I had now made a circuit of the Southern Ocean in a high latitude, and traversed it in such a manner as to leave not the least room for the possibility of there being a continent, unless near the pole, and out of the reach of navigation. … Thus I flatter myself, that the intention of the voyage has, in every respect, been fully answered; the southern hemisphere fully explored; and a final end put to the searching after a southern continent …


**The diary**

Monday 1 January 1973

*Whales for the New Year this morning! The sea was nearly flat calm so they were easy to see—just breaking the surface in big splashes, not blowing—it wasn’t possible to tell their size. The weather was good, so I could stand on deck with only a thin sweater. A storm which was predicted has passed us by.*

*I am getting to the stage where I have no idea what time of day it is—no doubt a combination of irregular working and sleeping times with increasing day length. We have sunset around 10pm now. The past two days have been occupied with splitting, sampling and labelling core—a certain amount of*
judgement is needed in the sampling, but the rest is sheer physical labour. Cores are incredibly messy—one gets to a stage where another coating of wet mud hardly makes any difference!

To bed at 3am both Saturday and Sunday nights but this morning I slept till 11 so made up lost sleep.

There was a very quiet New Year party after the last core was up yesterday—nothing like the verve and lack of inhibition of the Christmas one—I think everyone was too weary. The music makers tried very hard—Derek and Peter on organ, Art Ford on harmonica, and assorted guitarists, but there seemed to be little enthusiasm to party and the event didn’t get off the ground—it was just a ritual for the New Year.

The news of the Eltanin¹ came the other day—a cable from the National Science Foundation informing us of the cancellation of that vessel’s activities because of budget problems, and that all grants associated with the ship’s programme were to be revoked. So that is the end of any American salary I might have had! Turns out that I gave up nothing financially by coming on this cruise … others may have lost their jobs … people don’t seem to count in US science programmes.

Tuesday 2 January

Site 266 Site 3 (56°24.13′S; 110°06.70′E) Water depth 4,167 m.

Occupied 2–4 January 1973

On site for No 3, me playing lead sedimentologist this time. Another whale close to the ship—about 30′—with dorsal fin?

Daylight comes now just after 3am.

Thursday 4 January

¹ The Eltanin was a survey vessel funded by the US National Science Foundation. In the Southern Ocean its role was to undertake geophysical surveys that would show the geometry of strata below the sea floor. This would give a preliminary picture of the expected strata, and would prevent the Challenger from drilling into structures that might trap petroleum. In 1975 the Eltanin was transferred to the Argentine Navy.

The Eltanin’s name is perpetuated in the Eltanin Impact, a structure located in the Bellingshausen Sea off the Antarctic Peninsula, that reflects the impact of an asteroid around 2.51 million years ago. Sediment cores collected by the Eltanin were found to be enriched in iridium, a metal that is found in higher proportions in meteorites than in the Earth’s crust. The asteroid that impacted this site is estimated to have been between 1 and 4 km in diameter.
A chinstrap penguin swam and porpoised around our stern—it was very clearly identifiable, and way out of its range, which looks to be closer to the Peninsula and to the South Orkneys (?) In any case he is certainly far out to sea. Some of the crew tried to catch it in a bucket—fortunately they didn't succeed.

Encountering James Cook

Somewhere between Sites 267 and 268 the *Glomar Challenger* would have crossed an historic furrow—the track of Captain James Cook in his second voyage of 1772–76. In the last week of February 1773 Cook's journal shows that the *Resolution* was at latitude 61°52′S. Drill site 267, occupied by the *Glomar Challenger* on 6 January 1973, was a little to the north, at 59°15′S, with a longitude of 104°29′E. By 1 March the *Resolution* was at 60°36′S and 107°54′E; that is, some 3 degrees of longitude east of the *Glomar Challenger* drill site. On Leg 28, therefore, it seems we missed an encounter with Cook by 200 years and about two months!

