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# Contents

ABSTRACT

The recording of details about caves and karst in Australia is traced from the earliest records of European explorers and travellers, through the development of scientific and official interest in caves, largely related to tourism, to the organised speleology (both amateur and professional) of the latter part of the twentieth century. A detailed catalogue of speleological serials, containing over 130 titles (of which about 30 are probably active), is appended. Some current trends, mainly resulting from digital technology, are discussed.

Speleological documentation in Australia is evidently highly dependent on the efforts of volunteers, and thus dependent on their interests and levels of activity. The focus remains on exploration and survey with scientific studies restricted to a few specialists.

## Introduction

Caves and karst have been written about from the earliest times of European settlement in Australia. While Aborigines occupied the continent for perhaps 100,000 years prior to this time, and made extensive use of caves for shelter, ceremony and industry (Jennings 1979), they kept no 'written' records pertaining to caves in the sense used by this study. Thus, while this study acknowledges the active interest in and use of caves by the pre-contact Aboriginal population, it does not attempt to address the period prior to the arrival of Europeans and the preparation of written records.

The purpose of this paper is to survey of the nature and extent of written records about caves and karst within the national territory of the Commonwealth of Australia, highlighting the particular types of records and the times during which they were principally in use, and citing examples of each. The classification used is a fairly subjective but, I believe, practical one: journals, diaries and personal records are treated first as these are the oldest form of documentation available. Personal records not published at the time or shortly afterwards could have been treated separately (especially as they could have had no direct impact on subsequent events). They have here been identified but otherwise included with published accounts. In the case of serials (and series) expressly focussed on speleological investigations, a complete listing is attempted and current trends, particularly relating to digital publishing, are discussed.

The details presented are derived from previous work by the author and others, supplemented by original research into both historical and more recent records. References to caves or karst were sought in what were considered 'likely' historical sources and as far as practicable original material was sought. Time has not permitted an exhaustive survey and the likelihood of discovering material from the very early phase (pre-1788) remains high. In relation to speleological serials, full details are still not known for all, especially the earlier, less formal, publications and those of smaller, remote and shorter-lived organisations.

A bias towards the East Coast – especially N.S.W. – is acknowledged – and is probably inevitable. This is a region of early exploration, first European settlement and the first organised speleology; it is also the region best known to the author. A conscious effort has been made to redress the imbalance but doubtless relevant events and examples from the centre, north and west have been omitted.

## Journals, diaries and personal records

This category of records includes the earliest documentation of caves in Australia. The document types include personal dispatches (which were often not published until many years later, e.g. Phillip 1892, 1914), personal diaries and journals (some of which were rushed into print, e.g. Hunter 1793, but some languished, unpublished for many years before their contents became known, e.g. Lawson 1821, Hellyer 1827). In all cases caves were a relatively minor element in the narrative; perhaps least so in Mitchell (1838).

An attempt has been made to include the earliest of these types of records and the more important, but otherwise just relevant parts of a sample of this type of record are reproduced below. As far as is known, no exhaustive listing of these documents exists.

The first Europeans to venture to "The Great South Land" were mariners with a strongly-developed tradition of meticulous record-keeping in the form of logs, journals and reports to their superiors. Since some caves are evident from the sea it is logical to expect that the first sighting of a cave (using the term in its widest sense) in Australia would have been by an early mariner. However, the earliest documentation of sightings of caves from the sea known to the author are those by Stirling in Western Australia, as late as 1827 (Stirling 1827). These are addressed below but the possibility of earlier sightings from the sea needs to be further investigated.

## *The West Coast of 'New Holland'*

This is the region and period least known by the author and time has not permitted a thorough examination of the records. As many sections of the coast of Western Australia are calcareous and subject to extreme wave action, there is a reasonable likelihood of caves occurring near where landings have taken place in the past. There is thus a chance that caves or karst have been mentioned in the records of early visitors.

For example, following the wreck of the Dutch ship, *Batavia,* in July 1629, the survivors spent an horrendous period prior to the rescue of a few. In *Islands of Angry Ghosts,* Edwards (1966) noted that:

> *West Wallabi [or Weibbe Hayes' Island] proved to have far more to offer the castaways than the first large (or High [or East Wallabi]) Island. ... Their first water came from brackish pools of stinking rainwater in the low cliffs, but many days later they found wells in the centre of the island – limestone cisterns ten feet deep, large enough for a man to climb down into, with fine clear water at the bottom. They were overjoyed. ... Here was enough food and water to last the whole company weeks ... until a rescue ship came.* (pp.51-52)

Evidently, the original records of this disaster make reference to karst; perhaps these 'cisterns' should even be regarded as caves, in which case these may be the first caves to have been recorded by Europeans in Australia.

## *Phillip 1788*

The earliest reported record of actual caves (again, using the term in its broadest sense) in Australia known to the author is that by Captain Arthur Phillip upon his visit to – or at least, sighting of – sandstone rockshelters at Grotto Point, Port Jackson in January 1788 (for location, see Fig. 1). I have not been able to locate a contemporary account of this visit, but Kennedy and Kennedy (1989, p.95) report:

> *Grotto Point NSW, a locality in Manly*[1]*, was first named for the caves found there by the exploratory expedition which Captain Arthur Phillip led to investigate Port Jackson before the First Fleet moved north from Botany Bay in*

[1] While Grotto Point is within the Municipality of Manly, it is at the southern end of a separate ridge running into Middle Harbour west of Manly, which is a locality at the base of North Head. Grotto Point is on the same promontory as Dobroyd Head, of which it lies immediately to the west.

> *January 1788. Lieutenant W. Bradley used the name in his record of explorations in the harbour on 28 January 1788.*

Certainly, Lieut. Bradley wrote in his Journal (Bradley 1969, p. 67):

> *29 January 1788*[2]*: From here we went to Grotto Point, moored the boats for the night and made a tent fore and aft the longboat in which we all slept.*

By his casual use of the name "Grotto Point" Bradley implies he was familiar with it. Unfortunately he does not state in his Journal when it was named, by whom or whether it was inspired by a particular 'grotto'. It is also known that on 23rd January 1788, Phillip landed at Manly (Phillip 1789, p. 50) and it is claimed that he noted Aborigines living in caves in what is now Wellings Reserve (Stephenson and Kennedy 1980, p. 296)(see Fig. 1).


*Fig. 1. Location of Grotto Point, Middle Harbour, Port Jackson; the rocky point has a number of rockshelters and overhangs.*

Figs. 2 and 3 show two of the sandstone rockshelters which presumably gave rise to the naming of "Grotto Point" by Phillip's party.

[2] Others give the date as 28 January 1788. Nautical practice at the time was apparently to start the day at noon of what we would regard as the previous day. Thus the afternoon of 28 January was recorded as the 29th by Bradley.

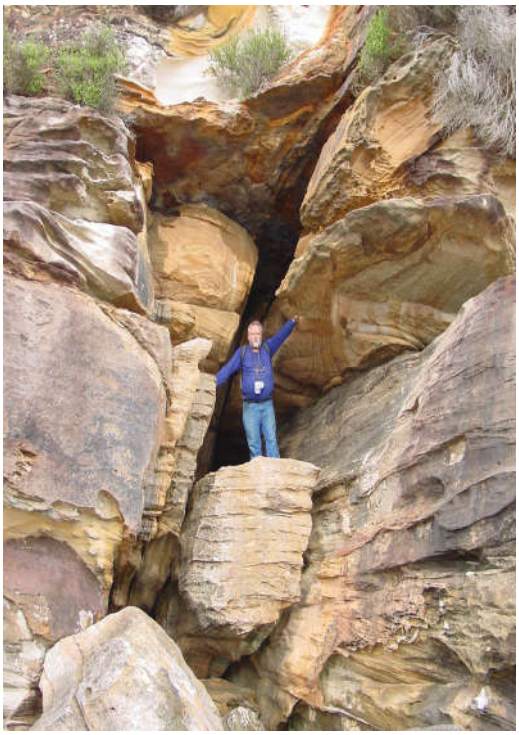

*Fig. 2. One of the rockshelters which may have led to the name "Grotto Point".*

*Fig. 3. Another of the numerous rockshelters on Grotto Point.*

Evidently the party stayed at the point long enough for the official artist to paint an image of the location – see 'Art', below and Fig. 8.

Phillip also took part in the exploration of Broken Bay, commencing on 2 March 1788. In his first dispatch to Lord Sydney, dated 15 May 1788 (Phillip 1892, p.131;1914, p.27) he wrote, under "Observations on the aborigines":

> *When the south branch of Broken Bay was first visited we had some difficulty in getting round the headland that separates the two branches, having very heavy squalls of wind and rain, and where we attempted to land there was not sufficient water for the boat to approach the rocks, on which were standing an old man and a youth. They had seen us labour hard to get under the land, and after pointing out the deepest water for the boats, brought us fire, and going with two of the officers to a cave at some distance, the old man made use of every means in his power to make them go in with him, but which they declined; and this was rather unfortunate, for it rained hard, and the cave was the next day found to be sufficiently large to have contained us all, and which he certainly took great pains to make them understand.*

Phillip used almost the same words to describe the incident in his journal (Phillip 1789, pp. 70-71). According to Macken (1991, p. 2) the cave was shown to Phillip's men on 5th March 1788.

There has since been some debate about which (sandstone) cave is being referred to. Daly and Daly (2000, p. 63) state:

> *There is now much evidence to suggest that the cave recorded by Phillip is the shelter site visited on the Red Hands Cave, Resolute Beach, West Head Beach circuit walk [in Ku-Ring-Gai Chase National Park].*

Anderson (1996, p. 22), however, suggests the cave shown to Phillip's men

> *... was probably the one in the southern corner of the harbour beach, not far from Palm Beach wharf. There are also two caves in the corner of Dark Gully, either of which the theorist may prefer.*

Sydney archaeologist Val Attenbrow (pers. com.) considers –

> *'Resolute Rockshelter'* [Fig. 4] *is the rockshelter that some people (eg local historians) believe was the shelter that Aboriginal people showed to Governor Phillip's party. There is at least one other shelter that some people believe is the shelter shown to Phillip's party. I don't believe it would have been Red Hand Cave. It is not only too far inland, but its usable floor area is far too small. I can't imagine anyone would suggest a party of people camp in it to shelter from the rain.*

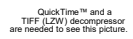


*Fig. 4. Resolute Rockshelter, West Head, Ku-Ring-Gai Chase National Park, the most likely contender for the cave shown to Governor Phillip in March 1788.*

## *Hunter 1793*

The second Governor of New South Wales, John Hunter, made some interesting observations in his journal (Hunter 1793) on the Aboriginal use of caves for shelter and on the frequent occurrence of caves in the sandstones around Sydney:

> *Men, women and children go entirely naked, as described by Captain Cook; they seem to have no fixed place of residence, but take their rest wherever night overtakes them: they generally shelter themselves in such cavities or hollows in the rocks upon the sea shore, as may be capable of defending them from the rain, and, in order to make their apartment as comfortable as possible, they commonly make a good fire in it before they lie down to rest; ... (p. 43)*
>
> *These people have not the most distant idea of building any kind of place which may be capable of sheltering them from the severity of bad weather; ...*[3]
>
> *Their ignorance in building, is very amply compensated by the kindness of nature in the remarkable softness of the rocks which encompass the sea coast, as well as those of the interior parts of the country: they are a soft, crumbly, sandy stone; those parts which are most exposed to, and receive the most*

[3] Hunter grossly overstates the situation here; he later goes on to describe native shelters made of wood and bark.

> *severity of the weather, are generally harder than such parts as are less exposed; in the soft parts time makes wonderful changes; they are constantly crumbling away underneath the harder and more solid part, and this continual decay leaves caves of considerable dimensions: some I have seen that would hold forty or fifty people, and in a case of necessity, we should think ourselves not badly lodged for a night. Wherever you see rocks in this country, either on the sea-shore, or in the interior parts, as they are a1l of this soft sandy kind, you are sure of finding plenty of such caves. (pp. 44-45)*

This passage probably constitutes the first instance of any European describing weathering processes leading to cave formation in Australia.

It is well known that the "journal" of George Barrington (1793 or 1794) "relied upon large fragments lifted straight out of John Hunter's *Historical Journal"* (Rickard 2001, p. 32); in relation to sandstone shelters, Barrington "wrote":

> *They all go entirely naked, men, women and children, and seem to have no fixed place of residence, but lie down wherever night overtakes them. Cavities in the rocks on the sea shore, are places they usually seek to shelter them from the wind and rain; and they mostly make a good fire before they go to sleep, by which means the rocks round them become heated, and retain their warmth a considerable time, like an oven; and spreading a little dried grass they lie and huddle together*. (Barrington 1793 or 94).

## *Labillardière 1793*

In 1792 and 1793 a French expedition led by Bruny D'Entrecasteaux to search for the missing La Pérouse visited Tasmania. Among the scientists on the voyage was botanist J.J.H. de Labillardière. His journal of the voyage is regarded as a classic of French travel literature (Labillardière 1800). About 24th February 1793 he wrote:

> *Just by (in Adventure Bay) we saw some limestone rocks, bounding an extensive sandy shore. ...*
>
> *The steep hills, which skirt the sandy shore a little further to the north, had in them caves, which appeared pretty much frequented by the natives, to judge by the black colour they had received from smoke, and the shells of lobsters and other fish which we found there.* (Labillardière 1800, vol. 2, p. 81)

## *Flinders 1798*

During his circumnavigation of Tasmania with Bass in the sloop *Norfolk* (after they had proved Van Diemens Land to be an island), they were exploring Frederick Henry Bay near the mouth of the Derwent when Flinders noted in his Journal, on Sat. 15 December 1798:

> *We … ran over to a small island … anchored on the lee side … and went on shore upon it with a theodolite. Its length is not more than a quarter of a mile SE and NW. It is frequented by gulls who lay their eggs here; and it had also been frequented by men but a few months back, there being several fire-places with numbers of large ear-shells about them. Finding several dark holes in the cliffs, I called this the Isle of Caves. In the afternoon we weighed and steered for a smooth beautiful-looking island up the opening, which bore from E. 5° 30' to 10° 40' S. from the Isle of Caves."* (Flinders 1895 pp. 805-806)

## *Barrallier 1802*

Ensign Francis Barrallier was among the first to attempt to cross the Blue Mountains west of Sydney. He was not successful but his journal records that in November 1802 he found a significant sandstone cave:

> *At 6 o'clock I found myself at a distance of 2 miles from the western passage. I was obliged to climb over a very steep height, at the summit of which I found a cave large enough to contain twenty men. … The rain compelled me to seek a shelter for myself and my men in the cave which, the natives assured me, was the home of wombats. I waited till 7 o'clock in the cave for my two men, …* (Barrallier 1897, p. 795)

Unfortunately Barrallier's description of his route has led to conflicting opinions over exactly where he went and the location of the cave. Andy Macqueen carried out one of a number of investigations into Barrallier's route and identified a cave on the approach to Byrnes Gap as "Barrallier's Cave" (Macqueen 1993, pp. 78-80). Andrews, in a later interpretation, focussing on the local geology, concluded that Macqueen identified the wrong cave (which Andrews terms a "weathered indentation"). Andrews identifies a cave which is 10 metres long with a 3 metre overhang on the approach to Byrnes Gap from the Tonalli River (Andrews 1998, p. 66). Dunkley (2002, p. 99) is confident that Andrews has correctly identified Barrallier's cave, which Dunkley asserts is thus the first identifiable

cave described in Australian literature. (Obvious competitors are those reported by Phillip in 1788 and by Labillardière in 1793, if they can be positively identified.)

## *Flinders 1803*

Somewhat later, on 14 January 1803, in far northern Australia, during his circumnavigation of the continent, Matthew Flinders came upon "a higher cliffy island" in the Gulf of Carpentaria which he called Chasm (or Cavern) Island. Of it Flinders wrote in his Journal (1814, p. 188):

> *I went in a boat to this last island with the botanical gentlemen, intending to take bearings from the uppermost cliffs; but the many deep chasms by which the upper parts are intersected, made it impossible … This was called Chasm Island; … and in some of the chasms the ground was covered with this fruit … several trees shot up in these chasms, thirty or forty feet high … In the steep sides of the chasms were deep holes or caverns, undermining the cliffs; upon the walls of which I found rude drawings, made with charcoal and something like red paint upon the white ground of the rock. These drawings represented porpoises, turtle, kanguroos, and a human hand; …*

Barrett and Kenyon (1958, p. 24) note that this is the first record of Australian Aboriginal art in caves – although it must surely have been seen earlier by Europeans, for example in some of the shelters around Sydney Harbour. That Flinders' was the first record of Aboriginal cave art is confirmed by Chaloupka (1999, p.18).

## *Lawson 1821*

William Lawson, one of the first Europeans to cross the Blue Mountains west of Sydney in 1813, continued to explore to the west and in November 1821, while touring the country around Bathurst, found himself in the hamlet of Limekilns, then called Limestone Hills. He was shown a cave and recorded in his journal (Lawson 1821) on 8 November (Fig. 5):

> *Camped at the Limestone Hills, here government has a kiln built for burning of lime for the use of the settlement which proves to be the very best quality. Here is a curious cave through a solid rock of limestone. Its entrance is very narrow. At nine o'clock at night I took four men with three candles and proceeded into it about one hundred yards. At the end is a fine pool of clear water. In many places for several yards together I was obliged to creep on my hands and knees.*

*The inside of the cave is very curious and well worth seeing. I got some fine specimens. Came out at one o'clock in the morning.*

This is significant as the first recorded visit to a limestone cave in Australia but Lawson immediately sent his journal to Governor Macquarie. Later the book found its way into the Mitchell Library but it was never published. The speleological significance of the piece was recognised by Ken Pickering of the Blue Mountains Speleological Club in 1972 and he delivered a paper on it to the Ninth ASF Biennial Conference in Sydney later in that year. The proceedings of that conference have never been published and the existence of the Lawson record might have been forgotten again but fortunately Pickering subsequently published a revised version in *Oolite* (Pickering 1975; see also Ellis and Middleton 2002).

