources', Deakin remarked pointedly, 'but agricultural, pastoral, and kindred pursuits need the superintending and assisting help of the States and of the Commonwealth'.²⁰ Agriculture was not just about profit. Isaac Isaacs had argued for the need to 'liberalise' agriculture, 'to raise it to a level higher than it has ever occupied before, to give it a dignity, a worth and a profit which may raise the Australian nation in the whole scale of civilization'.²¹ The application of science promised to 'elevate' agriculture and its practitioners.²² No more would the farmer be figure of ridicule, a 'clodhopper', a 'hayseed'.²³ On the contrary, Deakin argued, 'The modern "Hayseed" is an up-to-date, keenly alive businessman, whose study is how to make the best of a small area with limited means but unlimited intelligence'.²⁴

Science was a potent addition to the regenerative elixir of frontier life. The idea that a new 'type' of man was being created at the nexus of European civilisation and Australian environment had gained considerable currency, infused by progressive assumptions about the benefits of rural living and the role of the

¹⁷ For example, see Groom's speech on the Bounties Bill, *CPD*, vol. 36, 23 July 1907, p. 776.

¹⁸ *CPD*, vol. 50, 3 August 1909, p. 1928.

¹⁹ For example: Rodgers (Wannon), *CPD*, vol. 70, 16 September 1913, p. 1261; Patten (Hume), *CPD*, vol. 72, 12 December 1913, p. 4249.

²⁰ *CPD*, vol. 58, 6 October 1910, p. 4215.

²¹ *CPD*, vol. 2, 12 July 1901, p. 2507.

²² For example: Senator McColl, *CPD*, vol. 52, 15 October 1909, p. 4603.

²³ *CPD*, vol. 52, 14 October 1909, p. 4521.

²⁴ *CPD*, vol. 59, 23 November 1910, p. 6589.

frontier in the formation of national character.²⁵ Edwin Brady warned that the land's 'ancient lineage forbids the familiarity of the unworthy', and welcomed its 'paradoxes and difficulties' as a test of Australia's physical and mental prowess.²⁶ The establishment of a Bureau of Agriculture was a response to this continental challenge, offering further improvement of the Australian type through a reinvigorated assault on the vicissitudes of frontier existence. Groom quoted approvingly US President Roosevelt's assessment, that as well as creating wealth, his own department must aim 'to foster agriculture for its social results ... to assist in bringing about the best kind of life on the farm for the sake of producing the best kind of men'.²⁷

But in the transfigurative furnace of frontier life, both man and land were forged anew. Just as Groom had looked to a future when the 'despised' lands of the Northern Territory would be revealed in their true productive glory, so other supporters of the Bureau of Agriculture believed that the accumulation of knowledge would ultimately redeem lands now defamed as 'desert'.²⁸ Deakin described the transformation wrought upon the desert plains of the United States, arguing that the answer was not simply irrigation, but intelligence: 'Brains pay better than water, and brains are making farming pay to-day'. Australia's 'hope', he continued, 'lies in those enormous tracts which have yet to be brought into the service of man and made productive of wealth for the whole community'.²⁹ Australia's 'Dead Heart', Brady proclaimed memorably, was in fact a 'Red Heart' destined to 'pulsate with life'.³⁰ Brain and heart, mind and matter, man and nature – the golem of progress would arise, moulded from the continent's red soil, in the image of the 'modern hayseed'.

Groom imagined a nation made strong through the accumulation of knowledge and the occupation of land. The frontiers of science and of settlement would be brought into alignment by his Bureau of Agriculture, thence to move forward in their inexorable conquest of the continent. Australia's 'emptiness' was no longer simply a location for scientific research, it was itself an object for study and transformation. 'Altogether, a great realm of exploration lies open to us', proclaimed Prime Minister Joseph Cook, introducing legislation for the Bureau in 1913: 'A whole vista of duties and potentialities opens up when inquiry is

²⁵ Richard White, *Inventing Australia*, pp. 63–84; Graeme Davison, 'Frontier', pp. 269–70. See also: Roe, *Nine Australian Progressives: Vitalism in Bourgeois Social Thought, 1890–1960*, pp. 68–70; Brigid Hains, 'Mawson of the Antarctic, Flynn of the Inland: Progressive Heroes on Australia's Ecological Frontiers'.

²⁶ Brady, *Australia Unlimited*, p. 636.

²⁷ *CPD*, vol. 50, 3 August 1909, p. 1929.

²⁸ For example: Fenton (Maribyrnong), *CPD*, vol. 58, 6 October 1910, p. 4217; Patten (Hume), *CPD*, vol. 72, 12 December 1913, p. 4251.

²⁹ *CPD*, vol. 59, 23 November 1910, p. 6590.

³⁰ Brady, *Australia Unlimited*, p. 630.

made as to what there is to be done in Australia'.³¹ A new wave of discovery and possession was gathering momentum. 'Little now remains for the geographical explorer to do', Brady argued, 'but for the scientific investigator there is still an almost limitless field in Australia'.³² Time and space were traded along the frontiers of the future. Science gained space, a 'vista of potentialities' to explore and conquer. The land, in return, won a sense of inevitable fulfilment – the gift of time, the power of destiny.

The battle of Australia

The campfire was slowly dying, as was the dream. Edwin Brady continued to ponder the Northern Territory's future, but the sounds of progress filling his thoughts gradually yielded to the insistent 'tramp of young Australian feet at drill'. Instead of 'clinking' harvesters, he now heard 'the wireless keeping watch by night and day'; instead of rumbling freight trains there was the sound of 'scouting aeroplanes coming home to their military hangars'. As the embers crumbled to ash, Brady concluded his campfire devotions, looking up at the stars 'glittering like bayonet points' and offering a prayer to the 'God of Nations and of Battles' that 'this Northern State-to-be might put her young feet upon the paths of Destiny ... in peace'.³³ Brady's hymn of the future was scored to a martial beat; Australia's unlimited future could be assured only through determined vigilance and resolute defence.