Cook's second voyage 1772–75

The matter of the great southern continent

Cook's first voyage to the Pacific, in the *Endeavour*, was acclaimed a success in naval circles and he was promoted to Commander. That voyage produced charts of the coast of New Zealand and the east coast of Australia, and successfully observed the transit of Venus in Tahiti. But it was the young Joseph Banks, rather than the more serious Cook, who enjoyed resounding public acclaim for the vast botanical collections he amassed on that voyage. It was he, along with botanist Daniel Solander, who attracted lavish comment in the London press, comments that fed Bank's opinion of himself as the expert in exploration of the South Seas.

After his first voyage Cook felt that the matter of the great southern continent—where it might lie, or whether it existed at all—had not been settled. So, the year after his return on the *Endeavour*, he submitted plans for a second voyage. The purpose of this voyage was, by circumnavigating the globe at a high southern latitude, to prove or otherwise the existence of Terra Australis Incognita, the Great South Land.
Early ideas of a great southern continent were based on the theory that a southern landmass should exist to balance the weight of continents in the northern hemisphere. Such is clearly shown in speculative maps of the seventeenth and eighteenth centuries—for instance, that of the Dutchman Henricus Hondius in 1642 who in his *Polus Antarcticus* expressed the idea of an undetermined but vast southern continent centred on the South Pole and extending to the Tropic of Capricorn. The possible boundaries around such a landmass are of necessity vague. Hondius has drawn zigzag boundary lines across the Pacific and Indian oceans. He showed too the southern coast of Australia, then known through the voyages of Abel Tasman and earlier Dutch mariners who encountered the west Australian coast—the vessels *Leeuwin* in 1622 and the *Eendracht* commanded by Dirk Hartog in 1616. The illustrated corners of the map show landscapes with a diversity of human figures; there are also animals and boats. Notably, there is a clear representation of a penguin and, in a somewhat
obscure background, a suggestion of one of these being hunted. Such birds could reasonably have been known from the Cape of Good Hope or from southern South America, both regions shown on the map.

The French cartographer Philippe Buache published an even more fanciful map in 1763, between the unlikely covers of the famous English magazine *The Gentleman's Journal*. The map acknowledges its derivation from the *Memoirs of the Royal Society at Paris*. Again it shows a large continent spilling over beyond the confines of the Antarctic Circle, and occupying much of the Indian, Pacific and South Atlantic oceans. It draws too on recorded iceberg sightings; curiously, it shows an Antarctic continent in two parts.

**An uneasy start; ships and crew**

Cook in 1772 selected two vessels for his proposed voyage. The navy, on his recommendation, purchased two near-new Whitby colliers, which were renamed *Resolution* and *Adventure*; they had been built by the same shipwright as the *Endeavour*. Cook was familiar with this robust style of vessel from his early career. He was impressed by their large holds and their spacious ‘tween decks’ that would provide more light and air for the crew than the vessels preferred by the East India Company. The ships were refitted for the voyage at Deptford, carrying ice anchors and water distillation plants.

It was Joseph Banks whose demands caused delays in the planned departure dates. Banks, fresh from his huge and very public success as a collector and scientist on Cook’s first voyage, where his participation was a ‘social and international sensation’, pictured an even greater response to his involvement in Cook’s second voyage. This he visualised, was to be ‘his’ voyage, with himself as its real commander and Cook as executive officer, providing the official transport for Bank’s collecting activities. In support of his involvement, he collected a party of no less than 15 individuals—including two musicians, a number of draughtsmen and, as artist, the German neoclassical painter Johan Zoffany.

For a start, Banks didn’t like the ships selected by Cook for the voyage. He considered that the *Resolution* would not be large enough for himself and his retinue. He submitted plans for extensive alterations and additions to the vessel. These were at first overruled by Sir Hugh Palliser, then Controller of the Navy, and a fellow Yorkshireman of Cook. But the
Navy Board was itself overruled by one of Banks’s connections—Lord Sandwich, then enjoying his third stint as First Lord of the Admiralty. At this point Cook refrained from commenting, anxious to be seen to oblige Banks. He considered, thoughtfully, that the changes ‘might do’.