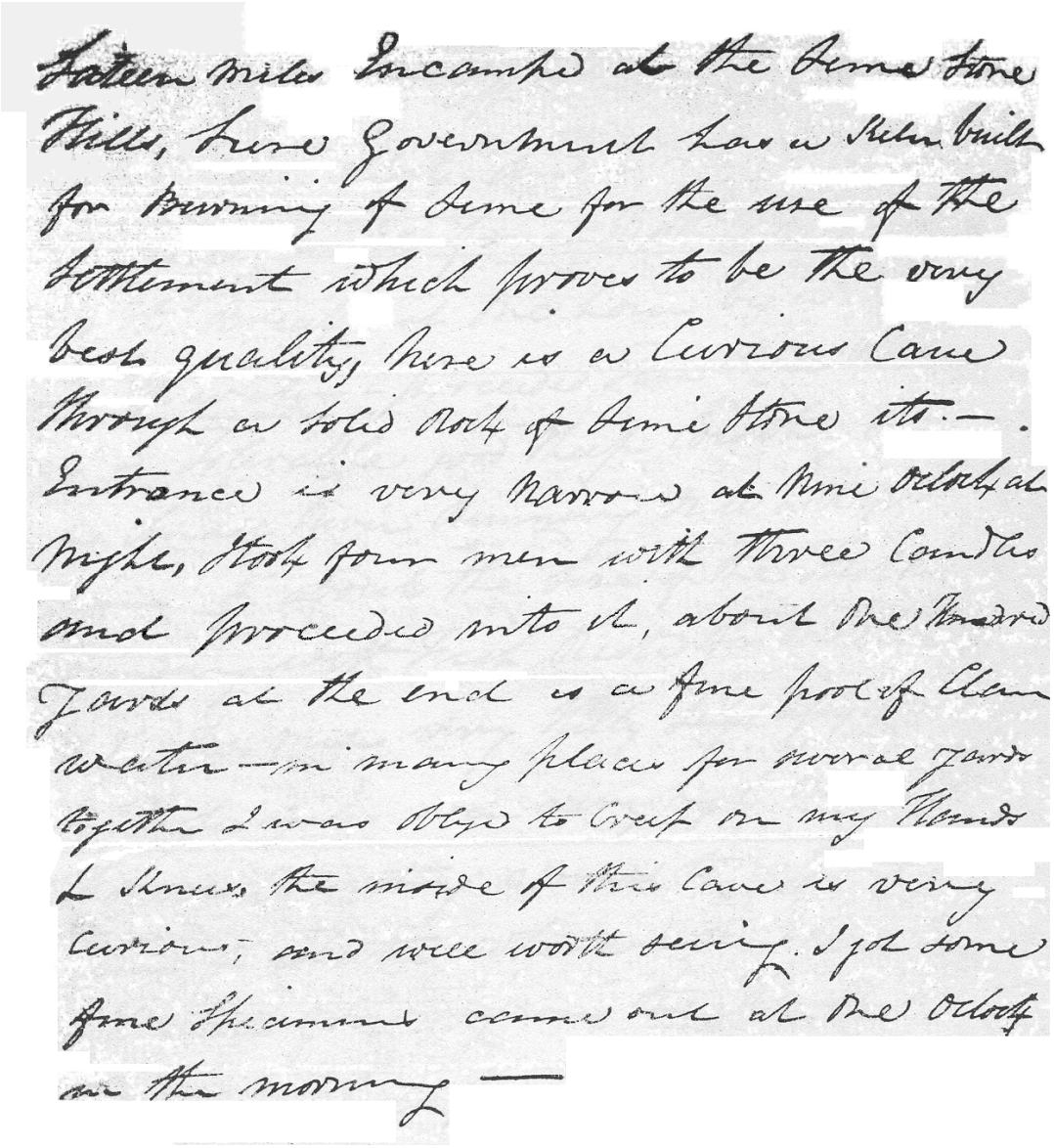
Fifteen miles I encamped at the Lime Stone Hills, here Government have a Kiln built for burning of Lime for the use of the Settlement which proves to be the very best quality, here is a Curious Cave through a solid Rock of Lime Stone etc.— Entrance is very Narrow at One o'clock at night, took four men with three Candles and proceeded into it, about One Hundred Yards at the end is a fine pool of Clear water — in many places for several Yards together I was obliged to Crept on my Hands I Knees the inside of this Cave is very Curious, and well worth seeing. I got some fine Specimens came out at One o'clock in the morning —

*Fig.5. The page from Lawson's 1821 diary recording his visit to Limekilns Cave*

## *Stirling 1827*

In March 1827, two years prior to establishment of the European settlement at Perth, Western Australia, Capt. James Stirling, who was sent to investigate the Swan estuary, noted that the "heads" at the mouth of the Swan River were composed of limestone which, "subject to the action of the surge, is worn into Caverns". Exploring inland in the vicinity of Cape Naturaliste, Stirling noted "compact limestone, sections of which were seen 200 feet in depth" and "under the limestone cliffs, many magnificent Caverns; some of these are remarkable for their extent and some for the beautiful stalactites and incrustations which they contain" (Stirling 1914).

Accompanying Stirling on the *H.M.S. Success,* was the Colonial Botanist of NSW, Charles Fraser. He prepared a paper on the botany of the Swan River which is probably one of the first scientific papers to mention karst in Australia; it is dealt with in the relevant section, below.

## *Hellyer 1827*

Henry Hellyer was employed by the Van Diemens Land Company as a surveyor within its lands in north-western Tasmania following the granting of the lands in 1825. In July 1827 he was cutting a road to the property when he came to Rocky Cape. He recorded in his notebook:

> *Descended E and turned round to the North to inspect the Cave Rock - in going down passed by large Rocks of Quartz red, white and blue veined, went up from the Valley climbed over steep rocks and entered the Cave. It is a grand cleft in a perpendicular mass of rock from 2 to 300 feet high - proceeded with caution expecting the Natives might be there. Its entrance is 50 feet high. There is a steep ascent the whole depth.*
>
> *The bottom is covered with the Shells which the Natives have carried there to cook, viz muscles, muttonfish, limpets and warrinas. There are plants growing 10 feet within the Entce.*
>
> *NB. The NW or Lower Outer Hill faces this Cave's mouth and bears WNW (abt. 400 yds off).*
>
> *The strata of this mass of Rock are nearly vertical, receding abt. 20° from a vert[ical] line southward.*

Hellyer included a rough plan of the cave (Fig. 6) – the earliest known Australian cave map – and a drawing of the quartzite hill in which it is located, showing the entrance (Fig. 11).

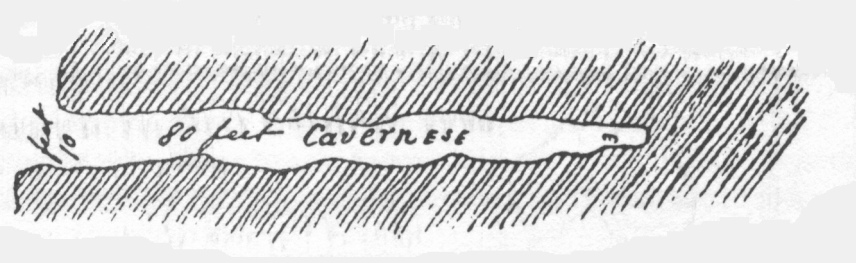


*Fig. 6. Hellyer's 1827 plan of Rocky Cape North Cave.*

While this record is historically of considerable interest, it had no impact on the public knowledge of, or interest in, caves in Australia as it lay undiscovered in Hellyer's papers (later transferred to the University of Tasmania) until reported to the present author in 1990 (Middleton 1990). Meanwhile the cave was studied by archaeologists, most notably by Rhys Jones in the mid 1960s. It remains among the most intensively studied archaeological cave sites in Tasmania.

## *Mitchell 1829-1838*

In December 1829 Thomas Mitchell, surveyor, was working on "The Great Road Southward" when he took time to visit the caves at Bungonia. He recorded the details in "Field book C46". This was later lodged in the Mitchell Library, Sydney, where the relevant parts were transcribed by Joy Whaite and published in *Bungonia Caves* (Ellis et al. 1972, pp. 207-208).

Mitchell's work at Wellington has been thoroughly documented and analysed in an outstanding paper by Lane and Richards (1963) – and before that by Foster (1936). Mitchell wrote scientific papers on the valley and its caves (see below), as well as including a chapter on them in his published journal (Mitchell 1838). As Dunkley (2002, p. 104) has observed, this chapter differs from the rest of Mitchell's *Journals*, in that it is a retrospective compilation, not a narrative.

## *Robinson 1830-34*

In Tasmania between 1829 and 1834, George Augustus Robinson carried out his mission to "save" the last of the tribal Aborigines by persuading them to go into exile on Flinders Island. In the course of his travels he came across a number of caves – and he kept a journal. This was published, with annotations by N.J.B. Plomley (1966).

On 16 June 1830, Robinson was shown a cave on Cape Grim in the far north-west of Tasmania:

> *Mr Fossey invited me to see a cave at the bottom of a cliff. It measured forty by seventy and forty feet high, and had been frequented by natives.* (Plomley 1966, p. 175).

Nine days later, further to the west, opposite the Doughboy islands, he was shown a steep path which led down to the sea and a fresh water spring.

> *Two hundred yards further along the rocks was a large cave which had often served as a shelter for the natives during a storm.* (Plomley 1966, p. 183).

He was curious to check out stories he had heard of caves and the exploitation of albatrosses on Albatross Island so he took a boat there on 7 October 1832:

> *Here we entered a small aperture and then descended by a narrow passage to a depth of several fathoms, when we came to a lofty and spacious cavern. On entering the subterranean passage leading to the cave the stench was intolerable, occasioned by the putrid carcases of the albatross which lay in heaps in different parts of the cavern. I was struck with astonishment at the vast magnitude of this singular excavation. The south-west end leads into a wide and deep ravine which extends across the island and divides the cavern from another on the opposite side, with which from its similarity of appearance and direction it must originally have been united. Both caves opened into the ravine and were tolerably well lighted. At the entrance of the large cavern, on the left hand side, is a small cavity sufficiently large to admit a man to pass through on his hands and knees. This passage runs for a considerable distance and had never been explored. There are also several very singular rocks at the entrance of the cavern. Some pieces of rock in the shape of an inverted cone are suspended from the top of the cavern and hang down like chandeliers and partly obstruct the entrance. A huge rock also overhangs the entrance to the passage. The appearance of the cliff at the landing place, as also the ravine between the two caves, presents an amphitheatre of rocky eminences.* (Plomley 1966, p. 664)

On his final mission, Robinson encountered limestone caves at Mole Creek. On 24 July 1834 he recorded:

> *Fine day. Visited the cave and explored it. This singular excavation is situate at the east end of a small plain [note: Den Plain] on the south side of the Mersey River. … I discovered this cavern in the course of my perambulation whilst walking under the cliffs accompanied by the aborigines. I returned to the encampment, when the whole of the aborigines went with me for the purpose of exploring it. Having prepared ourselves with torches made of bark I proceeded accompanied by my servant to explore, but all the arguments I could adduce were insufficient to prevail on the natives to follow. They would proceed about a yard or two and then rush out in greatest terror shouting vociferously and crying out that the devil was coming, that it was the devil's LEEBRUNNER. I however persevered and succeeded in exploring it. It measured two hundred and sixty-six paces (the cave at Albatross Island is one hundred yards). A rill of water runs through it for the first sixty or seventy paces and measures about nine feet. At this part the water runs through a hole underneath and which a pig might get through. You then climb up about four feet and pass through an aperture which brings you into the large chamber. This part is from twenty to forty feet in altitude and twenty in width in the widest part, with galleries and singular cavities. When about two hundred paces you turn an angle which leads you to the end. The sides at this part are perpendicular, in others overhanging. The water rushes from under the rocks and rolls down a gentle acclivity over a stony bottom and which when you first enter the cavern about half way you hear roaring as though some mighty torrent or fall of water were before you threatening you with instant destruction. This is occasioned by the sound reverberating. The stream is not more than ankle deep at the end. I tied a piece of canvas on which I had written my name—G A Robinson July 24 1834. The first two hundred paces is nearly level.* (Plomley 1966, p. 908)

This was more than a passing observation. Robinson shows real interest in the caves; the next day he was underground again:

> *Visited the cavern and at length prevailed upon two of the natives to accompany me. They were highly pleased with their excursion, but said that they fully expected I should be washed away by the water because I disturbed or displaced the stones in the river, which they say is sure to make the water come. I however escaped.* (Plomley 1966, p. 908).

Two days later his sons visited the cave and he noted:

> *There are several caves on the Moleside Creek, one about one hundred yards long and lofty.* (Plomley 1966, p.908)

## *George Grey, 1838*

The remarkable Captain George Grey, Esq., later Governor of South Australia, made two noteworthy expeditions in north-western Australia in 1837-39 and meticulously recorded these in his journals which were published, in two volumes, in London in 1841 – including colour plates of some of his more spectacular art discoveries. On 26th March 1838 he recorded:

> *... on looking over some bushes, at the sandstone rocks which were above us, I suddenly saw from one of them a most extraordinary large figure peering down upon me. Upon examination, this proved to be a drawing at the entrance to a cave, which, on entering, I found to contain, besides, many remarkable paintings.*
>
> *The cave appeared to be a natural ho1low in the sandstone rocks; its floor was elevated about five feet from the ground, and numerous flat broken pieces of the same rock, which were scattered about, looked at a distance like steps leading up to the cave, which was thirty-five feet wide at the entrance, and sixteen feet deep; but beyond this, several small branches ran further back. Its height in front was rather more than eight feet, the roof being formed by a solid slab of sandstone, about nine feet thick, and which rapidly inclined towards the back of the cave, which was there not more than five feet high.*
>
> *On this sloping roof the principal figure (No. 1.) which I have just alluded to, was drawn; in order to produce the greater effect, the rock about it was painted black, and the figure itself coloured with the most vivid red and white. It thus appeared to stand out from the rock; and I was certainly rather surprised at the moment that I first saw this gigantic head and upper part of a body bending over and staring grimly down at me.*
>
> *It would be impossible to convey in words an adequate idea of this uncouth and savage figure; I shall therefore only give such a succinct account of this and the other paintings as will serve as a sort of description to accompany the annexed plates.* (Grey 1841, pp. 201-202)

Grey went on to describe the paintings (of a type the Aborigines called "Wandjinas") in some detail and to include coloured illustrations of a number of them. He also described at this site, a most unusual carved face:

> *I was moving on, when we observed the profile of a human face and head cut out in a sandstone rock which fronted the cave; this rock was so hard, that to have removed such a large portion of it with no better tool than a knife and hatchet made of stone, such as the Australian natives generally possess, would have been a work of very great labour. The head was two feet in length, and sixteen inches in breadth in the broadest part; the depth of the profile increased gradually from the edges where it was nothing, to the centre where it was an inch and a-half; the ear was rather badly placed, but otherwise the whole of the work was good, and far superior to what a savage race could be supposed capable of executing. The only proof of antiquity that it bore about it was that all the edges of the cutting were rounded and perfectly smooth, much more so than they could have been from any other cause than long exposure to atmospheric influences.* (Grey 1841, pp. 205-206)

An accompanying plan ("The district and River Glenelg on the north western coast of Australia …") shows the location of this cave, which he labelled "Native Cave with many remarkable native Paintings." He also notes another "Native Cave & Paintings" south of the Glenelg, just short of "Grey's farthest". Of this second cave, Grey records:

> *Just at this point, we saw, in the cliffs on our left hand, a cave, which I entered in the hope of finding native paintings.*
>
> *Nor was I disappointed,– for it contained several of a very curious character. This cave was a natural chasm in the sandstone rocks, elevated at its entrance several feet above the level of the ground, from which the ascent to it was by a natural flight of sandstone steps, …*
>
> *The cave was twenty feet deep, and at the entrance seven feet high, and about forty feet wide. … The principal painting in it was the figure of a man, ten feet six inches in length, clothed from the chin downwards in a red garment, which reached to the wrists and ankles [sic]; beyond this red dress the feet and hands protruded, and were badly executed.* (Grey 1841, pp. 213-214)

## *Stewart Ryrie 1840*

Probably the first contemporary account of a visit to Victoria's Buchan Caves was by Stewart Ryrie, a grazier who was commissioned by the NSW government to report on the Monaro squatting district. On 7th April 1840 he recorded in his journal:

> *Proceeded through Buckan [sic] forest as far as a cattle station of Mr Wilkinsons. Blue limestone abounds all over this forest and it is full of caves. I descended into one of them to a considerable depth but saw nothing remarkable.*
>
> *The Limeston*e *in the cave was all in horizontal layers. There are numerous natural basins on the surface where the limestone is found, many of them from forty to fifty feet in diameter and from fifteen to twenty feet in depth.* (Ryrie 1840)

## *George Grey 1844*

Grey (at the time Governor of South Australia; later Sir George) wrote of his expedition along the south-east coast of South Australia in April 1844 in a letter to Lord Stanley. Having mentioned volcanic craters, he makes the first reference to a cenote (or water-filled sinkhole)[4] in Australia when he writes:

> *and the enclosed sketch by Mr G.F. Angus, a young artist who accompanied me, represents very faithfully one of the most remarkable of another species of crater, which are very numerous in this country, and which are filled with fresh water, and are almost unfathomable. The water in the one represented in this drawing was 103 feet deep, close to the edge of the crater.* (Grey 1845, p. 161)

Grey's glowing reports on the region led directly to its being opened up for development.

## *Thomas Burr 1844*

Grey was accompanied on his 1844 expedition in the south-east of South Australia by his Deputy Surveyor-General, Thomas Burr, who kept a daily journal, which Lord Stanley later caused to be published (Burr 1845). On 23rd April he describes calcareous rhizomorphs and suggests in detail how they might have formed (Burr 1845, p. 166) and on 29th, approaching Mount Benson, he describes a calcareous tufa:

[4] A cenote is a water-filled sinkhole of a particular type common in the south-east of South Australia, Florida and the Yucatan Peninsula of Mexico.