Australia Unlimited was a 'Book with a Mission', not merely to sell Australia, but to save it. 'A mere handful of White People', perched uncomfortably near Asia's 'teeming centres of population', could not expect to maintain unchallenged ownership of the continent and its potential riches, the book's prospectus warned.³⁴ Even as Australia was beginning to enjoy the first fruits of nationhood, its legitimacy, its very existence, seemed imperilled. Australia's 'empty north' was widely perceived as an open door to potential Asian aggressors.³⁵ The Deakin government was keen to remedy this vulnerability, and its move to assume control of the Northern Territory was justified both in terms of development and security. 'We have in the north a rich, fertile country', Groom argued, introducing the legislation, 'and ... that Territory, as it is to-day, especially in relation to other nations, is a menace to the Commonwealth'.³⁶

Offering both the promise of riches and the threat of invasion, northern Australia revealed the complexities of nation building – development and defence were closely entwined. The problem with the Northern Territory, Groom explained,

³¹ CPD, vol. 70, 5 September 1913, pp. 933, 935.

³² Brady, *Australia Unlimited*, p. 53.

³³ *ibid.*, p. 571.

³⁴ Copy of prospectus (undated) contained in NAA: A659/1, 1943/1/3907.

³⁵ David Walker, *Anxious Nation: Australia and the Rise of Asia 1850–1939*, pp. 113–126.

³⁶ CPD, vol. 50, 30 July 1909, p. 1880.

was that it remained 'unmanned'.³⁷ But 'manning' the country was not simply a matter of numbers. What was required was 'effective' occupation, 'by a people who are applying their energies and industry to developing the resources of the country'.³⁸ Only when settled by sturdy, hardworking landholders would the north be made both productive and secure. With its promise to improve the quality and efficiency of rural life, science appeared ready and able to bulwark the nation's defensive frontiers. The Bureau of Agriculture was an essential part of a system aimed at developing a strong, self-contained nation. Moreover, as part of a well-balanced civic education, science rounded out the armoury of Australia's 'citizen soldiery'. The nation's best defence, Groom argued, lay in 'the ideal of the intelligent proprietor of the land defending his own country'.³⁹

But defence meant more than just preparedness. Australia's progress had to be won in an ongoing contest of legitimacy, with battles raging along the frontiers of race, land, identity and occupation. Groom's 1901 election campaign was energised by his detailed and passionate advocacy of the principle of 'White Australia'. Quoting C. H. Pearson on the dangers of Asian immigration and the threat of racial degeneracy, he warned his electors 'we are not fighting the battle of Australia alone, ...we are fighting the battle of civilised Europe'.⁴⁰ Australia was seeking to defend, not only its land, but its integrity as a civilised nation. Fears of infiltration, contamination and degeneration constantly pricked at the confidence of White Australia, reflected in Commonwealth action to enforce quarantine and eradicate topical diseases.⁴¹ Groom's Bureau of Agriculture was justified as a means of defence against the pests and diseases, which 'have no respect for the border lines marked on our maps'.⁴² It was in the denial of borders, the negation of boundaries, that Australia's dissolution threatened. The battle for racial integrity was both personal and national, moral and martial. 'Can you allow your children to blend their blood with that of the alien races?', Groom asked, 'Can you imagine anything more pathetic than sad-looking almond eyes peeping out of the Caucasian faces?'⁴³

But the very notion of integrity, the fearfully imagined borders of White Australia, were themselves a denial of Aboriginal presence. The 'waste' and the 'emptiness' that Groom hoped to dispel through the application of science, were

³⁷ CPD, vol. 50, 30 July 1909, p. 1880.

³⁸ *ibid.*

³⁹ *Toowoomba Chronicle*, 21 November 1906.

⁴⁰ *Toowoomba Chronicle*, 29 August 1901. For more on the influence of Pearson, see: Walker, *Anxious Nation: Australia and the Rise of Asia 1850–1939*, pp. 45–9; Roe, *Nine Australian Progressives: Vitalism in Bourgeois Social Thought, 1890–1960*, pp. 17–18.

⁴¹ Alison Bashford, 'Quarantine and the Imagining of the Australian Nation'; see also Walker, *Anxious Nation: Australia and the Rise of Asia 1850–1939*, pp. 141–153.

⁴² *Toowoomba Chronicle*, 10 December 1903.

⁴³ *Toowoomba Chronicle*, 29 August 1901. On fears of miscegenation, see: Walker, *Anxious Nation: Australia and the Rise of Asia 1850–1939*, pp. 181–193.

constructed out of a lingering sense of unease and illegitimacy.⁴⁴ With its offer of life and renewal, science helped to legitimate possession, demonstrating the inevitability of civilised conquest. There was a place for Aboriginal people in this modern world, but it was not on the land. Opening the science section of the Austral Festival in Toowoomba, Groom noted that while the region's 'native tribes' were virtually extinct, some of their weapons remained. He suggested that 'out of love and respect for the black races that were passing away' such implements should be preserved 'as an historical lesson ... as to the weapons of those who preceded civilisation' and as a 'permanent memorial'.⁴⁵ With Aboriginal people apparently consigned to the museum showcase, it was the land itself that had to be subdued. Brady imagined the coming breed of farmers, 'with library and laboratory behind them', as a 'silent conquering army': 'Led by the shining spirit of William Farrer, this Army of Invasion is preparing its assaults upon the outstanding citadels of Nature'.⁴⁶

Frontiers are uneasy places, juxtaposing the known and the unknown, civilisation and nature, us and them. Around and through the markers of geography, the imagined borders of knowledge and possession create place from race, gender and time. The splendour of nation is revealed against the dark, looming shadow of otherness. Unthinkingly we talk about the future in terms of our fears and our hopes, rarely pausing to consider how the two are related. Groom's vision of progress, his mission to create a prosperous and fulfilling future through the application of science, encompassed both development and denial. Progress was both a triumphant quest for improvement and a fearful battle against the spectre of degeneration and dissolution. It is this tension that gives progress its power. The oppositions and dichotomies of frontier imagining energised the process of nation building, expanding the bubble of time to create a space into which the future could unfold.⁴⁷ But this act of creation proceeds by destruction, obliterating alternatives. For Groom and Deakin the development of the north was both a fulfillment of destiny, and a vital necessity. There was no choice. Progress uses its own internal tensions to make itself seem natural, necessary, inevitable.

Blast the bush

Len Beadell was leading a survey party through the mulga scrub of central South Australia, when he came across something unusual, even unnerving. 'It was

⁴⁴ Tom Griffiths, *Hunters and Collectors: The Antiquarian Imagination in Australia*, p. 187; Walker, *Anxious Nation: Australia and the Rise of Asia 1850–1939*, pp. 12, 113ff.

⁴⁵ *Toowoomba Chronicle*, 7 November 1906.

⁴⁶ Brady, *Australia Unlimited*, pp. 286–7.

⁴⁷ Deborah Bird Rose describes the 'hand of destruction' and the 'hand of civilisation' that shape the space-time of the frontier, see Deborah Rose, 'The Year Zero and the North Australian Frontier', pp. 19–20; Deborah Bird Rose, 'Hard Times: An Australian Study', pp. 12–15.

almost like a picket fence', he described, with posts made from 'slivers of shale'. Being in such an isolated location, he decided 'it was obviously an ancient Aboriginal ceremonial ground built by those primitive, stone-age nomads in some distant dreamtime' – an Aboriginal 'Stonehenge'. As he scrabbled in the dust, searching for a piece of charcoal that might be used to fix this eerie structure in time, Beadell pondered the 'ironic clash of old and new': 'only a few short miles away the first mighty atomic bomb ever to be brought to the mainland of Australia was to be blasted into immediate oblivion ... and it was by-products of this very weapon which could be used for determining the age of the charcoal from these prehistoric fires'.⁴⁸ Beadell's expedition had set out from the British atomic test site at Emu Field, searching for a permanent testing range – one that would become known as 'Maralinga'.⁴⁹ It was 1953, and something new was coming.

The 'clash of old and new', the sense of disjunction, was a familiar characteristic of frontier experience. But with the coming of the atomic bomb, the sense of 'newness' seemed to have become more acute. The destruction of Hiroshima was revealed unto a shocked world as the harbinger of a new age – the 'atomic age'. Media reports talked about 'new vistas', a 'new era' in world affairs, a 'revolution' in daily life.⁵⁰ The atomic bomb, Clem Christesen wrote in *Meanjin*, had 'severed the old world from the new with guillotine-like decisiveness'.⁵¹ Most importantly, the world faced new challenges, for the atomic age carried grave implications for the future of humanity. It was a 'turning point', 'perhaps the most solemn turning point of all history', Rev. Dr C. N. Button warned his Ballarat congregation: 'Humanity is at the crossroads'.⁵²

The *Sydney Morning Herald* relayed the news from Hiroshima under a pair of significant subheadings: 'Terrifying New Weapon' and 'Big Possibilities In Peace'.⁵³ The 'good' atom/'bad' atom routine dominated much public understanding of this mysterious technology.⁵⁴ It was a formula popularly represented in the image of the atomic crossroads, placing humanity at a fork

⁴⁸ Len Beadell, *Blast the Bush*, pp. 173–6. Radiocarbon dating was one of the products of the atomic age, see: Griffiths, *Hunters and Collectors: The Antiquarian Imagination in Australia*, pp. 86–94.

⁴⁹ Twelve full-scale atomic tests were conducted at three sites – the Monte Bello Islands, Emu Field and Maralinga – between 1952 and 1957. For an official history (with all that entails) see: Lorna Arnold, *A Very Special Relationship: British Atomic Weapon Trials in Australia*. For more critical appraisals see: Robert Milliken, *No Conceivable Injury: The Story of Britain and Australia's Atomic Cover-Up*; Tim Sherratt, 'A Political Inconvenience: Australian Scientists at the British Atomic Weapons Test, 1952–3'.

⁵⁰ *Argus*, 5 June 1946, p. 7; *SMH & Argus*, 8 August 1945, p. 1.

⁵¹ Clem Christesen, 'Editorial'.

⁵² C. N. Button, *God, Man, and The Bomb*, p. 8.

⁵³ *SMH*, 8 August 1945, p. 1.

⁵⁴ For US experience, see: Paul Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, pp. 109–30; Spencer Weart, *Nuclear Fear: A History of Images*, pp. 170–182.

in the road of destiny, with a signpost pointing one way to destruction and the other to progress. Which was it to be, apocalypse or utopia? There was no escaping; it was time to choose. The assumed imminence of the crossroads, the disjunctive dynamic of the atomic age, obscured much of its familiarity. Like the frontier, the crossroads gained its metaphorical power from the conjunction of opposites. The wonders of a techno-utopia shone invitingly amidst the menacing gloom of atomic obliteration. But there was no choice. The signpost to destruction was a warning, a lesson to be learnt. Just as it had in Groom's plans for northern development, progress in the atomic age used the threat of dissolution to charge itself with the force of destiny. Both imagined a future fulfilled through the accumulation of space, whether by the inexorable expansion of Australia's frontiers, or by a continuing march along the road to atomic nirvana. Both offered a journey from which there was no turning back.