> *On this plain we for the first time met with a calcareous Tufa, which is generally termed "Biscuit." This Tufa presents a singular appearance; the plain was covered with it in pieces of various sizes, some being small and some of a considerable size; each piece was nearly circular, and had much the appearance of ship-biscuit. One of these cakes was broken by me; the form was nearly circular. They appeared to be formed by the deposit of lime held in solution by shoal-water. There is a nucleus for each, round which the lime is deposited in successive layers. ...* (Burr 1845, p. 170).

On 5th June Burr noted a karst surface and then the first of a series of cenotes:

> *... at 2pm [we] passed a small flat which presented a remarkable appearance; the whole surface was bristled with rocks, which stood up from 1 to 12 inches, and might be considered Alpine ranges in miniature; they were of coral limestone. At about 28 miles we crossed a watercourse with many holes, but at the point where we crossed there was no water. At 3pm I called the attention of his Excellency to what appeared to be a chasm in the rock, and which was about 200 yards to the left of our line of route; we made off towards it, and discovered it to be a well of pure water of an oval form, the longest diameter of which was about 80 yards, the shortest 70 yards, with perpendicular or overhanging cliffs. Our tether ropes were immediately put in requisition, for the purpose of ascertaining the depth of this singular well. A large stone was tied at one end of the line , which was let down from the cliff. [The water was shown to be 103.5 feet deep at the edge; much deeper in the centre.] ... The rock is coral limestone and the water, although of an inky blue when seen from above, is perfectly pure and fresh. This well was called by the Governor "The Devil's Punchbowl". At 1 mile S.E. we came to another well, similar to that just mentioned, except that it was divided into two portions by a narrow rock that sloped gradually to the water, which could thus be reached with little difficulty.*

## *George F. Angas 1844*

Angas was an artist who accompanied George Grey, Governor of South Australia (1841-45), on his expedition along the south-east coast of South Australia and subsequently had his detailed diary published. On 15th April 1844 they crossed the Murray River and Angas mentions a horse getting its foot stuck in a groove in limestone (1847, p. 129).

Following along the Coorong, on 20th, Angas mentions “limestone hills” (p. 134) and, on 21st, describes some karst features:

> *The limestone reefs which run out into the water are so fretted away by the action of the sea-air, that they resemble castles and ruins covered with rich tracery. The entire country, from the water's edge, is covered with surface limestone, in small rugged pieces, amongst which grow the dwarf eucalyptus and the xantharœa.* (1847, p.139)

and on 23rd, he describes rhizomorphs:

> *In every direction were seen hollow tubes of sand, cemented by moisture and lime, forming an arenaceous limestone, rising perpendicularly, and varying in height from two to twelve inches; appearing as though they had originally been formed by a gathering of sand and lime around sticks, which having decayed had left the hollow tubes.* (1847, p. 145)

On 28th he records reaching Mount Benson,

> *a round-topped eminence, about seven hundred feet above the sea, and the highest of a range of limestone-hills, visible from the sand-hills at Lacepede Bay.* (1847, p. 150)

and further:

> *Upon the plains beyond Mount Benson, and those around Lake Hawden, until we reached the neighbourhood of Rivoli Bay, our attention was arrested by the flats being covered in many places with a limestone tufa, in shape and appearance exactly resembling biscuits. Their size varied from that of a large captain's biscuit to the smallest ratifia-cake, and the ground for miles was completely overspread with them. To a hungry traveller they must prove a sad disappointment, for the deception is so perfect that at first sight a person is easily led to mistake one for a biscuit.* (1847, p. 151)

On 5th May 1844 he describes their discovery of the first cenote recorded from Australia–

> *Towards the afternoon a vast circular cavity was discovered in the coral limestone, about 260 yards in circumference, its perpendicular sides perforated with holes; and at the bottom, about fifty feet below the surface, was a lake of pure fresh water, that looked black from its extreme depth. Attempts were*

> *made to fathom it by fastening tether ropes together, but at 130 feet no bottom was obtained close to its precipitous margin. This singular phenomenon was named "the Devil's punch-bowl."* [5] (1847, p.165)

And then–

> *At two miles further on we discovered another coral basin, which was divided by a rocky wall cross the centre, forming two semicircular lakes, with shrubs growing down the steep sides of the basin.*[6] (1847, pp. 165-166)

## *Edward Snell 1850*

Sailing from England in 1849, Snell was to spend ten years in Australia, working and travelling – and keeping a personal diary. This was published in 1988 (Griffiths 1988) and reveals interesting details on Curramulka Caves, central Yorke Peninsula, South Australia. On 5th September 1850 he wrote:

> *Started with Bob for a guide for Curry Murka Cowey [Curramulka], the where the caverns were to be found. Penton overtook us on horse back and lent us a couple of candles. We went into the cave*[7] *leaving Bob outside. He wouldn't go in, alledging as a reason that "Muldappy" (the devil I suppose) plenty sit down there–we left our gun coats and supply of grub in the first chamber C and crawled on our faces into the second chamber E, explored E & G and then descended through H into a breakneck sort of a place, the roof of which I estimated at about 80 feet high. In this place we found numerous skeletons of various animals, Wild dogs, Kangaroos, Kangaroo rats, Bandicoots, Wallabys, Hawks, and parrots, out of this was the entrance into another cavern K also full of skeletons.* (Griffiths 1988, p. 140)

The detailed description continues, all related (by the letters) to a well-drawn section through the cave, and supplemented by sketches of the entrance and three passages within the cave. They found the cave "insufferably hot" and left after an hour and three quarters. Unfortunately Snell doesn't record visiting caves elsewhere on his travels.

---

5 The cenote, 5L47, is still known by this name, as well as The Black hole, Miniature Blue Lake, The Big Hole and "Blacks" (Horne 1993).

6 This is probably the feature now known as The Sisters or Double Well, 5L43-44 (Horne 1993).

7 Now known as Curramulka or Corra-Lynn Cave, 5Y1.

## *James Bonwick 1857*

Bonwick was the Inspector of denominational schools in Victoria when he undertook an "educational tour" of the west of the state in 1857 (Bonwick 1858). He describes the lava fields of the "Volcanic Ash Plains" in some detail and, in describing "The Rises – a remarkable geological feature" he compares the rocks to a petrified sea and writes:

> *In some parts the chasms are deep and the bold fronts of the Barriers in the dim evening twilight have a most unearthly appearance; especially when frowning upon some yawning cavern, from whose dismal recesses one hears the mysterious flitting of bats, and the repulsive growls of wild cats. ...* (Bonwick 1858, pp. 19-20)

He goes on to record:

> *Allusion has been made to the caverns of the Rises. The largest I entered was a mile from the mount [Porndon]. Considerable scrambling over the Barriers had to be endured before the entrance was gained, which was nearly blocked up with masses of basalt and overgrown vegetation. Accompanied by a settler I ventured a considerable distance into the gloom. An unpleasant smell and a very peculiar soft rustling of wings told of the presence of bats. By and by these creatures resented our intrusion, and came forth in strong squadrons to charge us. I am not ashamed to say that so unexpected an attack, so uncomfortable a collision with their cold bodies, to say nothing of their shrieking, compelled me to beat a hasty retreat to daylight and sweet air. Three large heaps of bat guano rise from the basaltic floor. ... This cave is twenty-five feet wide, fifteen high, and one hundred and fifty deep. Similar ones occur in other basaltic countries. Fingal is loftier, but the same extent. The origin is supposed to be from the bursting out of confined gases, which had previously distended the lava stream when in a viscid state.* (Bonwick 1858, pp. 21-22)

This passage is probably the earliest record of exploration of a lava tube cave in Australia.

Moving on to calcareous rocks, he notes, (p. 22):

> *The limestone comes into view near Elingamite; there are several fine caves in it, and one long tunnel of five or six hundred feet.*

In the vicinity of Warnambool he delighted in visiting a number of caves:

> *The greatest treat I had at Warrnambool consisted of two rambles by the coast among the limestone caves, ...* (p. 60)
>
> *On my first visit to the caves a friend was desirous of driving me thither . ... Four miles from the mouth of the Hopkins, high up the face of a cliff, is the entrance to a noble cave. To get to it you have to descend a dangerous place, where you have a fair chance of being flattened among rocks below, or carried out by the waves into the Southern Ocean; otherwise you must be lowered down a small hole by a rope from a windlass. The want of apparatus prevented my progress by the last mode one hundred and sixty feet, and the sight of the cliff scramble caused me some apprehension, ... A number of holes at the top give light to the realm below, and from the peculiarity of their appearance when looked up to, Mr. Latrobe gave the cave the name of the Star Chamber.*[8]
>
> *Among caves I did enter was one by the very deep and fresh lake of Gillore or Gillea, in which bones of natives were found in the soft and impalpable powder strewn on the floor. ...*
>
> *There is a small cave on the side of a rise, close to the sea, inhabited by Old Dan the fisherman. ...*
>
> *The attractions of one of these caves gave me a little fright. Accompanied by my botanical friend, I had rounded a headland on the beach to inspect a cavern. There were greater wonders beyond, and we ventured further. ... we gently descended from Needle Flat to the sandy beach, and entered some spacious and interesting fossiliferous caves. Geologically entranced, we paid no heed to time and tide; nor was it until the sea came bounding into the cavern that we were conscious of our folly and danger. A cry and a run, as the wave receded, brought us soon to the rock, and in our haste to escape we tested unpleasantly the keenness of the limestone needles.* (Bonwick 1858, pp. 63-65)

He examined the volcanic region around Tower Hill with great interest and noted seams of cherty limestone "noticed elsewhere by Darwin" but he questioned the latter's view of its marine origin (Bonwick 1858, p. 74).

Later he visits Bridgewater, of which he says:

[8] Now generally called Starlight Cave, 3W5 – EHS, pers. com.

*The charm and wonder of Bridgewater lay in its caves. The natives have some dim shadowings of traditions connected with them. Some spirit, Punyil, once resided in one, and was accustomed to descend therefrom and walk the shore. Rude attempts at drawings were said to be found there. I did not observe any, though want of time prevented a close examination of the various caverns. I confess to a love of the marvellous and beautiful, and have, therefore, a natural taste for a search in such mysterious regions. ...*

*Strange to say, you can not enter the Bridgewater caves in the orthodox manner. Instead of a descent, you have an ascent. They are arranged on the lofty side of an ancient sea cliff of limestone, and their several dark openings may, perhaps, extend across a space of two hundred yards. ...*

*We now clamber the hill and peep within the caves. There are seven of them; though some run into each other. Not one is of much depth, but all are of great beauty for the number, variety, and disposition of the pendant stalactites, or the rising stalagmites. Thanks to the good taste of Mr. Surveyor Lindsay Clarke, a Reserve of forty acres is declared round these curiosities of the colony; they are not suffered to go like the Lal-lall Falls from the free range of visitors. The most wonderful one has a gaping mouth like that of a monster dragon, to whose teeth the rows of stalactites would bear no ill resemblance. The front is seventy feet by sixty, expanding into an irregular arch. The roof is so fretted, as to look like some gorgeously sculptured ceiling of a cathedral. ...* (Bonwick 1858, pp. 112-113)

## *Alfred William Howitt 1875*

An experienced bushman who had retrieved the remains of Burke and Wills from Coopers Creek in 1861, Howitt was appointed a police magistrate and warden of the Omeo goldfields. In 1875 he travelled down the Mitchell River in Gippsland by canoe. In the process he came across two caves:

*... we came to a picturesque cavern, formed by the wearing away of the soft beds from underneath a hard coarse of grit. It extended in a semicircular form across the creek, the roof of the cave being the ledge over which the water falls during rainy times. The blackfellows were delighted with this 'house', and planned to themselves how they could come and camp here ...*

*A little further on we came to a second cave, a wonderfully picturesque and beautiful spot. As before, a soft bed of reddish shale had been worn away by the backwash of waters falling over a hard ledge, but here the cave was higher and deeper. In front was a pool of water looking black and smooth as glass under the dense shade of the 'Lilly pilly's' (Acmenia). Stalactites fringed the rim of the cavern and hung in pendant rows from its roof. A huge stalactitic mass at one side joined the roof to the floor so as partly to screen the cavern, and on either hand the rocks rose up almost perpendicularly for I think not less than 400 to 500 feet. ...*

*While I made a slight sketch and examined the rocks, the two blackfellows looked round the cave with many wondering exclamations of "Ko-ki' at the stalactites, two of which they carried off as wonderful objects to show their friends. ... Bungil Bottle [an Aboriginal] on his part was impressed vividly by the belief that this was indeed the haunt of the mysterious creature, the 'nargun', the 'ngrung a narguna.'*

*The nargun, according to their belief, is a mysterious creature, a cave-dweller, which haunts various places of the bush. So far as I could learn, the blacks believe the nargun haunts especially the Mitchell valley, which we had just followed from Tabberabbera. What is the appearance of a nargun they cannot describe, excepting that it is like a rock (wallung), and is said to be all stone except the breast and the arms and hands. They say it inhabits caverns, into which it drags unwary passers-by. If you throw a spear or fire at it with a bullet, they say the spear or bullet will turn back on you and wound you. There is a cave in the Miocene limestones of Lake Tyers which is said to be inhabited by a nargun, with which one of the natives, 'Dan's mother,' according to report, had a fight. This is all I could learn.*

*The rocks at the 'nargun's cave' I found to be the usual alternations of sandstones and grits with pebble conglomerates, and here, as in the typical locality near Iguana Creek, were thick beds of soft reddish rock, apparently devoid of stratification and evidently calcareous, judging from the stalactites which depended from the roofs and sides.* (Howitt 1876)

His journal notes, published later in a Geological Survey Report, include a sketch of the larger cave, now called ‘The Den of Nargun’.

## *St Michael-Podmore 1909*

Though somewhat more recent that the previous accounts, Podmore's is in a traditional style, being a personal account of "rambles" in Australia and elsewhere from the 1880s, apparently with the intent of encouraging emigration to Australia. He evidently took a particular interest in caves. The frontispiece shows the author with Mr Wilson in the Devils Coach-House at Jenolan. Visits to caves are described near Albany, WA (sea caves)(pp. 15-16), Yallingup (pp. 29-31), Lake Cave and others at Margaret River (pp. 42-45), Jenolan Caves (pp. 224-229) and Buchan Caves (p. 258).

## *Early newspaper reports*

Personal accounts published in newspapers should not be overlooked in this overview of 'personal records'. As examples, one might note the intriguing anonymous report in the *Sydney Gazette* of 6 October 1821, the letter by "L" in the same paper of 25 May 1830 and Roe's 1841 report of a journey of cave exploration with the Western Australian Governor.

The unattributed 1821 report of "A cave, of considerable dimensions, … recently discovered in the neighbourhood of Bathurst" gave no further details except that it (had) contained "very beautiful specimens of stalactites". It anticipated "a more particular description" but this never appeared. As the first written report of a limestone cave in the colony (and perhaps Australia), this has been the source of much speculation – at least by Lane (1975), Ellis and Middleton (2002) and Dunkley (2002). All conclude that the reported cave was probably the Benglen or Limekilns Cave, visited shortly afterwards by William Lawson.

The 1830 letter by "L" (believed to be the Rev. Dr. John Dunmore Lang) concerned an excursion to the Wellington Caves by George Ranken during which "a vast quantity of bones of various sizes" were found. This report appears to have been material in arousing Mitchell's interest in these caves – and perhaps also Henderson (Dunkley 2002, pp. 104-105).

In 1841 John Septimus Roe wrote of "an excursion by His Excellency the Governor and the Surveyor General to the caves of Maidin" (Roe 1841). This report, with a detailed description of the caves visited, was reprinted in *The Western Caver* in 1999 (vol. 39:26-28) with the comment by Lex Bastian that it was "the first true cave exploratory trip in the colony" [of WA].

### *Others*

The above are selected examples to demonstrate the genre, not an exhaustive treatment. Others who might have been included are Cunningham (Bungonia in 1824, original journal transcribed by Whaite 1972), Lesson (Limekilns 1824, published 1828, cited in Dunkley 2002), Sturt (Molong 1828, published 1833), Henderson (Wellington 1830, published 1832; Bungonia 1844, published 1851), Breton (Bungonia, early 1830s, published 1833), Bennett (Cave Flat 1832, includes the first cross-section of an Australian cave, published 1834), Grey (NW and SW Western Australia 1837-40, published 1841), Clarke (published 1860).

### *Review – journals, diaries and personal records*

These excerpts show that caves were noticed and were investigated by early explorers, adventurers and travellers. Caves were evidently regarded as significant by these people and sufficiently important to document their existence. In view of the backgrounds of the people involved, few of these records contain particularly insightful observations about the caves themselves (Hunter 1793 is an early exception) or anything approaching scientific descriptions (with the exception of Mitchell, the surveyor, and Clarke, who was a trained geologist). Henderson perhaps had pretensions to be an analytical observer but most of his notions regarding geology would not be taken seriously by most people today.

Many of these early accounts had significant impacts on subsequent settlement and some are very important elements in the national historical record. Some of the caves reported – such as those documented by Grey with their Wandjinas – have become established as national icons.

## Art depicting caves

In addition to the written word, art has contributed to the recording of caves in Australia. Of particular interest here is art prior to the widespread use of photography.

### *"Port Jackson Painter" [probably Henry Brewer] 1788*

Either on the occasion of Phillip's or Bradley's visits to Grotto Point in January 1788 or shortly thereafter, an official artist – thought by Bernard Smith to be Henry Brewer (Smith and Wheeler 1988) – rendered a painting of the point which shows an extremely slender and unusual arch (Fig. 7)(Challis and Smith 2000, p.17). If this is accepted as a cave, it could be the first 'cave' painted by a European in Australia – though it no longer exists.