In the glare of an atomic explosion, Len Beadell imagined, the mulga scrub around him would instantly 'come to life'.⁵⁵ At the dawn of this 'new' age, the image of vast expanses of idle and wasted land, silently awaiting the transforming power of science, continued to evoke enthusiasm. As Britain's readied its big bang at Emu Field, the *Sunday Herald* keenly anticipated the moment when the 'inland silence that remained unbroken for ages' would be 'shattered' by the bomb. Australia's desert lands had found a new destiny, for 'the very poverty of these areas in surface resources made them valuable in the atomic field, either as a storehouse of uranium riches or as the kind of waste land where experiments can be most safely conducted'.⁵⁶ Ivan Southall described the Woomera rocket range, established some years earlier, as an 'open-air laboratory': 'one of the greatest stretches of uninhabited wasteland on earth, created by God specifically for rockets'.⁵⁷

Even as rockets were being propelled into 'space' (the final frontier), science presented the land with yet another chance for renewal. Woomera and the atomic tests brought science and land together with a familiar mix of imperial loyalties and national self-interest, development and defence. The Minister for Supply, Howard Beale, sought to justify the establishment of the Maralinga range by portraying it as 'a challenge to Australian men to show that the pioneering spirit of their forefathers who developed our country is still the driving force of achievement'.⁵⁸ These new pioneers had the opportunity to contribute to the deterrent power of the free world, while possibly winning Australia access to

⁵⁵ Beadell, *Blast the Bush*, p. 8.

⁵⁶ *Sunday Herald*, 4 October 1953.

⁵⁷ Ivan Southall, *Woomera*, p. 3. For the history of Woomera, see: Peter Morton, *Fire Across the Desert: Woomera and the Anglo-Australian Joint Project 1946–1980*.

⁵⁸ Quoted in Milliken, *No Conceivable Injury: The Story of Britain and Australia's Atomic Cover-Up*, p. 93.

the secrets of the atomic age. Distorted echoes of Deakin's 'citizen soldiery' rang down the years, charged with imminence of the crossroads challenge.

Australia Unlimited Ltd

In June 1957, the *Sydney Morning Herald* published the first in an annual series of supplements surveying 'the great endeavours and achievement of Australian commerce and industry in the postwar years and the fabulous promise of future national development'. The supplements were titled *Australia Unlimited*. Edwin Brady would have been pleased by the overwhelming sense of optimism that suffused every page. 'Confidence', the supplement declared, was the 'theme for the future'.⁵⁹ It was a confidence born of postwar reconstruction, economic expansion, and a rise in the standard of living, but it was nourished also by a belief in the generative power of science and technology. The Chairman of CSIRO, Ian Clunies Ross, provided something of a keynote in his observation that 'there are no problems so great that they cannot be solved once we marshal our resources for a resolute and sustained attack on them'.⁶⁰ Clunies Ross's 'faith', the supplement concluded, 'articulates the endeavours of the planners and makers of Australia's future'.⁶¹

The Minister for Primary Industry, Billy McMahon, praised the work of Australia's 'modern explorers', the 'scientists and scientifically minded farmers', who were 'rolling back our farm horizons' and revealing our 'unlimited' opportunities.⁶² He invoked a familiar catalogue of hopes, but one that was charged with an increasingly powerful sense of expectation. Attempting to define the 'newness' of the atomic age, the nuclear physicist Ernest Titterton suggested that 'the funeral pyre of Hiroshima' was 'the symbol of an era in which science has become so important in our lives that all decisions, including political ones, must be made with scientific considerations in mind'.⁶³ No nation, it seemed, could afford to ignore the implications of science. The power of science was the power of the bomb, the ability to change the world, to bring down the guillotine on the past, to erect the signposts at the crossroads of destiny. Progress, science and atomic energy were virtual analogues, each brought the promise of a future transformed.

Old dreams were invested with new hope. Atomic energy would power the reclamation of Australia's 'great spaces'.⁶⁴ The Chairman of the Australian Atomic Energy Commission, J. P. Baxter, described the possibility of 'package power stations' to serve 'the remoter parts of the continent', particularly those

⁵⁹ 'Australia Unlimited Supplement', *SMH*, 19 June 1957, p. 1.

⁶⁰ *ibid.*, p. 28.

⁶¹ *ibid.*, p. 1.

⁶² *ibid.*, p. 24.

⁶³ E W Titterton, *Facing the Atomic Future*, p. 4.

⁶⁴ 'Australia Unlimited Supplement', *SMH*, 19 June 1957, p. 16.

whose mineral wealth 'will demand exploitation'.⁶⁵ Uranium offered a solution at last to Australia's 'empty north', propelling the nation into a new phase of 'pioneering'.⁶⁶ The mining and processing of this mysterious metal, it was argued, would give 'the economic life of the Territory the transfusion of new blood it needs'.⁶⁷ Progress was represented not only by the Rum Jungle uranium mine, but by the modern town of Batchelor, created specifically for miners and their families. Opening the project, Prime Minister Menzies declared it 'something of a miracle'. 'Not long ago', he continued, the Northern Territory had seemed 'almost worthless': 'But the history of Australia is the history of converting people from despair to hope and from hope to achievement'. With the discovery of uranium, the north seemed destined to host 'one of the great communities of Australia'.⁶⁸

Edwin Brady always intended to write a sequel to *Australia Unlimited*, and if he had lived a few years longer, one could imagine him poring over accounts of the Rum Jungle project, thinking back to that campfire and his dreams of progress.⁶⁹ But there was something rather different about this new style of pioneering. The town of Batchelor, with its individually styled family homes and its remarkable range of 'comforts and amenities', had brought suburban living to the frontier.⁷⁰ More importantly, its inhabitants were not sturdy landholders working their properties, but wage earners, employees of Consolidated Zinc Pty Ltd. *The Sydney Morning Herald's* version of *Australia Unlimited* was not the story of hardworking individuals creating national progress out of their own instinctive drive for improvement. In the wake of the Manhattan Project, the scale of progress had changed dramatically, represented now by huge developmental projects that married government-supplied infrastructure with foreign investment and expertise.⁷¹ Progress was measured not in the sweat of the yeoman farmer, but in the profits of large multinational companies.