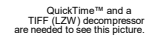


*Fig. 7. Painting by an official artist of Grotto Point, Port Jackson, 1788. If the apparent arch ever existed, it does not now. However, some of the sandstones on the point are finely bedded, resembling the jagged overhangs depicted (cf. Fig. 8).*

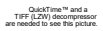


*Fig. 8. Sandstone overhang, Grotto Point, Port Jackson (June 2004)*

## *Lesueur 1800*

C.A. Lesueur, official artist to the Baudin Expedition of 1800-04 drew an early image of an Australian cave (using the term in its broadest sense). "Grottes, chasse et pêche des savages du Port-Jackson" (Fig. 9) shows a group of Aborigines sitting around a large fire in front of a sandstone rockshelter. It was engraved and etched by A. Delvaux and J. Devilliers from the original by Lesueur; it appeared as plate 31 (upper) in Péron &

Freycinet (1824). This reproduction is from Bonnemains et al. (1988, p.62) who said of this engraving:

> *No detailed drawings for this exist, though scenes with similar content were done by other artists. Perhaps Lesueur drew it from memory aided by some of his detailed sketches of the canoes and possibly coastal views.*

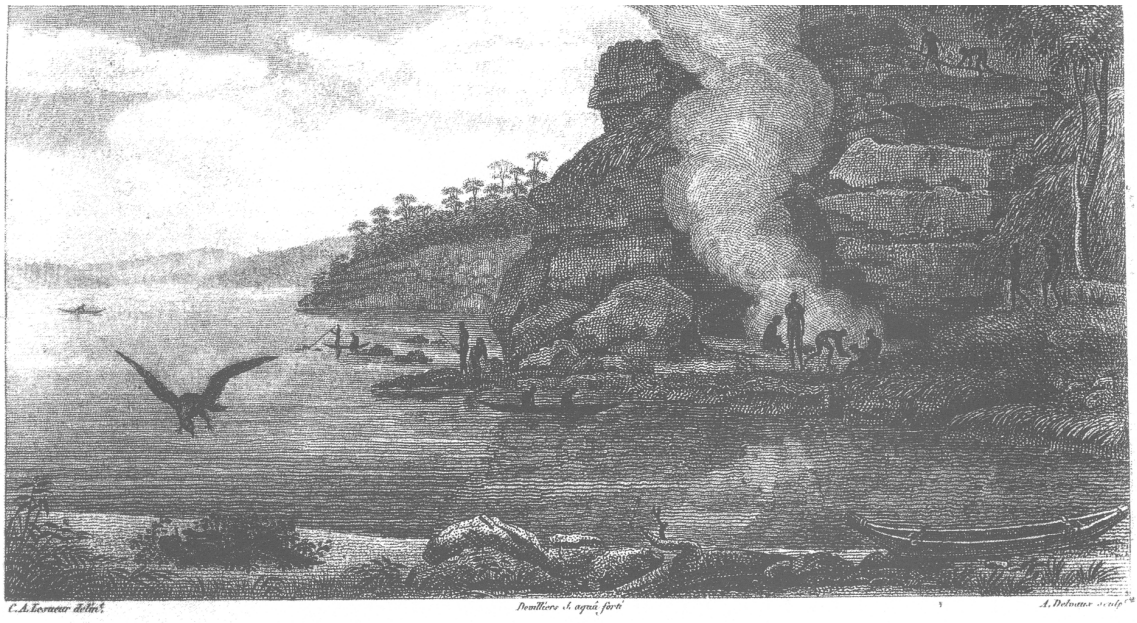

*Fig. 9. Grottes, chasse et pêche des sauvages du Port-Jackson*

## *Earle 1826*

Augustus Earle, a professional 'travel artist', painted the first images of an Australian limestone cave when, in 1826 he prepared three watercolours of scenes in "Mosmans Cave", Wellington, NSW (Hackforth-Jones 1980; Hamilton-Smith 1997). One of these is shown in Fig. 10.

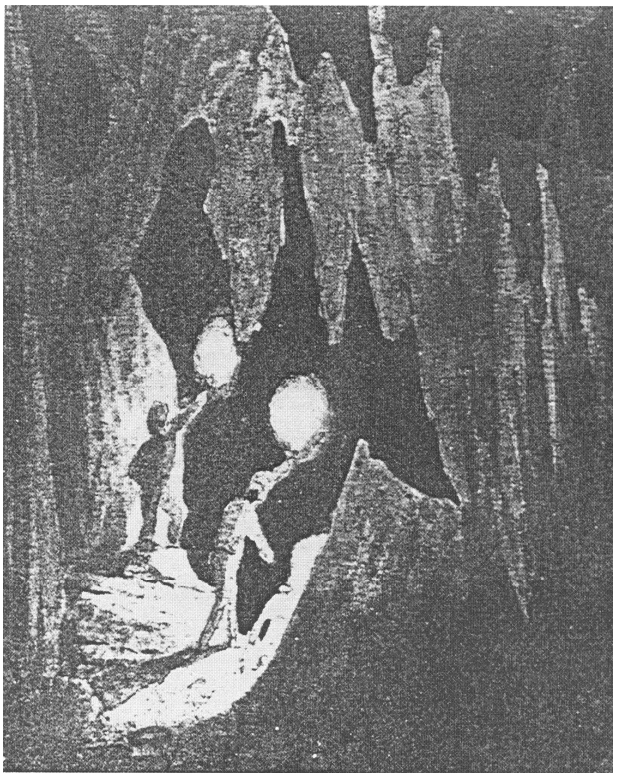

*Fig. 10. One of Augustus Earle's watercolours of Mosmans Cave, Wellington.*

## *Hellyer 1827*

As mentioned, surveyor Hellyer included in his diary a sketch showing the entrance to Rocky Cape North Cave in July 1827 (Fig. 11).


*Fig. 11. Henry Hellyer's sketch of the quartzite bluff at Rocky Cape, showing the entrance to Rocky Cape North Cave.*

### *Others*

Many others have documented Australian caves by drawing or painting. The whole subject of art inspired by Australian caves and karst has been exhaustively treated by Hamilton-Smith (1997a) and a catalogue of works presented (Hamilton-Smith 1997b).

In the 20th century there was a tendency to visually document caves photographically, but interest in cave art has enjoyed a renaissance in recent years, notably led by June MacLucas, based in South Australia (see, for example, MacLucas 2002).

### *Review – art showing caves*

Art has played an important role in the early recording of caves and probably would have been more significant if more ready means had been available for the recording and printing of graphic images. Undeniably graphic depictions of caves convey valuable details and impressions difficult to achieve through words or even maps.

## Scientific papers

The second phase in the documentation of caves and karst in Australia (though overlapping with the 'journals and diaries phase', involved the publication of scientific papers. This, of course, had to await the contributions of suitably qualified writers and the availability of appropriate journals. A benefit of publication in a journal was that it would generally be much more immediate and not require large financial resources. As early as 1830 Mitchell was able to get his observations published within a few months in a Scottish scientific journal; his own journals took a further eight years to publish in book form.

### *Fraser 1830*

As mentioned in relation to Stirling's report of 1827, Fraser, the NSW Colonial Botanist, prepared a paper on the botany of the Swan River which was published in 1830 (Fraser 1830, as cited in Hay 1906). This included a number of observations on karst, springs and caves:

> *On the beach I observed several small pools of water and many moist spots which, in seasons of unusual humidity, must be the seat of active springs issuing from the calcareous rocks that bound them. ... ...*

> *While examining the productions of a mass of cavernous limestone rocks on the beach, I was astonished by observing an extensive spring issue from beneath them, in width about 7 feet, running at the rate of 3 feet in a second.* (Fraser 1830)

Fraser contrasts the benefits of the Swan River district with New South Wales and among these he cites "the great abundance of limestone". He also describes the conditions in the vicinity of Cape Naturaliste, noting:

> *The granite rock was succeeded by a bed of micaceous schist, in an advanced stage of decomposition, over which were observed several caverns, which were found to contain rock-salt in crystallised masses in large quantities. ... ... The base of the cavern is a coarse sandstone, the whole covered with limestone. The southern extreme of the cape consists of lofty cliffs, presenting two ranges of superb caverns, the lowest of which we explored. The great or outer cavern is about 40 feet high at the entrance, 40 feet in breadth, and about 90 feet in depth. Into this cavern the sea rolls at high water, over immense blocks of granite, in awful grandeur. The stalactites in the cavern are many of them from 20 to 25 feet in length, covered with minute* Cryptogamic *vegetables of fantastic colors and form. The walls are clothed with the same substances, which give to the whole an extraordinary appearance. The second cavern is distinct from the first. The entrance is about 20 feet in height and 20 in breadth, increasing in height and breadth further in. The stalactites and stalagmites are abundant, and of the purest white. The former were observed to exceed 15 feet in length. There was a remarkable circumstance observed at the entrance of the cavern, the stalactites being all bent outwards, as if a gale of wind was perpetually blowing through the cavern. The three succeeding ones are of minor importance, but all containing stalactites.*
>
> *The appearance of the cliffs and caverns from the sea is exceedingly grand. It is impossible to pass along the beach 14 yards without crossing a stream which issues from caves of limestone, and which forms banks of shells, seaweed, stones, and whatever substances may come within their reach, incrusting them in a most beautiful manner.* (Fraser 1830)

These are not mere casual observations but the detailed and informed notes of a person with an understanding of karst processes and an empathy with caves. Probably this paper

includes the first record of phytokarst in Australia. If this is the first scientific report on caves in Australia it is of a surprising standard.

## *Mitchell 1830-38*

It has been suggested that Surveyor-General Thomas Mitchell of NSW should be regarded as the country's first speleologist in view of his work on the bone caves of Wellington (see, e.g. Dunkley 2002, pp. 103-108). Certainly, in terms of publishing his results in journals devoted to the furthering of science, Mitchell was well to the fore. He published three initial papers on the Wellington finds, (the first of which actually appeared as the work of J.D. Lang who carried the manuscript to the journal editor), in the *Edinburgh New Philosophical Journal* in 1831 (Lang=Mitchell 1831a), in the *Philosophical Magazine* in the same year (Mitchell 1831b) and in the *Proceedings of the Geological Society of London* in 1834 (Mitchell 1834), the latter having been read to the society in April 1831. A letter Lang had written to the *Sydney Gazette* (under the pseudonym 'L', published 25 May 1830) also appeared as an introductory piece in Scottish journal (Lang 1831).

Understandably, the Wellington bone deposits resulted in a steady stream of scientific papers over the succeeding years, e.g. Jameson 1832, Pentland 1832, 1833, Krefft 1867, Owen 1884, Dun 1893.

## *Stirling 1880s*

In 1884 James Stirling published "On the caves perforating marble deposits, Limestone Creek" in the proceedings of the Royal Society of Victoria and, in 1888, notes on the geology of the Wombat Creek valley, its caves and silver lodes (though this, and others, might be more properly classified as an official report – see below).

## *Scientific American*

The prestigious journal *Scientific American* published some early items on Australian caves, notably Richter (1884) on Jenolan Caves and an anonymous report in 1895 on the glow worm caves of Tasmania (Mystery Creek Cave at Ida Bay).

## *Danes 1910-17*

J.V. Danes was a Czech geologist who worked for a time in north Queensland and took a particular interest in the Chillagoe-Mungana limestone outcrops and their caves. He provided an overview of Queensland limestones in 1910 (Danes 1910) and of Australian

karst studies (in German) in 1917 (Danes 1917). Jennings later reviewed his ideas on the Chillagoe karst (Jennings 1966).

## *Management and technology*

Papers dealing with aspects of cave management and technology were very unusual prior to the 1970s. Interesting early instances were Leigh's "On the artificial method of lighting the Jenolan Caves" (Leigh 1894) and Trickett's (presented to the Institution of Surveyors, NSW, in June 1929, but apparently unpublished) "An instrument for use in rapid underground surveys" (Middleton 1991, pp. 105-106). Of course, a great deal has been written on cave management in more recent times, most of which can be found in either the quarterly *Australasian Cave and Karst Management Association Journal* (since 1988) or in the proceedings of the biennial conferences of ACKMA *(Cave Management in Australasia).* There have also been independently-produced reports, often arising from consultancies, such as Hamilton-Smith, Kiernan and Spate's (1998) report on management of the Cape Range Karst, W.A.

## *Others*

Scientific papers relating to Australian caves in the latter part of the 19th century and early 20th century were not frequent. Clearly they were stimulated by discoveries such as those at Wellington, but otherwise they tended to relate to local or regional geology with mentions of caves (such as Clunies Ross – Limekilns 1894), anthropological papers referring to caves/shelters with Aboriginal art or remains (e.g. David & Etheridge 1889, Etheridge & Trickett 1904) or describing new species of cave life (e.g. Lea 1910).

The outstanding published contributions of Joe Jennings to the study of karst geomorphology in Australia from the late 1950s to his death in the mid-80s deserves particular acknowledgment. A comprehensive bibliography of Jennings' major published works has been provided, as part of a tribute to Jennings, by Spate & Gillieson (1984).

The advent of the journal *Helictite*, specifically focussed on caves and karst, in 1962, was without doubt a landmark in Australian speleological publishing. It provided a vehicle for the publication of refereed papers and ensured that scientific speleology in Australia could be recorded in a specialist journal. *Helictite* has set the standard in speleological publishing in Australia since its inception in 1962.

### *Review – scientific papers*

A wide-ranging, systematic examination or review of scientific writings about Australian caves and karst is beyond the scope of this report and has not been attempted. What is clear from the above is that a scientific approach was developed early in the documentation of Australian caves and has remained as a strong element in Australian cave studies.

## Official reports

The early interest of government agencies in the protection and management of caves in Australia was unusual, as has been noted by Shaw (1986, p. 10 and 1992, p. 61). Jenolan Caves in NSW were reserved in 1866 and a caretaker appointed in 1867, ushering in a long period of official management of caves for tourism purposes and the preparation of surveys and reports[9] which underpinned that management.

But the first encouragement for the publication of official reports relating to caves in NSW came from the palaeontological discoveries at Wellington Caves. At the urging of none other than Professor Richard Owen of the British Museum in 1867 (Owen 1870), the NSW parliament agreed (in June 1869) to "a careful and systematic exploration … of the limestone caves of Wellington Valley" (Robertson 1870). The Curator of the Australian Museum, Mr Gerard Krefft, was entrusted with the organisation of the work on an initial budget of £200. Professor Owen responded to news of the decision in glowing terms, adding, significantly:

> *I regard this vote as of more importance to the advancement of science than the greatest success in its immediate application, in its relation, namely, as a precedent and example of a recognition by a Parliament of the value of abstract truth irrespective of direct application to material profit*. (Owen 1870b).

This endeavour was fully reported on in the *Journal of the Legislative Council* for 1870 and has been amply summarised by Lane and Richards (1963, pp. 22-25).

Although he had received well over 2,000 specimens from Wellington in 1870, by 1876 Owen, now joined by Sir George Macleay, was again pressing for further exploration of cave fossil deposits, this time through the Agent-General for NSW in London (Foster 1882). On this occasion, however, the ante was considerably raised, in that not just

[9] Official reports, as understood in this context, include all papers by government employees included in official publications, particularly departmental annual or technical reports or parliamentary records.

Wellington, but "certain caves in the Western and Southern districts" [of NSW] were to be explored and the rivers of neighbouring colonies, particularly Queensland, were to be searched for native fish. Despite approaches to all other colonial governments, even that of New Zealand, only NSW took up the proposal. Pressure was added by a supporting letter from the well-known author of *Cave Hunting,* Professor Boyd Dawkins, to Archibald Liversidge, a trustee of the Australian Museum (Liversidge 1882). As a result the Australian Museum formed a committee to manage the exploration of caves and rivers and, in relation to caves it listed its priorities (Cox 1882):

1. Wellington Caves
2. Cowra, or Belubula Caves
3. Abercrombie
4. Wollombi
5. Fish River [Jenolan]
6. Wombean [sic]
7. Wallerawang
8. Cargo
9. Yarrangobilly
10. Murrumbidgee
11. Kempsey

Henry Barnes carried on the work at Wellington and obtained well over 1,000 additional bones. Charles Jenkins, licensed surveyor, was engaged (at his own suggestion) to explore the "Coodradigbee Caves" at Cave Flat, despite the fact that they were not considered a priority by the Committee. Jenkins recovered only recent bones and many Silurian marine fossils (Ramsay 1882). The available funds were expended before any other studies could be undertaken. The entire proceedings of the committee were set out in the parliamentary paper "Exploration of the caves and rivers of NSW (Minutes, reports, correspondence, accounts.)", *Votes and proceedings of the Legislative Assembly* 1882, Vol. 5: 1-52 plus 26 pages of photographs, plans and figures of significant fossil bones.

By 1875 in NSW reports of officers and professional staff such as the Geological Surveyor dealing with cave and karst-related matters were being published in the annual reports of the Department of Mines. The first in a long series of such reports was on the "Blow-

hole" at Kiama, formed by the marine erosion of a basalt dyke (Wilkinson 1875[10]). The publication of such reports continued regularly until 1919 (when Oliver Trickett retired) and occasionally thereafter. These reports from 1875 to 1919, together with the 1870 and 1882 parliamentary papers relating to the exploration of caves and rivers mentioned above and cave related papers in the *Records of the Geological Survey of NSW* (1892-1904), together amounting to 140 separate documents, have been thoroughly listed and indexed by the author (Middleton 1988).

The *Annual Reports of the Department of Mines, NSW* include administrative reports on the caves by C.S Wilkinson, Harrie Wood, W.S. Leigh, T.W.E. David, E.F. Pittman, O. Trickett and D.C.W. Laughlan together with technical reports by Lamont Young, W. Anderson, W.S. Leigh, R. Etheridge Jnr., O. Trickett, L.F. Harper and J.E. Carne on most of the principal cave areas of NSW. The outstanding contribution made to the documentation, protection, management and interpretation of the caves by Oliver Trickett has been documented by Middleton (1991).

In Victoria a somewhat analogous situation seems to have existed in relation to the reports of the Mining Registrars. In 1888 James Stirling produced "Preliminary notes on the geology of the Wombat Creek valley, its caves and silver lodes" and in 1889, "Report on the marble deposits at Limestone Creek" (Stirling 1889a) and "Preliminary report on Buchan Caves" (Stirling 1889b).