The Liberal Party went before the electors in 1958 emphasising its achievements in national development and its success in attracting foreign capital.⁷² 'Our slogan is "Australia Unlimited"', Menzies asserted, 'and we pronounce it with

⁶⁵ *ibid.*

⁶⁶ 'Australia Unlimited Supplement', *SMH*, 19 June 1957, p. 10. See also: Alice Cawte, *Atomic Australia: 1944–1990*, pp. 64–95; Noel Saunders, 'The Hot Rock in the Cold War: Uranium in the 1950s'.

⁶⁷ *National Development*, no. 1, October 1952, p. 13.

⁶⁸ *SMH*, 18 September 1954, p. 3.

⁶⁹ Brady's hopes for further volumes and revisions of *Australia Unlimited* are documented in Series 10, Brady Papers, NLA MS 206.

⁷⁰ D. E. Burchill, 'Rum Jungle Uranium Field – Building the Township of Batchelor'; *SMH*, 23 September 1954, Womens Section p. 7. See also: Noel Saunders, 'The Hot Rock in the Cold War: Uranium in the 1950s', pp. 155–69.

⁷¹ Lenore Layman, 'Development Ideology in Western Australia, 1933–1965', pp. 235, 258–60; Lenore Layman, 'Development'.

⁷² Marian Simms, *A Liberal Nation: the Liberal Party & Australian Politics*, p. 58.

confidence'.⁷³ The campaign theme was highlighted by a tour of key projects and facilities, including the opening of Australia's first nuclear reactor at Lucas Heights.⁷⁴ But behind the confidence of 'Australia Unlimited' lurked a new fear. Electors were urged, not to make, but 'to conserve the forces of progress'.⁷⁵ As the security enclosures at Rum Jungle and Lucas Heights demonstrated, while individuals had seemingly lost the power to create progress, they had somehow gained the ability to threaten it.

A change of heart

The war, when it came, only lasted for a month, but that was long enough. All life was quickly extinguished in the northern hemisphere, and the clouds of deadly radioactive fallout gradually diffused to shroud the whole globe. For the people of Australia, it was a lingering, drawn out journey to oblivion. Nevil Shute's apocalyptic novel *On the Beach* was published the same year as the first *Australia Unlimited* supplement. Its theme was not confidence, but fear, resignation and confusion. There was a new threat from the north, invisible and unstoppable. 'It's going to go on spreading down here, southwards, till it gets to us?', Moira asks, 'And they can't do anything about it?' 'Not a thing', replies Commander Dwight Towers, 'It's just too big a matter for mankind to tackle. We've just got to take it'.⁷⁶ All they can do is wait helplessly for their own death. In this final act of surrender the people of Australia are united with the rest of humanity: one world or none.

Just as atomic power promised to conquer Australia's vast spaces, so the bomb seemed poised to obliterate national boundaries. There would be no winners in an atomic war. G. V. Portus from the University of Adelaide argued that the 'only defence of the world against the threat of atomic warfare is political defence', and called for the 'abandonment' of the 'out-of-date' concept of national sovereignty.⁷⁷ Some looked with hope to the newly formed United Nations and its attempts to negotiate a system of control, but the UN Atomic Energy Commission soon descended into deadlock.⁷⁸ Others sought more radical solutions, inspired by Einstein and his declaration in favour of world government.⁷⁹ But the political fallout from our atom-bombed world soon settled,

⁷³ *Australian Liberal*, vol. 2, no. 1, November 1958, p. 1.

⁷⁴ An occasion celebrated by the *SMH* with yet another supplement, the 'Australian Nuclear Research Establishment Feature', 18 April 1958.

⁷⁵ Liberal Party of Australia, *Australia Unlimited! A Nation on the March*.

⁷⁶ Nevil Shute, *On the Beach*, pp. 39–40.

⁷⁷ Kerr Grant and G. V. Portus, *The Atomic Age*, pp. 16, 23–4.

⁷⁸ Joseph I. Lieberman, *The Scorpion and the Tarantula: The Struggle to Control Atomic Weapons, 1945–1949*. For Australian involvement see: Tim Sherratt, 'A Physicist Would Be Best Out of It: George Briggs and the United Nations Atomic Energy Commission'.

⁷⁹ *SMH*, 29 October 1945. See also: Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, pp. 33–45.

and the divisions became clear again. In this new age of oxymorons, war was cold, and the bomb was a weapon of peace.

The Cold War pushed Australia's defensive frontiers ever northward, as the concept of 'forward defence' emerged to contain the threat of communism.⁸⁰ 'We must, by peaceful means extend the frontiers of the human spirit', Menzies proclaimed, 'We must, by armed strength, defend the geographical frontiers of those nations whose self-government is based upon the freedom of the spirit'.⁸¹ Menzies invoked the prospect of a looming third world war to justify his government's defence preparation program, but increasingly Australia sought security in treaties and alliances, rather than men and guns.⁸² The nation's defence was to be assured through the graces of its powerful friends, rather than the character of its citizen soldiery. Just like the characters in *On the Beach*, Australians were left to ponder a threat that they barely understood, and against which they could do very little.

But even as the frontiers of Australian security expanded, so they rebounded inwards, enclosing hearts and minds in an ever tighter grip. Long-held fears of infiltration were revived, with communism identified as a domestic as well as an international threat. Agents of the enemy were amongst us. The circumstances of the bomb's creation and use focused much of this anxiety on the myth of the 'atomic secret'.⁸³ The CSIR, with its modest atomic energy program, proved a favourite target for political opportunists.⁸⁴ Not only was it believed to be harbouring communists, its Chairman, David Rivett, had the temerity to suggest that good science entailed the free and open interchange of information.⁸⁵ To prove their security credentials at home and abroad, both Labor and Liberal governments cranked up the legislative apparatus, providing new levels of protection for defence 'secrets', and creating new agencies to monitor the threat within.⁸⁶ The common citizen was no longer the nation's guarantee of security, but a potential weak link in its defensive perimeter.

It was, perhaps, human weakness that was most glaringly exposed by the bomb blast over Hiroshima. Even as the world marvelled at this new conquest of the forces of nature, they wondered if humanity had the maturity and wisdom to control it. 'It is a challenge to the conscience of man', the *Argus* considered, 'to

⁸⁰ Lachlan Strahan, 'The Dread Frontier in Australian Defence Thinking'.

⁸¹ Quoted in *ibid.*, p. 162.

⁸² Geoffrey Bolton, *The Middle Way*, pp. 79–80.

⁸³ For some cultural antecedents, see: Weart, *Nuclear Fear: A History of Images*, pp. 55–74. See also: Saunders, 'The Hot Rock in the Cold War: Uranium in the 1950s'.

⁸⁴ Phillip Deery, 'Scientific Freedom and Postwar Politics: Australia, 1945–55'; Jean Buckley-Moran, 'Australian Scientists and the Cold War'.

⁸⁵ Rohan Rivett, *David Rivett: Fighter for Australian Science*, pp. 1–14.

⁸⁶ Frank Cain, 'An Aspect of Postwar Australian Relations with the United Kingdom and the United States: Missiles, Spies and Disharmony'; Frank Cain, *The Australian Security Intelligence Organization: An Unofficial History*, p. 30ff.; David McKnight, *Australia's Spies and their Secrets*, pp. 6–48.

ponder gravely whether his intellectual achievements have not outrun his moral perceptions'.⁸⁷ The 'crossroads of destiny' had brought a 'moral test' upon the world; science demanded 'a change of heart'.⁸⁸ And there was no time to get your breath back. Bomb tests followed bomb tests, and then the Russians had it, and so the Americans built the H-bomb, and there were more tests ... The frontiers of science were running ahead, pushing ever deeper into unknown territory, leaving the world gasping, trying to catch up. In April 1954 a distinguished panel of speakers considered the latest menace under the title 'The H-Bomb – A Challenge to Humanity'. Canon E. J. Davidson proclaimed: 'Our civilisation stands at the point of decision ... It must conform to the moral order of the universe or perish'.⁸⁹

Each new challenge brought its own sense of urgency, its own restatement of the crossroads choice – change or die. There was no 'turning point', no critical juncture on the road to progress, only constant reminders of our own fallibility and the apparent disconnection of science from the ethical life of humanity. The crossroads offered not the chance to change the future, but to conform to it. We were the 'other', able to occupy the future only through the courtesy of science. The destructive sense of inevitability that the frontier wreaked upon the land and its original inhabitants was turned upon us all. It was humanity itself that threatened progress.

A hapless mess of wreckage and misunderstanding

In May 1999, *The Australian* invited a range of 'well-informed and influential' speakers to examine the question: 'How can we continue to build an open, competitive international economy while ensuring we develop a progressive society?'⁹⁰ The resulting conference was entitled – yes, you guessed it – 'Australia Unlimited', and focused on the dangers and opportunities wrought by the latest in revolutionary forces – globalisation. Something new was here. The forum's major sponsors provided a convenient summary of its themes in their half-page advertisements. Ansett offered 'a world of destinations', Foxtel brought the news of the world to you 24 hours a day, while IBM described the 'treasure trove of products' available on the Web. 'Now it really is a small world', they told us.⁹¹ But globalisation is simply progress rebadged, measured still in the conquest of distance, the colonisation of space. Science and technology continue to bolster its imagined momentum, pushing time beyond its limits, creating the fault-lines of the new.

⁸⁷ *Argus*, 8 August 1945, p. 2.

⁸⁸ *Age*, 1 July 1946, p. 2; *Argus*, 6 July 1946, p. 2.

⁸⁹ *ibid.*, p. 19.

⁹⁰ 'Australia Unlimited' Liftout, *The Australian*, 8–9 May 1999, p. 2; Articles and reports from 1–8 May in the *Australian*.

⁹¹ *The Australian*, 1–2 May 1999, p. 17; 3 May 1999, p. 12; 4 May 1999, p. 16.

Within each Australia Unlimited, there was an attempt to articulate the balance of forces that will ensure continued progress: the interplay of nation and citizen, knowledge and capital, freedom and control. In the latest version it was the balance between the 'two competing imperatives' of 'economic growth and social harmony' that most concerned the movers and shakers.⁹² Stuart Macintyre was the only contributor to comment on the link to Brady and Deakin, noting that 'the principal object of Australian policy in the early years of the century was not the economy or social justice but the nation'.⁹³ It was a point lost on most forum participants, who imagined progress to be found in the maintenance of a healthy, global economy. Nations are not built; they grow in the rich and fertile environment of globalisation – just keep piling on the manure. But all is not well in this garden of plenty, for the disintegration of social cohesion threatens continued reform. 'Even at a terrible cost to themselves', Dennis Shanahan wrote in his summary of the forum, 'individuals and single nations have the potential to turn the advantages and underpinnings of globalisation against globalisation itself'. Unless governments and corporations can persuade individuals of the benefits of this new age, their 'resistance ... has the potential to ... set off a chain reaction threat to general progress'. The danger is not ideological, resistance derives not from political commitment, but from 'a sense of alienation, envy and resentment'.⁹⁴ The problem is in being human.