In Queensland an official report on Olsens Caves was written by J. Christensen (1903) and published in the *Queensland Government Mining Journal.*

Of invaluable service to speleology in Australia have been official geological reports, particularly those dealing with limestones, which often included references to caves. Pre-eminent among these publications is NSW's Carne and Jones (1919) which was regarded as their 'bible' by the first generation of cavers in that state. It was updated in 1986 (Lishmund et al. 1986) but contained little new information in relation to caves.

A comparable volume was produced in Tasmania in 1957 (Hughes 1957); but this gives little information on caves. For example, in the chapter on Ida Bay, the word "cave" appears only once except for frequent references to Caves Hill; in the chapter on Mole Creek, the fact that some caves are open to the public is acknowledged – and it is admitted

[10] In fact, Annual Reports of the NSW Department of Mines were always published in the following year, but to avoid confusion it is usual for the year to which they relate to be used in citations.

that "many other caverns exist in the area and some of these may be equally suitable for development" - but in considering the availability of limestone for quarrying, it is only stated that "it is extremely doubtful if they [caves] will be large enough to cause any inconvenience". Fortunately, any deficiency in systematic data on karst areas in Tasmania has been thoroughly rectified by Kiernan's *An atlas of Tasmanian Karst,* in two volumes (Kiernan 1995). This identifies and charts each calcareous deposit in the state and indicates its karstic potential.

Western Australia has *The Geology of Western Australia* (Geol. Survey of WA 1975) which gives information on the occurrence of limestone, but little on caves – the only indexed reference to "caves" states that the best remains of extinct marsupials have been recovered from Mammoth Cave in the southern part of the Perth Basin (p. 256). On the Nullarbor, caves (eg Cocklebiddy, Haig, Mullamullang) are mentioned only in so far as they reveal limestone formations.

## *Review – Official reports*

The relatively large number of official reports relating to Australian caves reflects the early interest taken in caves by governments in this country, as noted above. NSW officials were particularly prolific in the production of reports (due initially to the palaeontological discoveries at Wellington and later to interest in caves as tourist attractions) but they were produced also in other states. These authoritative reports were to prove particularly useful in later cave investigations and studies.

## *Guidebooks and picturebooks*

Another category of cave publication, many of them official, is the guidebook. Probably the first was Wilkinson's Jenolan guide, "The Fish River or Binda Caves", published in *The railway guide of New South Wales* (2nd Edn. 1884). This was followed by Foster's *The Jenolan Caves* (1890) which is regarded as a classic although it did not achieve a second edition. (It also includes "Geological observations on the Jenolan Caves by C.S. Wilkinson and Lamont Young, pp. 89-96.) Trickett's *Guide to the Jenolan Caves, NSW* was first published in 1899 and ran to three further editions (1905, 1915 and 1922) and a combined edition with those for Wombeyan and Yarrangobilly caves, probably in 1906. Similar guides were produced for Yarrangobilly (1905 and 1917) and Wombeyan (1906), together with guides in a smaller format for Abercrombie, Bungonia and Wellington caves (all in

1906). Trickett also provided brief notes for the benefit of those going on an excursion to Jenolan Caves from a meeting of the British Assoc. for the Advancement of Science in Sydney in 1914.

Ward L. Havard, known for his history of Jenolan, wrote separate guides to the Orient Cave (1924) and the Lucas Cave (Havard, n.d.). An anonymous guidebook, *Jenolan Caves (NSW): nature's masterpiece* appeared in the 1930s; first published by the Australian Guide Book Co., the second, third and fourth (c. 1951) editions were published by the Gregory Publishing Company (Dunkley 1988). In 1952 the first edition of Dunlop's *Jenolan Caves NSW, Australia* appeared; it ran to a further ten editions by 1979. Byfield's *Let's look at Jenolan Caves* was published by the NSW Department of Tourism in 1977. Henderson produced *Jenolan: a guide to Australia's famous caves* in 1990. In 1997 Charlotte Berry produced a new guide for the Jenolan resort (Berry 1997).

Corrie's guide to Wombeyan Caves appeared in 1899 and the Bowral Tourist Association published a further guide to Wombeyan (pp. 115-127) in its (anonymous) *Southern health and pleasure resorts* in 1904. In 1985 Henderson produced *The Wombeyan experience* (Henderson 1985a).

A second guide to Wellington Caves was probably not produced until Starr & McMillan's in 1985. Henderson produced a guide to Wellington and Abercrombie Caves in 1988.

The author prepared a new guide to Yarrangobilly for the National Parks and Wildlife Service in 1970 (Middleton 1970).

A general work on Jenolan of great significance, and in the nature of a guidebook, was Cook's privately-produced *The Jenolan Caves* (1889). According to Shaw (1992, p. 62) "This was the very first time that such photographs, taken underground, were used as book illustrations, printed by conventional means on ordinary paper."

Whitcombe wrote the first guide for Buchan Caves, Victoria, in 1908. The Victorian Railways issued *Picturesque Victoria and how to get there* (3rd Edn. 1906; 10th Edn. 1910); it included a section on Buchan in the 3rd Edn. (pp. 187-190) with some information on the caves and a separate chapter on Buchan Caves in the 10th Edn. (pp. 232-238) with information on the various caves and the tours available, and 3 photos of the caves. Talent produced *The Buchan Caves* for the Mines Dept., Melbourne, in about 1970. Kent Henderson published a guidebook in 1985, *The Buchan Experience,* (Henderson 1985b) and another for Princes Margaret Rose Caves in 1987.

North Queensland's Olsens Caves, near Rockhampton, had a guidebook produced by the owner before 1962 when *The beautiful Olsen's Caves* achieved its 3rd edition (Olsen 1962). Further north at Chillagoe, Les Pearson produced his souvenir guide to Chillagoe in 1983.

In Western Australia, Ramaciotti edited *The wonderful caves of Western Australia* in 1902. This includes detailed descriptions of the South-west caves, access options and a paper by Simpson explaining the geology and geomorphology. Shapcott's (undated but early 1930s) booklet on Yanchep was published by the State Gardens Board. In 1967 Hyslop, with assistance from Clive Spackman, produced a guide to the Augusta Jewel Cave.

The South Australian Government Tourist Bureau published a guide to Naracoorte Caves, probably about 1920. Wells' *World famous Fossil Cave, Naracoorte* (which shows only his initials, R.T.W.) was published locally in 1975 and Lewis' *Discover Naracoorte Caves,* in 1977. Henderson added a guidebook on Naracoorte and Tantanoola caves to his series, in 1986.

It does not appear that Hastings Caves in Tasmania had a guide book until the Skinners' *Hastings Cave State Reserve, Tasmania* (1976); this was followed by one for Mole Creek in 1978.

The development of photography and cheaper printing saw the rise in popularity of photographic souvenir books. The most successful of the photographic souvenirs were those in large format (black and white) by Harry Phillips, starting about 1909 with *Blue Mountains and Jenolan Caves – an illustrated tourist guide. Jenolan Caves* followed in 1912 with later editions in 1920 and after 1922. *Jenolan Caves, NSW* was first published in 1914 with a 2nd edition in 1920. *Nature's masterpiece: Jenolan Caves* was first issued in 1918, with later editions in 1920-21 and at least a further four editions after 1922. Not only were these large format photographs popular but the 'swing lens' used by Phillips allowed the taking of unique panoramic photos. Phillips' life and work was detailed by Kay (1985).

Full colour picture souvenir books became popular when colour printing became economic. Typical were those produced of Jenolan by Bartel Postcards (Anon. 1992).

Buchan Caves was featured in many photographic souvenirs, from as early as 1907 (Heath 1907). A series of booklets by Bulmer on East Gippsland, but featuring Buchan, was well underway by 1927; it ran to at least seven editions by 1934.

"Mr James Umpherstone's Cave, near Mount Gambier" and two views of Naracoorte Caves were featured in the undated (but probably around 1900) and unattributed photobook *Gems of South Australian Scenery* published as an advertisement by Büring & Sobels, wine merchants of Adelaide. *Views of the Narracoorte Caves, South East S.A.* was published by Harry G. Bevilaqua prior to 1906. *The Naracoorte Caves, South Australia* was published by Clayfield, Millicent. The undated *Narracoorte caves and town: book of views,* published by Davidge features numerous photos of the "Old", Alexandra and Victoria caves. Several editions, all undated, are known. Bradley and Bell published *Glorious Kangaroo Island, its caves and beauty spots,* featuring numerous photos and description of the Kelly Hill Caves around 1927 (Bradley & Bell n.d.)

In Western Australia, Macdougall prepared the undated *Western Australia's wonderland,* Ratcliffe published *Souvenir of the Caves, Western Australia,* also undated and *Picturesque travel in Western Australia,* featuring both Yanchep Caves and the caves of the South-West (Leeuwin-Naturaliste) was published in 1936. This was primarily designed to encourage passengers on cruise-boats to break their journeys and visit the SW of WA, especially the caves. The anonymous *Cave Wonderlands of Western Australia* (covering Jewel Cave, Lake Cave, Mammoth Cave and Yallingup Cave in the south-west) in full colour was published about 1988.

The Queensland Railways produced a booklet *Tours in the Cairns District* in 1915. It features a double page spread of photos in the Chillagoe and Mungana caves, a picture of a Chillagoe limestone bluff and the Balancing Rock near Chillagoe. The Royal Arch, Organ and Snow caves are mentioned (p. 2), as are "the caves of Girofla" (p. 24).

## *Review – Guidebooks and picturebooks*

Although the tourist cave guidebooks were directed at the tourist market, they initially drew heavily on the earlier reports and some reproduced maps and photos from them. In Oliver Trickett's case they were produced by the same officer.

Initially in black and white, the picturebooks utilised colour photography when this became economically feasible. The picturebooks were very popular with visitors as souvenirs; they now provide an interesting record, both of the development of the various caves, and of the way they were seen by the people of the day.

## Popular and non-speleological magazines

Private cave exploration and study developed slowly in Australia, mainly as an adjunct to bushwalking. Bushwalking as a recreational pastime began in NSW late in the 19th century. Some groups just went for day walks but the more serious undertook walks further afield. Myles Dunphy was such a walker; in October 1913 he and Bert Gallop undertook a two-week trip from Picton Lakes via Yerranderie, Colong Caves, Mt Werong and Wombeyan Caves to Mittagong (over 250 km). At Colong they inspected the Onslow Cave and met Smith and Fattorini, miners from Yerranderie who were blasting obstacles in the cave (Meredith 1999 pp. 53-54). Although Dunphy kept a detailed log, it was not published. Dunphy's Mountain Trails Club, formed in 1914, spawned the Sydney Bush Walkers in 1927 and it did publish reports of its activities. The *Sydney Bush Walker Annual* (No. 2) for 1935 recorded that in 1933 and again in 1934 the SBW visited Tuglow Caves (Moriarty 1935) and, in 1934, ran a large-scale (21 person) trip to Colong Caves (Reichard 1935).

With the rise of organised speleology (see next section) came a desire for publicity through newspapers and popular magazines. Some of it may have been inspired by the hope of recruiting new members, some was written by journalists looking for unusual stories, sometimes it promoted safe caving or conservation - and some was probably plain publicity-seeking. They were generally well illustrated. From the 1970s this form of publicity tended to be avoided by organised speleologists as it was considered undesirable to encourage novices to go looking for thrills in caves. The following are a few examples, mainly from the 1950s and 60s.

***Australasian Post***

February 1957: Jonathan Cole: "Never Never Underworld" – sixty Australian speleologists (led by Elery Hamilton-Smith of Melbourne) explore cave on the Nullarbor Plain, inspired by the stories of Captain Maitland Thompson.

August 1960: K.G. Willey: "Vast caves hid a mystery river! – cavers at Katherine, NT have found an underground lake and river.

***Australian Outdoors***

May 1959: Edward de Villa: "Dive into darkness" – SSS diving at Jenolan.

September 1959: Frauca, Harry: "The cult of the cave" – epic tales of "toughies" who relish adventure underground – exploration of Growling Swallet, 'Pillinger Pothole', Exit Cave and Kubla Khan in Tasmania.

May 1960: Harry Frauca: "Deep dark dive: the coldest, darkest cave dive was recently accomplished in Tasmania, where three divers explored underground Alph River" – Kubla Khan resurgence.

December 1960: Joe Frank: "Danger 500 feet down: In a bizarre world of glow worms, colourless mosquitoes, waterfalls and crashing rock, they set a record by descending 560 feet into Australia" – TCC exploration of Growling Swallet.

January 1961: Ross Elliot: "A cave of mystery" – Cliff Spackman and Lloyd Robinson's discoveries in Augusta Jewel Cave, WA.

July 1961: Cliff Calder: "Plumbing the Never Never" – Mount Isa Speleological Society explores caves near Camooweal, Queensland.

***Australian Women's Weekly***

July 1960: Penny Ford: "Caves and cameras mean fun and finance" – a group of Sydney University students is making money selling cave slides.

February 1962: Frank Hurley: "Captain Hurley's last expedition: Surprises on the Nullarbor" – exploration of Nullarbor caves weeks before author's death.

August 1963: Colin MacKay: "Cavewoman of 1963" – a woman seeks to break the world cave-sitting record in Ngilgi Cave at Yallingup, WA.

October 1965: Jenny Irvine: "How to be a cavewoman" – account of a woman caver.

***Man***

November 1960: Harry Frauca: "Aiming for Hell: The perilous sport of potholing has taken man 3231 ft under the ground — into a fantastic world of frozen rivers and waterfalls" – slightly sensationalised general article on cave exploration.

***People***

May 1955: Anonymous: "A mermaid joins the cavemen" – Lois Linklater is the only woman member of the Underwater Explorer's Club and dived in Imperial Cave at Jenolan.

August 1957: Harry Cox: "Abos lived under the Nullarbor: the original Australians may have been cavemen" – sixty speleologists explore Nullarbor Caves and Dr Gallus finds evidence of Aboriginal occupation in Koonalda.

September 1959: Harry Frauca: "The cave divers: from behind masks, the frogmen stared in wonder at the eerie sights in an underground stream" – diving in Kubla Khan resurgence, Mole Creek.

January 1960: Adam Smith: "They just gotta glow" – glow worms at Waitomo Caves, NZ.

April 1960: Harry Cox: "Australia's ice age men: ancient artisans toiled in a cave about 200 ft below the surface" – detailed description of Dr Gallus' finds in Koonalda Cave.

September 1960: Harry Frauca: "The potholers: daring Tasmanian cavemen pioneer fresh tourist attractions" – exploits of TCC.

***Pix***

July 1955: Anonymous: "They seek new caves to conquer" – members of Sydney Speleological Society excavate The Efflux at Bungonia.

July 1957: Anonymous: "Drama in icy cave: frogman explorers near death when gear tangles in perilous swim" – breathless recounting of a cave dive in Imperial Cave, Jenolan by the Underwater Research Group.

April 1965: Mal Leyland: "The strange world beneath us" – NSA activities at Timor.

***The Etruscan*** (Bank of New South Wales)

March 1958: J.N. Jennings: "Caves and caving in Australia" – general article on activities of caving groups in Australia.

***Walkabout, the journal of the Australian Geographical Society***

April 1939: E.J. Brady: "Some Australian caves"

July 1947: J.M. Thomson: "Nullarbor Caves"

November 1952: J.M. Thomson: "The Nullarbor"

May 1954: H. Fairlie-Cunningham: "The Golden Stairway" – cover photo of formation in Croesus Cave, Mole Creek.

February 1956: Arnold Wright: "Caves beneath the Nullarbor" – Maitland Thompson guides a party of boy scouts exploring Nullarbor caves.

November 1957: Douglas Kemsley: "The mysterious Nullarbor Plain" – exploring with Captain Maitland Thompson.

July 1958: Lennox V. Bastian: "Caveman's glory: exploring a new cave at Augusta, Western Australia" – discovery and exploration of the Augusta (Jewel) Cave by the author and Lloyd Robinson.

January 1961: Elery Hamilton-Smith: "Underground adventure" – general promotional article on caving in Australia.

***Wild Life (Australian Nature Magazine)***

December 1950: G.D. Lyons: "Tasmanian caverns claim world records" – makes some dubious claims about unsurpassed quality of some Tasmanian speleothems.

***Woman's Day with Woman***

December 1959: Noel Ottaway: "Cave Women 1959: they stepped back into the prehistoric past in search of a monster believed to be extinct" – three women go caving with SSS.

### *Popular magazines – review*

The articles cited here represent a phase in the development of Australian speleology when adventurers were promoting themselves, 'outback' tourism was firmly establishing itself and fledgling caving groups were keen to attract new members. While they generally glorified and exaggerated the adventure and danger elements in underground activities, they also served to inform the community about little-known aspects of the natural environment, widen public appreciation of the diversity of Australian outdoor activities and demystify some of the esoteric practices of 'modern cavemen'. Despite their frequent superficiality, these articles, and especially their photographs, serve as a valuable record of a period in the development of Australian speleology which is otherwise poorly documented.

## Speleological serials

### *Overseas*

Since Australian organised speleology was relatively late starting it's hardly surprising that the first published reports in speleological serials appeared overseas. Probably the first was Tissandier, on Jenolan, in the French journal *Spelunca* in 1895; much later O'Brien published an overview of Australian speleology in the *Bulletin of the National Speleological Society* (1959). The latter, incidentally, includes a listing of Australian

speleological serials of the day: *ASF Newsletter, SUSS* (Journal of the Sydney University Speleological Society), *Communications* (SSS), *C.S.A. Reports* (Cooranbong Speleological Association), *Victorian Cave Exploration Society Occasional Papers* and *Tasmanian Caverneering Club Handbook.*

## *Australian*

### Tasmanian Caverneering Club

Organised speleology began in Australia with the formation of the Tasmanian Caverneering Club in September 1946 "under the guiding influence of Professor S.W. Carey" (Iredale 1953). Initially the group produced only a single page *Circular*, the oldest of these to survive is undated but was produced in November 1947. The earliest extant Australian speleological serial is thus probably TCC's *First Annual Report* (1946-47). Though undated, the financial records are given to 30 June 1947 so it was probably produced in July 1947.

Early members were quite open about why they had formed the club:

> *Caverneering is not a solitary sport. Places which are impossible for a single prudent person may be quite straightforward for a party of three or four. The only way of being able to find another two or three people regularly free, willing and reasonably expert is to form a club. On the whole people eccentric enough to like crawling in dirty holes are not particularly clubby, but there we are – we have been forced into it, and, since we must have a club, we are trying to make its members efficient.* (Lewis, Long & Woolhouse 1953)

They had no airs about being highly principled scientists or cave documenters and don't seem to have been particularly concerned about conservation[11]:

> *We're not out to popularise caving. At the moment there are lots of new holes to be discovered in Tasmania, and, as there are few thrills to equal finding them, we don't want a lot of other enthusiasts getting there first. But if you like caves and don't jar too much on the nerves of other members we're prepared to let you join. As we say, we want to find the new stuff, but if you prefer to take*

[11] But it should be noted that at the back of the first Annual Report (1946-47) was the following: "All members are required to sign the following undertaking:

I agree to (a) accept the discipline of the party leader while under ground.
(b) preserve the caverns from damage or disfigurement by such acts as souvenir collecting or marking of names or initials etc. in caverns."

> *photographs or do serious studies of the hydrology or biology of caves we'll welcome you with open arms too.* (ibid.)

The need for a more enduring regular publication was satisfied by production of the *Bulletin of the Tasmanian Caverneering Club*; vol. 1. no. 1 being produced in 1957, edited by Albert Goede. This contained articles of a general or overview nature, designed to educate members about elements of speleology. Later issues added reports of special events and summaries of exploration activities. Trip reports were generally not published. The planned quarterly production (Goede 1957) was not possible but No. 2 appeared in July 1958. No. 3 followed in December 1958 but No. 4 did not eventuate until September 1960. Some papers were prepared for No. 5 but it was never published (they remain in the TCC Archives).

Meanwhile, the circular was upgraded in December 1960, numbered from #1 and given the name *Speleo Spiel* with the (anonymous) announcement:

> *New Name & Format.*
> *Once upon a time someone thought that they'd like to change the shape of things, so he did, and it is. As for the name it means "Cave Talk", which I think is appropriate. Any comments? If so, the Hon. Sec. will listen to (and probably ignore) them.*

This series lasted for 7 issues, the title *Speleo Spiel* being dropped on the 7th (May 1962) and an unnumbered, nameless circular was reinstated. It lasted another four years until, in April 1966, a new series of *Speleo Spiel* was commenced. With minor changes this serial continues today. As with most such group's newsletter-type publications, the basic element is the trip report, a detailed record of the activities of a party of cavers over a day, a weekend or, occasionally, a longer expedition. To these are added accounts of social events, records of biological, geomorphological, geophysical, etc observations, historical accounts (including reprints of obscure accounts), reviews of significant papers and new books and other items on caves and karst, generally written by, and of interest to, the group's members. These magazines are always distributed to members, generally exchanged with other groups (including overseas and international bodies) and generally deposited in relevant state, and the national, libraries. Some are now being made available through the internet.

**Sydney University Speleological Society**

The second Australian speleological group was formed at Sydney University in 1948. The author is not aware of any circular-type publication until 1956; SUSS seems to have launched, within 20 months of its inception, straight into a journal (which appeared to have the simple name *SUSS* but was generally regarded as *SUSS Journal).* Its editor(s) had loftier ambitions than their southern cousins; they explained that henceforth every trip should result in a report (presumably to be published). The aims of the Journal were stated as:

> *(1) to serve as a vehicle for the interchange of ideas and opinions in items of speleological interest,*
>
> *(2) to provide a medium for the publication of data from reports, and original observations on Australian caves.* (Anon. 1950)

It was probably fairly successful in perusing these aims; it continued in production until 1968 when it was subsumed into the *SUSS Newsletter* (successor to the *SUSS Circular),* subsequently the *SUSS Bulletin* (from 1971), reduced to *SUSS Bull* in 1996 and continuing, quarterly, at a high standard.

**Sydney Speleological Society**

SSS was formed in 1954 by a breakaway group from SUSS, dissatisfied with the administration's requirement that only students, staff or alumni could be full members of university societies (Bonwick 1994).

The group's first publication was an irregular circular called *News Sheet.* In 1957 this was given the name *News Bulletin* and became a fairly regular monthly.

In 1956, following a familiar pattern, the need was felt for a more substantial 'journal of record' type publication, so *Communications* was born. Two large issues were produced in 1955-56 but in 1959 it was decided to rename the (unnumbered) *News Bulletin* as *Communications* and continue the series as a monthly. A news sheet titled *Stop Press* was issued as a supplement to *Communications* from May 1962, but replaced that publication entirely in December 1962. Volume numbering and continuous pagination was introduced from Volume 11[12], 1967, and in 1970 it was deemed appropriate to change the name to *Journal of the Sydney Speleological Society,* as which it continues. The current editor,

[12] The volume number was derived by counting back each year to the first *News Bulletin* in 1957.

Ross Ellis, has produced *Stop Press* and the *Journal* virtually every month since May 1965 – probably a publishing record unmatched in the annals of speleology.

The Society has produced a series of eleven Occasional Papers and produced *Australian Speleo Abstracts* (with ASF) from 1970 to 1979. (Comprehensive abstracting was not carried out in Australia in the 1980s and early 90s, though a few of the larger newsletters and *Helictite* were abstracted for the International Union of Speleology's *Speleological Abstracts* during that time. Coverage of Australian speleological serials has been comprehensive again from 1997.)

**Summary**

Space does not permit a detailed overview of the development of each group's publications but the examples described above are fairly typical of the sorts of publications usually produced and the ways they change over time. As all of these groups' activities are generally voluntary, a high level of variation is common in content and standard.

**Details of Australian speleological serials**

As complete details as the author has been able to compile of all Australian speleological serials to the present (mid 2004) are set out in the "Annotated catalogue of Australian speleological serials to 2004" contained in the Appendix. All of these serials do not exist in any one place and not all have been sighted for the present work. Reliance has been placed on the original listing (Hamilton-Smith and Middleton 1971), with some alterations, and with additions from the ASF Library holdings list (by Cathy Brown, the author's catalogue of the Southern Tasmanian Caverneers library and STC archives and the Hamilton-Smith Library.

**Observations and trends**

Regret was expressed in Hamilton-Smith and Middleton (1971) at the undesirably large number of Australian speleological serials that had been published for a period and then been discontinued - this situation has not changed. As the 'Classified Summary' at the back of the Appendix shows, since 1971 some 44 such serials (some of them starting after 1971) have ceased publication – generally because the publishing group failed (24); in the other cases the publication seems to have just been discontinued (though in two cases its role was taken over by others). Of the 26 publications active in 1971, 11 are now defunct. Of the 43 new publications since 1971, 31 have, or appear to have, ceased.

Some trends which were observed in the 1971 paper have continued, most notably the publication of the proceedings of ASF Biennial Conferences (with the notable exception of the 9th) and the proceedings of the cave management conferences (since 1991 under the auspices of ACKMA). Occasional papers have continued sporadically – as is their nature – with some outstanding examples.

A continuing trend is the ever-improving standard of printing and, in some cases, binding – showing a willingness, in such cases, to put more resources into the group's publications. This is not necessarily matched by increased quality of content and in some cases has been achieved with reduced frequency (*The Western Caver,* which has been reduced from bimonthly to annual, being the extreme example). New printing techniques have allowed for greatly increased use of photographs (not always successfully) and, in most recent times, even colour photographs. Colour is still a major luxury and is usually only possible given a friendly printer or a philanthropic contributor. The use of colour is greatly facilitated by another, major development - publishing on the internet or on digital media. If these methods are employed colour can be incorporated at virtually no extra cost (unless the recipient requires a 'hard' copy, in which case the recipient bears the cost of production).

ASF has utilised the internet for distribution of its *Speleo-E-Bulletin* (from May 1999). In this case the benefit was seen as speed of transmission of timely information at low cost, rather than the use of colour (or any graphics). Some groups, such as Southern Tasmanian Caverneers and, at least until 2003, Newcastle and Hunter Valley Speleological Society, now regularly distribute their newsletters by making them available (to members, and perhaps others) through a web site in a fixed format such as PDF. *The Jenolan Guide,* privately produced by Rob Whyte, is an outstanding example of this *genre* (though sadly none of the 9 issues produced so far carry a date).

Those who access the relevant website, or in some cases only authorised people, can read or download (and print) these documents at their leisure. This technique is so far more common among New Zealand cave groups than among those in Australia.

It is likely that increasing use of this form of publication, or digital publication through CDs will greatly enhance groups' capacities to produce high quality (and large) publications at very reasonable cost. Examples include the *40th Anniversary Magazine on CD* produced by ISS in 2003 and the *ACKMA Insights* CD and its successors (*Conference proceedings and journal articles)* produced by ACKMA since 1999.

The capacity of digital media to store vast quantities of data, to be easily reproduced, to allow the data to be conveniently organised and to be of low cost has encouraged the Southern Tasmanian Caverneers to embark on a daunting publishing exercise: the production of an integrated archive of all of that club's and its predecessors' published and archived information, together with such other information on Tasmanian caves as copyright requirements will allow. Members are currently undertaking the digitising of publications and records back to at least 1947 and a program has been written to allow for the arranging of this data, together with photographs and surveys (and the data on which they are based) in such a way as to allow detailed searches and the provision of hyperlinks. While the current cost in terms of members' time is considerable, the reproduction costs will be very low, updating will be relatively easy and the benefits in terms of access to information *and the safeguarding of that information from loss* will be inestimable. Restricting access to certain information such as cave locations (if these are included in the archive) poses some problems.

A less formal way of distributing information (stretching 'publication' beyond its traditional meaning) is provided by e-mail 'lists', either monitored as with the USA's *Cavers Digest* (providing more of the impression of a 'publication') or unmonitored as in the case of our *Ozcavers.* While this has great potential to transfer information rapidly to large numbers of people, and to obtain rapid feed-back in appropriate cases, like the wider Internet, it has the danger of circulating dis- and mis-information (especially through unmonitored lists) and it can result in unwanted 'information overload' by the recipients. It is, however, something that appears to be here to stay and – barring collapse of the Internet or relevant servers – should provide great benefits in terms of information exchange.

# Cave inventories

## *New South Wales*

Trickett produced Australia's first list of caves/cave areas in his "The limestone caves of New South Wales", which was also our first speleological bibliography (Trickett 1897). Trickett listed 22 groups of caves or 'cave areas' in NSW.

This was not attempted again until 1956 when Anderson produced "Cave areas of New South Wales", including notes on each area, the main named caves of each and an extensive bibliography (Anderson 1956). He listed 49 cave areas.

SUSS's *The caves of Jenolan. 2: The Northern Limestone* (Welch 1976) contains an inventory of the known caves in the northern part of the Jenolan limestone belt. The belt is divided into 15 areas or bluffs and the caves in each are listed and described with surveys.

Hills Speleology Club produced an inventory of *Glenrock Caves,* a small karst area in the Hunter Valley, NSW, in 1987 (Pinnock 1987) and in 1992, *A guide to Mount Fairy Caves* (Hills Speleology Club 1992).

## *Tasmania*

The Tasmanian Caverneering Club had plans to publish a summary of information on each caving area at least as early as 1963. On the first page of the *TCC Handbook* (2nd Edition) it was stated

> *This is Part 1 of the Handbook of the Tasmanian Caverneering Club. Part 2, to be published later, will deal with Tasmanian caving areas.*

As is often the case with such good intentions, it didn't happen that way, but Tasmanian cavers did produce such an inventory in 1973 or 74. *Caves of Tasmania* (Goede et al 1973) contains a listing of known caves by cave area. It appears to have been prepared for the never-published second edition of *Speleo Handbook;* it had very limited circulation and its publication details are unknown.

## *South Australia*

In 1976 Ian Lewis produced a similar volume for South Australia, briefly describing the caves region by region (Lewis 1976).

In 1982 the Subterranean Foundation (Australia) Inc. published (for CEGSA as its *Occ. Pap.* 7) the *Nullarbor Caving Atlas* in two volumes (Pilkington & Mott 1982). This included a list of features ordered numerically, feature names ordered alphabetically, map sheets, land tenure details, locality maps, available maps, lists of longest and deepest and karst feature summaries (the inventory proper). A second edition was produced in 1986.

The *Lower South East Cave Reference Book* by Peter Horne (1993) was a valuable regional cave inventory published by CEGSA and the author.

## *Queensland*

Chillagoe Caving Club produced "speleological field guides", listing all known caves and other karst features, starting with the Chillagoe-Mungana-Rookwood and Mitchell-Palmer

karsts, in 1982 (Robinson 1982). This was followed by a Chillagoe supplement in 1988 (Robinson 1988) and a similar listing for the Mitchell-Palmer karst (Chillagoe Caving Club 1988).

## *Victoria*

In 1986, as part of a report on management of Victorian caves and karst, Davey & White produced a catalogue of cave areas and sites, giving a description of each cave and a range of other information.

Victorian Speleological Association published an annotated atlas of the Bats Ridge karst area in its newsletter, *Nargun,* in 1984 (White 1984). This included a list of all known caves in the area, notes on each and, where available, a map.

## *Australia*

The monumental "Australian caves" was produced for ASF by Peter Matthews (with a lot of helping from constituent clubs) in 1968 as part of the Federation's *Speleo Handbook* (Matthews 1958). It listed caves by cave area and by state, for all (plus Papua New Guinea) except Western Australia (from where information was not received in time). Eighty-three cave areas were listed for NSW, 5 for NT, 18 for Queensland, 6 for South Australia, 21 for Tasmania and 17 for Victoria. Key references were cited for each area.

While a second edition of *Speleo Handbook* was contemplated for some time, in 1979 Matthews produced "a simple register of the currently allocated cave numbers, cave names and area codes … as an interim list to help people keep track until the much fuller *Australian Karst Index* is published" (Matthews 1979). While it was decided that a new complete *Speleo Handbook* would be too great a task, in another 6 years Matthews produced a further comprehensive annotated cave list, this time entitled *Australian Karst Index 1985* (Matthews 1985). As well as lists of caves by area and by state, it included a map list, extensive reference list, gazetteer of cave names, statistics (6639 caves and karst features were listed), details of the karst index system, ASF documentation standards and addresses.

It is unlikely that an Australian karst index will ever again be produced in 'hard copy'. The existing data has now all been fed into a database and will in future be maintained on a state-by-state basis over the internet, with access being available to those interested to appropriate levels.

## Books, monographs

Few true books on Australian caves or karst have been published. Cook's *The Jenolan Caves: an excursion in Australian wonderland* (1889), already mentioned, was one of the first. Barrett's *Caves, cliffs and waterfalls* (1944), although very much a 'popular' account, stands out in the period when little was being published on Australian caves. Local or regional monographs, some published by speleological groups in their *Occasional Papers* series, and thus already mentioned, could also be considered in this category. The first significant one of these was *Mullamullang Cave Expeditions* produced by CEGSA (Hill 1966) followed by SRC's *Caves of the Nullarbor* (Dunkley & Wigley 1967). Other high points in this genre were UQSS's *Mount Etna Caves* (Sprent 1970) and SSS's *Bungonia Caves* (Ellis et al. 1972), both of which had a conservation focus and the Queensland Museum's entire part of the *Memoirs of the Queensland Museum* in 1978 which was devoted to papers dealing with aspects of the area which was to be flooded by the Glenlyon Dam, particularly a large part of the Texas Caves. The volume includes Grimes (1978) on the geology and geomorphology and Archer on the palaeontology (1978a) and modern fauna (1978b) of the Texas Caves.

SSS also later produced *Wombeyan Caves* (Dyson et al. 1982) and a 2nd Edition of Shaw's *History of Cave Science* (1992). Julie & Peter Bauer privately published *Under Bungonia* in 1998 and in the same year SUSS produced *Tuglow Caves* (Cooper et al. 1998).

In 1993 Humphreys put together a supplement to the *Records of the Western Australian Museum* which comprehensively dealt with the biogeography of the Cape Range, Western Australia (Humphreys 1993).

The South East Karst Province of South Australia was the subject of a compilation by Grimes, Hamilton-Smith and Spate in 1995. This included overviews of history, geology, karst landforms, hydrology, flora & fauna, etc and reviewed the caves by region; it also dealt with their values and future management (Grimes, Hamilton-Smith and Spate 1995).

Books originating from 'mainstream' publishers (with the exception of Barrett's) have been rare until recent decades. The first of these was Jennings' seminal *Karst* in 1971 (and the second edition, *Karst Geomorphology,* in 1985), followed in 1996 by Gillieson's *Caves: processes, development, management* in and, most recently, Finlayson & Hamilton-Smith's *Beneath the surface* (2003). These, together with the primarily-Australian (Watson et al.) *Guidelines for cave and karst protection* in 1997 and the significant Australian

contributions to Klimchouk et al.'s *Speleogenesis: evolution of karst aquifers* and Gunn's *Encyclopedia of caves and karst science* (2004), show that Australia continues to 'punch well above its weight' in the world of cave and karst literature.

## Conclusions

Australian speleological publications have been shown to have developed slowly but steadily from incidental mention of cave and karst features in personal accounts of travellers in the closing years of the 18th century, through the first period of interest in palaeontological sites[13] (1830-1890), the period of high 'official' interest (1880s to 1920s), the period of early tourism interest (1890s to 1940s), to the current period of 'organised speleology' (since 1950). During this time the scientific component has waxed and waned, reaching high points in the 1830s, 1890s and 1970s, while tourism interest reached an early peak in the late 1890s and again in the 1960s.

Changes in the level of interest in organised speleology since 1950 could probably be assessed by monitoring the volume of publication by caving societies. The data required for this is not currently available but the impression is gained that there was a peak in the 1970s which has probably not been reached in more recent years. The current level of activity (as reflected by the number of publications) appears to be fairly stable and is probably sustainable.