In traversing these three versions of Australia Unlimited, it is tempting to imagine a linear narrative, to trace the progress of progress. That is the lie at the heart of this paper. Concepts such as the individual, the nation, even science, are never simple, and are always contested. There is no single stream of progress meandering through time, there are many countercurrents, eddies, backwaters and divergences. The point is not what progress has become, but that it *has* become, and is becoming still. Progress is not a belief, a hope, a naïve aspiration; one that we can in our supposed sophistication simply reject or deny. Within the meaning of progress there are many balances to be negotiated and boundaries to be drawn: a continuing process of accumulation and disjunction that shapes our perceptions of time and our awareness of change.

The process of future-making leaves its traces, and this brief, inconclusive sortie has tried to find the chisel marks in the smooth, worked surface of the new. *Who makes the future?* Groom's idealised citizen seems to have been overtaken by the scientist, and both by the forces of global change, but all are fictions drawn from the battlefields of identity and authority. *Where is the future made?* Spatial metaphors are commonly invoked to illuminate the meaning of time, and so it is that progress is seen to be forged at the frontier, the crossroads, or in the

⁹² *The Australian*, 1–2 May 1999, p. 16.

⁹³ *ibid.*

⁹⁴ 'Australia Unlimited' Liftout, *The Australian*, 8–9 May 1999, pp. 1–2.

networks of globalisation. Movement is taken for granted, we are on a journey, ever onwards. *Is there a choice?* Images of a future under threat, of a menacing otherness, of the imminent danger of annihilation, all work to deny alternatives. We are warned to keep to the main road for our own safety, for the safety of the future. But to understand our options, we have to explore the meaning of our journey, to chart its origins, to look again at the signposts. We have to find the frontiers of our future in our past.

In one of his last journal entries, Alfred Deakin struggled to stay within time: 'Why babble more ... I have shed, once and for all, my past as a whole – my present fruitless – my future a hapless mess of wreckage and misunderstanding'.⁹⁵ His memory was almost gone, so too his words, his life. Groom lived on, but also battled to keep pace with progress. So thoroughly modern in his nation-building enthusiasm, he suffered the ultimate humiliation of being remembered by Robert Menzies as 'old fashioned'.⁹⁶ And Brady? Edwin Brady died in 1952, just short of his 83rd birthday. He spent most of his later years at his camp in Mallacoota, sandwiched between the bush and the sea. He was, he reflected 'perhaps the most successful failure in literary history'. Barely able to make a living, he nonetheless persisted 'in asserting that Australia is the best country in the world'.⁹⁷ Most of his plans had come to nothing. There was no sequel to *Australia Unlimited*, no film version, his hopes for the economic development of East Gippsland had been thwarted, his utopian farming community had failed. 'Should I end up, therefore, on a melancholy note?', he asked. Brady's journey along 'Life's Highway' was coming to an end, but he would not submit to the inevitable, he would not surrender to time. 'I decline to become mournful', he answered, 'I refuse to grow old'.⁹⁸ There is no turning back. Is there?

⁹⁵ Quoted in Murdoch, *Alfred Deakin – A Sketch*, p. 284.

⁹⁶ 'Foreword' in Groom, *Nation Building*, p. vi.

⁹⁷ Edwin James Brady, 'E.J. Brady, by Himself'.

⁹⁸ Edwin James Brady, 'Life's Highway'; extracts from 'Life's Highway' were published in *Southerly* from no. 4, 1954 until no. 4, 1955.

References

- Arnold, Lorna 1987, *A Very Special Relationship: British Atomic Weapon Trials in Australia*, London : H.M.S.O: Available from HMSO Publications Centre.
- Bashford, Alison 1998, 'Quarantine and the Imagining of the Australian Nation', *Health*, vol. 2, no. 4, October 1998.
- Beadell, Len 1976, *Blast the Bush*, Rigby, Adelaide.
- Bolton, Geoffrey 1990, *The Middle Way*, vol. 5, *The Oxford History of Australia*, Oxford University Press, Melbourne.
- Boyer, Paul 1985, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, Pantheon Books, New York
- Brady, Edwin James 1918, *Australia Unlimited*, George Robertson and Company, Melbourne.
- 1949, 'E.J. Brady, by Himself', *Life Digest*, vol. 3, no. 3, June 1949, p. 23.
- 1955, 'Life's Highway', *Southerly*, vol. 16, no. 4, p. 201.
- Buckley-Moran, Jean 1986, 'Australian Scientists and the Cold War', in Brian Martin, et al. (eds), *Intellectual Suppression: Australian Case Histories, Analysis and Responses*, Angus & Robertson, Sydney, pp. 11–23.
- Burchill, D. E. 1955, 'Rum Jungle Uranium Field – Building the Township of Batchelor', *Walkabout*, vol. 21, no. 1, January, pp. 29–33.
- Button, C.N. 1945, *God, Man, and The Bomb*, St Andrews Kirk, Ballarat.
- Cain, Frank 1989, 'An Aspect of Postwar Australian Relations with the United Kingdom and the United States: Missiles, Spies and Disharmony', *Australian Historical Studies*, vol. 23, no. 92, April, pp. 106–202.
- 1994, *The Australian Security Intelligence Organization: An Unofficial History*, Spectrum Publications, Richmond, Vic.
- Carment, David 1977, 'The Making of an Australian Liberal: The Political Education of Littleton Groom, 1867–1905', *Journal of the Royal Australian Historical Society*, vol. 62, no. 4, March, pp. 232–50.
- 1983, 'Groom, Sir Littleton Ernest', in Bede Nairn and Geoffrey Serle (eds), *Australian Dictionary of Biography*, Melbourne University Press, Melbourne, pp. 130–1.
- Cawte, Alice 1992, *Atomic Australia: 1944–1990*, New South Wales University Press, Sydney.
- Christesen, Clem 1945, 'Editorial', *Meanjin*, vol. 4, no. 3, Spring 1945, p. 149.