It is difficult at this point to predict the impact of digital technology on speleological publication but it is certainly making more information available more quickly than has been the case. The demise of 'hard copy' publication looks increasingly likely, because of the relative advantages in terms of cost, accessibility, distribution and storage associated with digital media.

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[13] A second major period of interest in cave palaeontological sites was associated with Naracoorte from 1969.

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## References

ANDERSON, M. 1996 *Story of Pittwater 1770 to 1920.* Ruskin Rowe Press: Avalon Beach. 64 pp. Reprinted from *J. & Proc. Roy. Aust. Hist. Soc.*, 6(4) (1920).

ANDERSON, Ronald 1956 Cave areas of New South Wales. *Communications,* 2: 24-56

ANDREWS, Alan E.J. 1998 *Earliest Monaro and Burragorang 1790 to 1840.* Tabletop Press: Palmerston, ACT. 208 pp.

ANGAS, George French 1847 *Savage life and scenes in Australia and New Zealand.* Smith, Elder and Co. Vol. 1 339 pp. (Facsimile edition: Libraries Board of South Australia 1969)

ANON. 1895 The glow worm caves of Tasmania. *Scientific American,* 23 Nov. 1895.

ANON. 1904 *Southern health and pleasure resorts.* Bowral Tourist Association: Bowral, NSW (Wombeyan section pp. 115-127)

ANON. 1936 *Picturesque travel in western Australia.* Government Printer: Perth. 32 pp.

ANON. 1950 For the record . . . . *SUSS Journal,* 1(1):1-2

ANON. 1988 *Cave Wonderlands of Western Australia*: *Jewel Cave, Lake Cave, Mammoth Cave and Yallingup Cave.* [Publisher not identified] 28 pp.

ANON. 1992 *Jenolan Caves Australia.* 6th Edition Bartel Postcards: Waterloo NSW. 28 pp.

ANON. n.d.a *Gems of South Australian Scenery.* Büring & Sobels: Adelaide 24 pp.

ANON. n.d.b *Souvenir of the Caves, Western Australia.* A.J. Ratcliffe: Perth 16 pp.

ARCHER, Michael 1978a Quaternary vertebrate faunas from the Texas Caves of southeastern Queensland. *Mem. Qld. Mus.,* 19(1):61-110.

ARCHER, Michael 1978b Modern fauna and flora of the Texas Caves, southeastern Queensland. *Mem. Qld. Mus.,* 19(1):111-120.

AUGUSTEYN, Ann 1995 *The history of Olsen's Capricorn Caverns 1882-1994.* The Author. 36 pp.

BARRALLIER, F. 1897 Barrallier's Journal [in] Bladen, F.M. (Ed.) *Historical records of New South Wales,* Vol. V, App. A, pp. 749-825

BARRETT, Charles 1944 *Australian Caves, cliffs and waterfalls.* Georgian House: Melbourne. 127 pp.

BARRETT, C.L. & KENYON, A.S. 1958 *Australian Aboriginal art.* (2nd Edn.) The Trustees of the National Museum of Victoria: Melbourne. 39 pp.

BARRINGTON, George 1793 or 1794 An impartial and circumstantial narrative of the present state of Botany Bay in New South Wales … S. & J. Bailey: London

BAUER, Julie & BAUER, Peter 1998 *Under Bungonia.* JB Books - Life on Paper: Oak Flats, NSW 284 pp.

BERRY, Charlotte 1997 *Rediscover Jenolan: a guide to scenic attractions and activities in the Jenolan Caves and surrounding districts.* Jenolan Caves Resort: Jenolan Caves.

BEVILAQUA, Harry G. <1906 *Views of the Narracoorte Caves, South East S.A.* The Author: Naracoorte. 12pp.

BONNEMAINS, Jacqueline; FORSYTH, Elliott and SMITH, Bernard 1988 *Baudin in Australian waters: the artwork of the French voyage of discovery to the Southern lands 1800-1804.* Oxford University Press: Melbourne. 347 pp.

BONWICK, James 1958 *Western Victoria: its geography, geology and social condition: the narrative of an educational tour in 1857.* Thomas Brown: Geelong 190 pp. (Facsimile edition with notes by C.E. Sayer; William Heinemann: Melbourne 1970).

BONWICK, JOHN 1994 The first ten years [in] HALBERT, Erik & BONWICK, John. The history of the Sydney Speleological Society 1954-1994. *Sydney Speleological Society Occ. Pap.* 12. pp. 1-16

BRADLEY, J.F. & BELL, Harold n.d. (c. 1927) *Glorious Kangaroo Island.* Bradley & Bell: Kangaroo Island. 80 pp. [Includes Bell's "Kangaroo Island caves: the story of their discovery and exploration. Pp. 37-66]

BRADLEY, William 1969. *A voyage to New South Wales 1786-1792. The Journal of Lieutenant William Bradley RN of HMS Sirius.* Reproduced in facsimile from the original manuscript by the Trustees of the Public Library of NSW in association with Ure Smith Pty Ltd.: Sydney.

BULMER, H.D. n.d. *Beautiful East Gippsland.* 3rd Edn. The Author: Bairnsdale. 36 pp.

BULMER, H.D. n.d. *Lakes Entrance, Bairnsdale, Gippsland Lakes and Buchan Caves.* 4th Edn. (of "Beautiful East Gippsland") W. Stanley Vogt: Bairnsdale, Vic. 24 pp.

BULMER, H.D. 1927 *East Gippsland and its Gateway.* Carter and Taverner (for Bulmer): Melbourne. 32 pp.

BULMER, H.D. 1930 *East Gippsland.* Mortons Ltd (for Bulmer): Melbourne. 32 pp.

BULMER, H.D. 1934 *East Gippsland and Lakes Entrance.* 7th Edn. Truth & Sportsman Ltd (for Bulmer): Melbourne. 32 pp.

BURR, Thomas 1845 Account of Governor G. Grey's exploratory journey along the south-eastern sea-board of South Australia. *Journal of the Royal Geographical Society of London,* 15(1): 163-184.

BYFIELD, C.C. 1977 Let's look at Jenolan Caves. Marcol Publications: Hughes, ACT for NSW Department of Tourism. 30 pp.

CARNE, J.E. & JONES, L.J. 1919 The Limestone Deposits of New South Wales. *Mineral Resources* No. 25. Geological Survey, Dept. of Mines: Sydney. 411 pp.

CHALLIS, Kate and SMITH, Bernard (Ed.) 2000 *Tales from Sydney Cove.* The Helicon Press: Wahroonga, NSW. 128 pp.

CHALOUPKA, George 1999 *Journey in time: the world's longest continuing art tradition.* Reed New Holland: Sydney 256 pp.

CHILLAGOE CAVING CLUB INC. 1988 *Mitchell-Palmer karst: a speleological field guide for the towers and caves of the Mitchell-Palmer areas in far North Queensland.* Chillagoe Caving Club Inc.: Cairns. 142 pp.

CHRISTENSEN, J. 1903 Olsen's Caves near Rockhampton. *Queensland Government Mining Journal.* [Incomplete citation from Augusteyn 1995]

CLARKE, W.B. 1860 *Researches in the Southern Gold Fields of New South Wales*. Reading & Wellbank : Sydney

CLAYFIELD, W.J. n.d. *The Naracoorte Caves, South Australia.* The Author: Millicent, S.A. 10 pp.

COOK, Samuel 1889 *The Jenolan Caves: an excursion in Australian wonderland.* Eyre & Spottiswoode: London. 192 pp.

COOPER, Ian; SCOTT, Martin & VAUGHAN-TAYLOR, Keir 1998 *Tuglow Caves.* 65 pp + map.

CORRIE, A.P. 1899 *The Wombeyan Caves and the Bowral, Mittagong and Moss Vale tourist districts.* Argus Publishing Works: Parramatta, NSW 32 pp.

COX, James C. 1882 Copies of minutes of the proceedings of the Committee appointed to manage the exploration of caves and rivers. Exploration of the caves and rivers of NSW (Minutes, reports, correspondence, accounts.) *Votes and proceedings of the Legislative Assembly* 1882, Vol. 5: 21

DALY, J. and DALY, L. 2000 *Take a walk in a national park: Sydney to Port Macquarie: Ku-Ring-Gai Chase National Park.* Take a Walk Publications: Brisbane 224 pp.

DANES, J.V. 1910 Physiography of some limestone areas in Queensland. *Proc. Roy. Soc. Qld.,* 23(1):73-86

DANES, J.V. 1917 Karststudien in Australien. *Sitzungsberichte Koniglichen Bohmischen Gesellschaft Wissenshaften [Proc. Royal Scientific Soc. of Bohemia, Branch for Mathematics & Natural Science]* #6 (75pp.)

DAVID, T.W.E. & ETHERIDGE, R. 1889 On the examination of an Aboriginal rock shelter and kitchen midden at North Harbour, Port Jackson. *Rec. Geol. Surv. N.S.W.,* 1(2):140-145

DAVIDGE, G.W. n.d. *Narracoorte caves and town: book of views.* Davidge: Naracoorte. 28 pp.

DAVEY, Adrian G. & WHITE, Susan 1986 *Victorian caves and karst: strategies for management and catalogue.* (Report to Dept. of Conservation, Forests and Lands). Applied Natural Resource Management: Canberra. 315 pp.

DUN, W. S. 1893 On palatal remains of *Palorchestes azael,* Owen, from the Wellington Caves bone-deposit. Rec. Geol. Surv. NSW, 3(4): 120-124.

DUNKLEY, John R. 1988 *A bibliography of the Jenolan Caves. Part 2: Literature.* Speleological Research Council Ltd.: Sydney 45 pp.

DUNKLEY, John 2002 Explorers, surveyors, missionaries and travellers: the first chapter of Australian speleological history 1788-1838. [in] Brown, C. (Ed.) *Proceedings of 2001: a cave odyssey* ASF: Broadway pp. 96-122

DUNKLEY, J.R. & WIGLEY, T.M.L. (EDS) 1967 *Caves of the Nullarbor.* Speleological Research Council Ltd: Sydney 62 pp.

DUNLOP, B.T. 1952 *Jenolan Caves NSW, Australia.* Dept. of Tourist Activities and Immigration: Sydney 96 pp.

DYSON, H. Jane, ELLIS, Ross and JAMES, Julia M. (Eds) 1982 *Wombeyan Caves. Sydney Speleological Society Occ. Pap.* #8. 224 + viii pp.

EDWARDS, Hugh 1966 *Islands of Angry Ghosts.* Hodder and Stoughton: London. 207 pp.

ELLIS, Ross; HAWKINS, Lyndsey; HAWKINS, Robert; JAMES, Julia; MIDDLETON, Gregory; NURSE, Benjamin; WELLINGS, Gleniss 1972 *Bungonia Caves. Sydney Speleological Society Occ. Pap*. #4. 230 pp.

ELLIS, Ross & MIDDLETON, Greg 2002 Limekilns – first written record of an identifiable Australian Cave? *J. Sydney Speleol. Soc.,* 46(9): 237-242

ETHERIDGE, R. & TRICKETT, O. 1904 The discovery of a human skeleton at Jenolan Caves. *Records of the Geological Survey of NSW,* 7(4):325-328

FLINDERS, Matthew 1895 Narrative of an expedition in the Colonial sloop Norfolk, from Port Jackson, through the Strait which separates Van Diemens Land from New Holland … [in] Bladen, F.M. (Ed.) *Historical records of New South Wales.* Government Printer: Sydney. Vol. III (1796-1799) App. B. pp. 769-818.

FOSTER, William 1882 The Agent-General to the Colonial Secretary 4 May 1876. Exploration of the caves and rivers of NSW (Minutes, reports, correspondence, accounts.) *Votes and proceedings of the Legislative Assembly* 1882, Vol. 5:17-18.

FOSTER, J.J. 1890 *The Jenolan Caves.* NSW Government Printer: Sydney. 96 pp.

FOSTER, W. 1936 Colonel Sir Thomas Mitchell D.C.L. and fossil mammalian research. *J. Roy. Aust. Hist. Soc.,* 22(6):433-443.

FRASER, Charles 1830 [Paper on botany of Swan River]. *Botanical Miscellany,* Vol. 1

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA 1975 The geology of Western Australia. *Geol. Survey of W.A. Memoir* 2. 541 pp.

GOEDE, Albert 1957 Introduction. *Bulletin of the Tasmanian Caverneering Club,* 1(1):4-5

GOEDE, Albert; KIERNAN, Kevin; SKINNER, Andrew; WOOLHOUSE, Bob 1973 (or 1974) *Caves of Tasmania.* Privately published? 66 pp.

GREY, George 1841 *Journals of two expeditions of discovery in north-west and western Australia, during the years 1837, 38 and 39, under the authority of Her Majesty's Government, describing many newly discovered, important, and fertile districts, with observations on the moral and physical condition of the Aboriginal inhabitants, &c. &c.* T. and W. Boone: London. Two volumes; 412 pp and 482 pp.

GREY, George 1845 [Letter to Lord Stanley 22 June 1844, in] Account of Governor G. Grey's exploratory journey along the south-eastern sea-board of South Australia. *Journal of the Royal Geographical Society of London,* 15(1): 160-163

GRIFFITHS, Tom 1988 *The life and adventures of Edward Snell: the illustrated diary of an artist, engineer and adventurer in the Australian Colonies 1849 to 1859.* (Edited and introduced by Tom Griffiths) Angus & Robertson with the Library Council of Victoria: North Ryde, NSW 480 pp.

GRIMES, K.G. 1978 The geology and geomorphology of the Texas Caves, southeastern Queensland. *Mem. Qld Mus.,* 19(1):17-60

GRIMES, K.G., HAMILTON-SMITH E. AND SPATE, A. 1995 *South East Karst Province of South Australia.* Australian Caves & Karst Management Assoc. 110 pp.

HACKFORTH-JONES, P. 1980 *Augustus Earle, travel artist.* Australian National Library: Canberra.

HAMILTON-SMITH, Elery 1997a Nineteenth century paintings, drawings and engravings of Australian caves. *Helictite,* 35(1&2):12-38.

HAMILTON-SMITH, Elery 1997b Perceptions of Australian caves in the 19th century: the visual record. *Helictite,* 35(1&2):5-11.

HAMILTON-SMITH, E., KIERNAN, K, & SPATE, A. 1998 *Karst management considerations for the Cape range Karst Province, Western Australia.* (A report for the W.A. Department of Environmental Protection) 80 pp.

HAMILTON-SMITH, E. & MIDDLETON, G. 1971 Speleological publication in Australia. *ASF Newsletter,* 54: 4-11.

HAVARD, W.J. 1924 *The Orient Cave, Jenolan Caves.* Government Tourist Bureau: Sydney

HAVARD, W.L. n.d. [1928?] *The Lucas Cave, Jenolan Caves: a practical guide to the regulation route.* Government Tourist Bureau. 32 pp.

HAY, J. G. 1906 *The visit of Charles Fraser to the Swan River in 1827, with his opinion as to the suitableness of the district for a settlement; together with copious notes by J. G. Hay*. J.G. Hay: Perth. 40 pp.

HEATH, F. Verrall 1907 *Views of the Buchan Caves and Pyramids.* T.C. Lothian: Melbourne. 34 pp.

HENDERSON, Kent 1985a *The Wombeyan experience: a guide to the Wombeyan Caves – New South Wales.* Neptune Press Pty Ltd: Geelong, Vic. 58 pp.

HENDERSON, Kent 1985b The Buchan experience: a guide to the Buchan and Murrindal Caves – East Gippsland, Victoria. The Author: Belmont, Vic. 68 pp.

HENDERSON, Kent 1986 *The Naracoorte Caves (and Tantanoola Caves).* Kent Henderson Publications: Belmont, Vic. 32 pp.

HENDERSON, Kent 1987 *Princess Margaret Rose Caves – Western Victoria.* Kent Henderson Publications: Belmont, Vic. 20 pp.

HENDERSON, Kent 1988 *The Abercrombie Caves and Wellington, NSW* Kent Henderson Publications: Belmont, Vic. 28 pp.

HENDERSON, Kent 1990 *Jenolan: a guide to Australia's famous caves.* Kent Henderson Publications: Belmont, Vic. 34 pp.

HILL, A.L. 1966 *Mullamullang Cave expeditions 1966. Cave Exploration Group of S.A. Occ. Pap.* #4. 48 pp. + maps.

HILLS SPELEOLOGY CLUB 1992 *A guide to Mount Fairy Caves.* Hills Speleology Club: Baulkham Hills, NSW 62 pp.

HORNE, Phillip 1993 *Lower South East Cave Reference Book.* Cave Exploration Group South Australia and the Author: Adelaide. [many pages, unnumbered]

HOWITT, A.W. 1876 Notes on the Devonian rocks of North Gippsland. *Geol. Surv. Vict. Prog. Rept.* 3: 181-249 [The report of the trip was reprinted by George Seddon (1989) in *The ballad of Bungil Bottle.* Centre for Gippsland Studies: Churchill, Vic. 20 pp.]

HUGHES, Terence D. 1957 Limestones in Tasmania. *Mineral Resources No. 10.* Geological Survey, Dept. of Mines: Hobart. 291 pp. + plates 46-53.

HUMPHREYS, W.F. (Ed.) 1993 The biogeography of the Cape range, Western Australia. *Records of the Western Australian Museum,* Supp. No. 45, 248 pp.

HUNTER, John 1793 *An historical journal of the transactions at Port Jackson and Norfolk Island: including the journals of Governors Phillip and King, since the publication of Phillip's Voyage: with an abridged account of the new discoveries in the South Seas.* John Stockdale: London 525 pp.

HYSLOP, R.C. and SPACKMAN, C.J. 1967 *Augusta Jewel Cave and other points of interest.* Lamb Publications Pty Ltd: Osborne Park, WA. 32 pp.

IREDALE, K.S. 1953 The first six years. *Tasmanian Caverneering Club Handbook.* TCC: Hobart. 71 pp.

JAMESON, R. 1832 Report on fossil bones from Wellington Valley. *Edinburgh New Philosophical Journal,* Part XXIV: 392.

JENNINGS, J.N. 1979 Man and other animals in Australian caves and shelters. *Trans. Brit. Cave Res. Assoc.*, 6: 96-130

JENNINGS, J.N. 1966 Jiri V. Danes and the Chillagoe Cave District. *Helictite,* 4(4):83-87

KAY, Phillip 1985 *The far-famed Blue Mountains of Harry Phillips.* Second Back Row Press: Leura NSW 96 pp.

KENNEDY, Brian and KENNEDY, Barbara 1989 *Australian place names.* Hodder & Stoughton: Rydalmere, NSW, p. 95

KENNEDY, Brian and STEPHENSON, P.R. 1980 *The history and description of Sydney Harbour.* A.H. & A.W. Reed: Terry Hills, NSW. 352 pp.

KIERNAN, Kevin 1995 *An atlas of Tasmanian karst.* Research Report No. 10, Tasmanian Forest Research Council, Inc.: Hobart. 2 vols, 255 pp., 351 pp.

KREFFT, C. 1867 Fossil remains of mammals, birds and reptiles, from the caves of Wellington Valley. *Catalogue of the Natural and Industrial Products of N.S.W., forwarded to the Paris Universal Exhibition of 1867 by the N.S.W. Exhibitions Commissioners.* Government Printer: Sydney. pp. 111-124

LABILLARDIÈRE, Jacques-Julien Houtou de 1800 *Voyage in search of La Pérouse: performed by order of the Constituent Assembly, during the years 1791, 1792, 1793 and 1794.* John Stockdale: London (2 vols.)

LANE, E.A. 1975 Lime, limestone and the first caves. Aust. Natural History, 18(6):191-195.

LANE, Edward A. & RICHARDS, Aola N. 1963 The discovery, exploration and scientific investigation of the Wellington Caves, New South Wales. *Helictite,* 2(1):3-53 + 8 plates.

LANG, J.D. 1831 Account of the discovery of Bone Caves in Wellington Valley, about 210 miles west from Sydney in New Holland. *Edinburgh New Philosophical Journal,* XXII:364-368 [published as a letter to the Editor of the *Sydney Gazette,* 25 May 1830, p. 3 under the pseudonym 'L'.]

LANG, J.D. [= Mitchell, Thomas] 1831 Additional information illustrative of the natural history of the Australian and osseous breccia. *Edinburgh New Philosophical Journal,* XXII: 368-371.

LAWSON, W. 1821 *Journal of a tour into the country north of Bathurst Nov. 8-24, 1821.* unpub. ms in Mitchell Library, Sydney (microfilm reel CY1642)

LEE, Arthur M. 1910 On some Tasmanian cave-inhabiting beetles. *Tasmanian Naturalist,* 2(3):53-58

LEIGH, W.S. 1894 On the Artificial Method of Lighting the Jenolan Caves. *Records of the Geological Survey of NSW,* 4(2):66-67

LEWIS, I.D. 1976 *South Australian cave reference book.* Cave Exploration Group (South Australia) Inc.: Adelaide. 140 pp.

LEWIS, I.D. 1977 *Discover Naracoorte Caves.* Subterranean Foundation (Australia): Adelaide. 74 pp.

LEWIS, G.R., LONG, J.B. & WOOLHOUSE, R.D. 1963 Foreword [to] *Tasmanian Caverneering Club Handbook.* [2nd edition] TCC: Hobart. 49 pp.

LISHMUND, S.R., DAWOOD, A.D. & LANGLEY, W.V. 1986 The Limestone Deposits of New South Wales. *Mineral Resources No. 25.* 2nd Edition. Geological Survey, Dept. of Mineral Resources: Sydney. 373 pp. + Figs. 1 & 28.

LIVERSIDGE, Archibald 1882 A. Liversidge, Esq., to the Colonial Secretary. Exploration of the caves and rivers of NSW (Minutes, reports, correspondence, accounts.) *Votes and proceedings of the Legislative Assembly* 1882, Vol. 5: 20

MACDOUGALL, Jas. H. n.d. *Western Australia's wonderland.* V.K. Jones & Co.: Perth. 20 pp.

MACKEN, Jim 1991 *Coasters' Retreat.* The Author: Sydney. 91 pp.

MACLUCAS, June 2002 Art technique used in speleo art. [in] Brown, C. (Ed.) *Proceedings of 2001: a cave odyssey* ASF: Broadway pp. 57-66

MACQUEEN, Andy 1993 The life and journeys of Barrallier. The Author: Springwood. 160 pp.

MATTHEWS, Peter 1968 Australian Caves [in] *Speleo Handbook.* Australian Speleological Federation: Broadway NSW. pp. 121-306

MATTHEWS, P.G. 1979 Check-list of Australian Caves and karst. Australian Speleological Federation: Broadway NSW. 73 pp.

MATTHEWS, Peter G. (Ed.) 1985 *Australian karst index 1985.* Australian Speleological Federation Inc.: Melbourne. 490 pp.

MEREDITH, Peter 1999 *Myles and Milo.* Allen & Unwin: St Leonards, NSW 376 pp.

[MIDDLETON, G.J.] 1970 *Yarrangobilly Caves, Kosciusko National Park.* National Parks & Wildlife Service: Sydney. 20 pp.

MIDDLETON, G.J. 1988 Index to references to caves in three New South Wales government publications 1870-1919. *Sydney Speleological Society Occ. Pap*. #9. 22pp.

MIDDLETON, Greg 1990 Rocky Cape North Cave – an early cave map from Tasmania. *J. Sydney Speleol. Soc.,* 34(11):213-215.

MIDDLETON, Greg 1991 Oliver Trickett: Doyen of Australia's cave surveyors. *Sydney Speleological Society Occ. Pap.* #10. 156 pp.

MITCHELL, Thomas 1831a On the limestone caves of Wellington Valley, N.S.W. *Philosophical Magazine,* Series 3, IX:445

MITCHELL, Thomas 1831b Further notice in regard to the fossil bones found in Wellington County, NSW. *Edinburgh New Philosophical Journal,* XXIII:179-180

MITCHELL, Thomas 1834 An account of the limestone caves at Wellington Valley, and of the situation, near one of them, where fossil bones have been found. Proc. Geol. Soc. Lond. 1: 321-322.

MITCHELL, Thomas 1838 *Three expeditions into the interior of Eastern Australia.* Vol. 2 T. & W. Boone: London

MORIARTY, O.M. 1935 Tuglow Caves located and explored. *The Sydney Bush Walker Annual,* No. 2 1935: 8-10

O'BRIEN, Brian J. 1959 Speleology in Australia. *Bulletin of NSS,* 21(1):1-12

OLSEN, T. 1962 *The beautiful Olsen's Caves: a symphony in limestone.* (3rd Edition) Olsen's Caves: The Caves, Qld. 32 pp.

OWEN, R. 1870 Professor Owen to the Colonial Secretary 23 February 1867. Wellington Caves: correspondence relative to exploration of. *Journal of the Legislative Council,* 1870, Vol. 19:668

OWEN, R. 1884. Evidence of a large extinct monotreme *(Echidna ramsayi* Owen) from the Wellington Breccia Caves, N.S.W. *Philosophical Transactions*, 175: 273-275.

PEARSON, Les 1983 *Chillagoe: souvenir guide.* The Author: Cairns, Qld. 32 pp.

PENTLAND, W. 1832 On the fossil bones of Wellington Valley, New Holland, or New South Wales. *Edinburgh New Philosophical Journal,* XXIV: 301-308.

PENTLAND, W. 1833 Observations on a collection of fossil bones sent to Baron Cuvier from New Holland. *Edinburgh New Philosophical Journal,* XXVII: 120-121.

PÉRON, François and FREYCINET, Louis 1824 *Voyage de decouvertes aux terres australes, fait par ordre du gouvernement sur les corvettes le Géographe, le Naturaliste et la goëlette le Casuarina, pendant les années 1800, 1801, 1802, 1803 et 1804. 2nd Edn. 4 vols and atlas.* Paris

PHILLIP, Arthur 1789 *The voyage of Governor Phillip to Botany Bay with an account of the colonies of Port Jackson and Norfolk Island ...* John Stockdale: London 298 + lxxiv [*Australiana Facsimile Editions,* Hutchinson, 1968, 1982]

PHILLIP, Arthur 1892 Governor Phillip to Lord Sydney. 15 May 1788 *Historical Records of New South Wales.* Government Printer: Sydney. Vol. 1, Part 2. 747 pp.

PHILLIP, Arthur 1914 Governor Phillip to Lord Sydney. Despatch No. 1, 15 May 1788 [in] Watson, F. (Ed.) *Historical Records of Australia,* Series I, 1: 29 Library Committee of the Commonwealth Parliament: Canberra

PHILLIPS, Harry c.1909 *Blue Mountains and Jenolan Caves – an illustrated tourist guide.* H. Phillips: Katoomba 95 pp. [Later editions c. 1925, c. 1928]

PHILLIPS, Harry 1912 *Jenolan Caves* H. Phillips: Katoomba. [Later edition c. 1920 42 pp.; >1922 H. Phillips: Willoughby 20 pp.]

PHILLIPS, Harry 1914 *Jenolan Caves, NSW.* H. Phillips: Katoomba [Later edition 1920, 20 pp.]

PHILLIPS, Harry c.1918 *Nature's masterpiece: Jenolan Caves.* H. Phillips: Katoomba 26 pp. [Later editions c. 1920-21 Printed by Snelling H. Phillips: Katoomba; >1922 Printed by Snelling H. Phillips: Willoughby; >1922 Printed and published by Phillips: Willoughby; >1922 Printed and published by Phillips: Willoughby. 24 pp.; >1922 Printed and published by Phillips: Willoughby, 36 pp.]

PHILLIPS, Harry n.d. *Jenolan Caves: Australia's underground fairyland.* 24 pp.

PICKERING, Ken 1975 Lieutenant William Lawson – Australia's First Speleologist. *Oolite*, 5(3):1-7

PILKINGTON, Graham & MOTT, Kevin 1986 *Nullarbor caving atlas. CEGSA Occ. Pap.* 7 Two volumes.

PINNOCK, Rick (Ed.) 1987 *Glenrock Caves, Upper Hunter Valley, N.S.W.* Hills Speleological Club Ltd.: Baulkham Hills, NSW 45 pp. + maps.

PLOMLEY, N.J.B. 1966 *Friendly Mission: The Tasmanian journals and papers of George Augustus Robinson 1829-1834.* Tasmanian Historical Research Association: Hobart 1074 pp.

PLOMLEY, N.J.B. 1983 The Baudin expedition and the Tasmanian Aborigines 1802. Blubber Head Press: Hobart p. 185.

PODMORE, St Michael 1909 Rambles and adventures in Australasia, Canada, India, etc. L. Upcott Gill: London. 288 pp.

RAMACIOTTI, L. 1902 *The wonderful caves of Western Australia.* Stirling Bros. (Morning Herald): Perth 24 pp.

RAMSAY, E.P. 1882 Curator's report on the exploration of caves, 31 December 1881. Exploration of the caves and rivers of NSW (Minutes, reports, correspondence, accounts.) *Votes and proceedings of the Legislative Assembly* 1882, Vol. 5: 44-45

REICHARD, Suzanne 1935 Colong Caves. *The Sydney Bush Walker Annual,* No. 2 1935: 26-27

RICKARD, Suzanne 2001 *George Barrington's voyage to Botany Bay: Retelling a convict's travel narrative of the 1790s.* Leicester University Press: London & New York. 181 pp.

RICHTER, J.E. 1884 The Fish River Caves, near Sydney, Australia. *Scientific American,* 51(15)(11 Oct. 1884):223, 229

ROBERTSON, John 1870 The Colonial Secretary to Professor Owen 16 June 1869. Wellington Caves: correspondence relative to exploration of. *Journal of the Legislative Council,* 1870, Vol. 19:668

ROBINSON, Tom (Ed.) 1982 *Chillagoe Karst: a field guide of the Chillagoe Mungana Rookwood areas in far North Queensland.* Chillagoe Caving Club: Cairns. 187 pp.

ROBINSON, Tom (Ed.) 1988 *Chillagoe Karst: a speleological field guide to the towers and caves of the Chillagoe-Mungana-Rookwood areas in far North Queensland. Supplement for caves CH301-CH400* Chillagoe Caving Club: Cairns. 40 pp.

ROE, John Septimus 1841 Journal of an excursion by His Excellency the Governor and the Surveyor General to the caves of Maidin. The Inquirer [Perth] 3 Nov. 1841

ROSS, W.J. Clunies 1894 The geology of Limekilns, Bathurst district. *J. Roy. Soc. N.S.W.,* 28: 289-301

RYRIE, S. 1840. Journal of a certain tour. [Original in the Dixon Library, State Library of New South Wales]; published in 1991 in *Gippsland Heritage Journal,* 11: 12-17

SHAPCOTT, L.E. n.d. [1930s] *The story of Yanchep: the western wonderland.* State Gardens Board of Western Australia. 32 pp.

SHAW, Trevor R. 1986 The history of cave studies. *Helictite*, 24(1&2):3-12.

SHAW, Trevor R. 1992 *History of Cave Science: the exploration and study of limestone caves, to 1900.* 2nd Edn. Sydney Speleological Society: Sydney. 338 pp.

SKINNER, A.D. & SKINNER, R.K. 1978 *The Mole Creek Caves.* The Authors: Hobart. 36 pp.

SKINNER, R.K. & SKINNER, A.D. [1976] *Hastings Caves State Reserve, Tasmania: a visitors' guide.* The Authors: Huonville. 16 pp.

SMITH, Bernard and WHEELER, Alwyne (Eds) 1988 *The art of the First Fleet and other early Australian drawings.* Oxford Univ. Press: Melbourne.

SOUTH AUSTRALIAN GOVERNMENT TOURIST BUREAU n.d. (c. 1920) *Naracoorte Caves.* The Bureau: Adelaide. 32 pp.

SPATE, Andy & GILLIESON, Dave 1984 Joe Jennings. *Helictite*, 22(2):35-42.

SPRENT, J.K. (Ed) *Mount Etna Caves.* University of Queensland Speleological Society: Brisbane 116 pp.

STARR, Joan and MCMILLAN, Doug 1985 *The Wellington Caves: treasure trove of fossils.* Macquarie Publications Pty Ltd: Dubbo NSW 54 pp.

STIRLING, James 1884 On the caves perforating marble deposits, Limestone Creek. *Trans. Proc. Roy. Soc. Vict.,* 20: 7-17.

STIRLING, James 1888 Preliminary notes on the geology of the Wombat Creek valley, its caves and silver lodes. *Reports of the Mining Registrars for the quarter ended 30 Sept. 1888*: 78-80

STIRLING, J. 1889a Report on the marble deposits at Limestone Creek. *Reports of the Mining Registrars for the quarter ending 30 September 1889:* 78-81 + maps

STIRLING, J. 1889b Preliminary report on the Buchan Caves, Goldfields of Victoria. *Reports of the Mining Registrars for the quarter ending 31st December 1889.* Appendix B: 65-68

STIRLING, J. 1914 Captain Stirling to Governor Darling (18 April 1827): Narrative of operations [in] Watson, F. (Ed.) *Historical Records of Australia,* Series III, 6: 551-584 Library Committee of the Commonwealth Parliament: Canberra.

TALENT, J.A. n.d. The Buchan Caves. Mines Dept., Victoria: Melbourne. 16 pp.

TISSANDIER, A. 1895 Les Grottes de Jenolan dans les Montagnes Bleues (Australie). *Spelunca: Bull. Société Spéléologique,* 1(1):50-56

TRICKETT, Oliver 1897 The limestone caves of New South Wales. *Annual Report of the Dept. of Mines, NSW,* 1897: 203-205.

TRICKETT, Oliver 1899 *Guide to the Jenolan Caves.* Geological Survey of NSW: Sydney 64 pp.

TRICKETT, O. 1914 Notes on the Jenolan Caves. [in] *Excursions arranged for members of British Assoc. for Advancement of Science; 1914 meeting, Sydney.* Govt. Printer: Sydney pp. 27-29.

VICTORIAN RAILWAYS 1906 *Picturesque Victoria and how to get there: a handbook for tourists.* 3rd Edition. Victorian Railways: Melbourne. 222 pp.

VICTORIAN RAILWAYS 1910 *Picturesque Victoria and how to get there: a handbook for tourists.* 6th Edition. Victorian Railways: Melbourne. 272 pp.

VIVIAN, William n.d. [37 views of] Naracoorte Caves and Naracoorte, South Australia. Wm. Vivian: Naracoorte. 24 pp.

WELCH, Bruce R. (Ed.) 1976 *The caves of Jenolan. 2: The Northern Limestone.* Sydney University Speleological Society in conjunction with SRC Ltd. 131 pp.

[WELLS], R.T.W. 1975 *World famous Fossil Cave, Naracoorte.* Naracoorte Tourist Promotions: Naracoorte, S.A. 16 pp.

WHAITE, J.M. 1972 Historical source papers on Bungonia Caves. *Bungonia Caves. Sydney Speleological Society Occ. Pap. 4.* pp. 206-213.

WHITCOMBE, Frank [1908] *Guide to Buchan Caves and Gippsland Lakes.* Cunninghame Progressive Assoc.: Lakes Entrance. 104 pp.

WHITE, Susan 1984 Bats Ridge Karst Area – an annotated atlas. *Nargun,* 17(6): 43-68.

WILKINSON, C.S. 1875 Report of progress of the Geological Survey during the year 1875. *Annual Report of the Department of Mines, NSW,* 1875: 118.

WILKINSON, C.S. 1884 The Fish River or Binda Caves [in] *The Railway Guide of New South Wales* (2nd Edn.) Thomas Richards, Government Printer: Sydney. pp. 137-145. (1st Edn. 1879 pp. 114-122? – Dunkley) Also note brief description of "Fish River Caves" on pp. 74-75 (2nd Edn) by "NSW Govt. Printer".