- Currie, Sir George, and John Graham 1966, *The Origins of CSIRO: Science and the Commonwealth Government 1901–1926*, CSIRO, Melbourne.
- Davison, Graeme 1998, 'Frontier', in Graeme Davison, John Hirst and Stuart Macintyre (eds), *The Oxford Companion to Australian History*, Oxford University Press, Melbourne, pp. 269–70.
- Deery, Phillip 2000, 'Scientific Freedom and Postwar Politics: Australia, 1945–55', *Historical Records of Australian Science*, vol. 13, no. 1, June, pp. 1–18.
- Docker, John 1991, *The Nervous Nineties: Australian Cultural Life in the 1890s*, Oxford University Press, Melbourne.
- Grant, Kerr and G. V. Portus 1946, *The Atomic Age*, United Nations Association, SA Division, Adelaide.
- Griffiths, Tom 1996, *Hunters and Collectors: The Antiquarian Imagination in Australia*, Cambridge University Press, Cambridge.
- Groom, Jessie (ed.) 1941, *Nation Building in Australia: The Life and Work of Sir Littleton Ernest Groom*, Angus and Robertson, Sydney.
- Hains, Brigid 1997, 'Mawson of the Antarctic, Flynn of the Inland: Progressive Heroes on Australia's Ecological Frontiers', in Tom Griffiths and Libby Robin (eds), *Ecology and Empire: Environmental History of Settler Societies*, Melbourne University Press, Melbourne, pp. 154–66.
- La Nauze, J.A. 1965, *Alfred Deakin – A Biography*, 2 vols., vol. 1, Melbourne University Press, Melbourne.
- Layman, Lenore 1982, 'Development Ideology in Western Australia, 1933–1965', *Historical Studies*, vol. 20, no. 79, pp. 234–60.
- 1998, 'Development', in Graeme Davison, John Hirst, and Stuart Macintyre (eds), *The Oxford Companion to Australian History*, Oxford University Press, Melbourne, pp. 184–6.
- Liberal Party of Australia 1958, *Australia Unlimited: A Nation on the March*, Liberal Party of Australia, Canberra.
- Lieberman, Joseph I. 1970, *The Scorpion and the Tarantula: The Struggle to Control Atomic Weapons, 1945–1949*, Houghton Mifflin Company, Boston, 1970.
- MacLeod, Roy 1994, 'Science, Progressivism and Practical Idealism: Reflections on Efficient Imperialism and Federal Science in Australia 1895–1915', *Scientia Canadensis*, vol. 13, no. 1, pp. 7–26.
- McKnight, David 1994, *Australia's Spies and their Secrets*, Allen & Unwin, Sydney.
- Milliken, Robert 1986, *No Conceivable Injury: The Story of Britain and Australia's Atomic Cover-Up*, Penguin, Melbourne.

- Morton, Peter 1989, *Fire Across the Desert: Woomera and the Anglo-Australian Joint Project 1946–1980*, AGPS, Canberra.
- Murdoch, Walter 1999, *Alfred Deakin – A Sketch*, Bookman, Melbourne.
- Reynolds, Wayne 2000, *Australia's Bid for the Atomic Bomb*, Melbourne University Press, Melbourne.
- Rivett, Rohan 1972, *David Rivett: Fighter for Australian Science*, R D Rivett, Melbourne.
- Roe, Michael 1984, *Nine Australian Progressives: Vitalism in Bourgeois Social Thought, 1890–1960*, University of Queensland Press, St. Lucia.
- Rose, Deborah 1977, 'The Year Zero and the North Australian Frontier', in Deborah Rose and Anne Clarke (eds), *Tracking Knowledge in North Australian Landscapes*, NARU, Darwin, pp. 19–36.
- 1999, 'Hard Times: An Australian Study', in Klaus Neumann, Nicholas Thomas and Hilary Ericksen (eds), *Quicksands: Foundational Histories in Australia & Aotearoa New Zealand*, University of NSW Press, Sydney, pp. 2–19.
- Rowse, Tim 1978, *Australian Liberalism and National Character*, Kibble Books, Malmsbury, Victoria.
- Saunders, Noel 1986, 'The Hot Rock in the Cold War: Uranium in the 1950s' in Ann Curthoys and John Merritt (eds), *Better Dead than Red*, Allen & Unwin, Sydney, pp. 159–65.
- Sherratt, Tim 1985, 'A Political Inconvenience: Australian Scientists at the British Atomic Weapons Test, 1952–3', *Historical Records of Australian Science*, vol. 6, no. 2, pp. 137–52.
- 1993, 'A Physicist Would Be Best Out of It: George Briggs and the United Nations Atomic Energy Commission', *Voices*, vol. 3, no. 1, pp. 17–30.
- Shute, Neville 1957, *On the Beach*, Heinemann, London.
- Simms, Marian 1982, *A Liberal Nation: the Liberal Party & Australian Politics*, Hale & Iremonger, Sydney.
- Southall, Ivan 1962, *Woomera*, Angus & Robertson, Sydney.
- Strahan, Lachlan 1996, 'The Dread Frontier in Australian Defence Thinking', in Graeme Cheeseman and Robert H. Bruce (eds), *Discourses of Danger & Dread Frontiers: Australian Defence and Security Thinking After the Cold War*, Allen & Unwin, Canberra, pp. 157–65.
- Titterton, Ernest William 1956, *Facing the Atomic Future*, F. W. Cheshire, Melbourne.

- Walker, David 1999, *Anxious Nation: Australia and the Rise of Asia 1850–1939*, University of Queensland Press, St Lucia.
- Weart, Spencer 1988, *Nuclear Fear: A History of Images*, Harvard University Press, Cambridge, Massachusetts.
- White, Richard 1981, *Inventing Australia*, George Allen & Unwin, Sydney.