So the vessel was altered. It underwent its extensions; the waist between forecastle and quarterdeck was heightened; a new upper deck and a roundhouse were added to accommodate the Captain, whose former ‘great cabin’ had been sacrificed. The extra space provided would accommodate Banks and his personnel, together with a large quantity of their instruments and bulky impedimenta.

The vessel, thus modified, became a tourist attraction—one of the ‘sights of the river’. Banks entertained on board persons of distinction. Cook, the quintessential seaman, was becoming uneasy but he postponed critical comment until there had been a full sea trial. When the ship sailed on such a trial on 10 May 1772, almost instantly it was declared inherently unstable. Cook reported:

On the 10th of May we left Long Reach, with orders to touch at Plymouth; but in plying down the river, the Resolution was found to be very crank, which made it necessary to put into Sheerness in order to remove this evil by making some alteration in her upper works. (Cook 1777, p.2)

Crank is here a naval term meaning unstable, likely to capsize.

Cook’s sense of frustration with Banks’s demands is apparent in his journal. There he wrote on 2 May 1772:

I shall not mention the arguments made use of by Mr Banks and his friends as many of them were highly absurd and advanced by people who were not judges of the subject, one or two sea officers excepted, who I believe sacrificed their judgement in support of their friendship.

The Resolution was directed to Sheerness where the new upper deck was removed and the overall weight reduced. Bank’s reaction was that of a madman. On the wharf he swore and stamped his feet and ordered all his appointees and servants out of the vessel. In place of the dozen or so personnel planned by Banks, the Forsters, father and son, were approved to sail on the Resolution, after being given a mere 10 days notice of their appointment. From Sheerness, Cook reported in his journal on 2 May 1772:
On my arrival I learnt that Mr John Reinhold Forster and his son, Mr George Forster were to imbark with me, gentlemen skill’d in Natural history and Botany, but more especially the former, who from the first was desirous of going on the voyage and therefore no sooner heard that Mr Banks had given it up then he applyd to go.

A generous stipend was allocated for these scientific gentlemen and their baggage.

Cook viewed the appointment of Johann Reinhold Forster positively, in the knowledge that he had the approval of the Admiralty. Forster’s reputation rested on his scientific writing in England, which included works on varied topics in journals as illustrious as the Transactions of the Royal Society, but also on texts as diverse as mineralogy and British insects. His difficult, irascible personality was yet to be tested.

Born in Prussia of a family with Scottish origins—the ‘Forster’ name has been claimed to derive from the Scottish ‘Forrester’—Forster had been schooled in Berlin. He favoured a career in medicine, but the family budget drove him instead, with considerable reluctance, to study theology. During his first appointment as a country parson, he strove to brighten the routine of his position by reading as widely as possible on all aspects of natural history, taking the opportunity to attend lectures when he could and endangering the meagre family budget by the excessive purchase of scientific books. His knowledge of languages was prolific; reputedly he had mastered 17. He was similarly widely read in ancient history and cultures.

In 1766 Johann moved to England with his eldest son Georg. There, struggling with meagre finances, he assiduously cultivated the scientific elite. He procured a teaching position at the then liberal Warrington Academy but left after some friction. The scientific papers he produced, varied in their range, won him election to Fellowship of the Royal Society in 1772.

The quality of Johann Reinhold Forster’s science cannot have been in doubt, yet his reputation was sullied by his temperament. J.C. Beaglehole, who published the journals of all three of Cook’s voyages, as well as a biography of Cook, saw fit to describe Forster’s appointment as ‘one of the Admiralty’s vast mistakes’ and that his ‘graces were few and his sins were many and heinous’ (Beaglehole 1992, p.302). He could not be compared to the astronomers William Wales and William Bayley, fellow appointees to the expedition, whose scientific integrity was regarded as unimpeachable.
William Wales, however, may have been largely responsible for Johann Reinhold Forster’s poor reputation, conflating his difficult temperament with scientific ineptitude.

After Joseph Banks’s vociferous announcement of his withdrawal from the expedition along with his selected entourage, Forster was surreptitiously approached by the admiralty and asked to go in place of Banks. To this he readily agreed, with the proviso that his talented 18-year-old son Georg accompanied him. When Lord Sandwich suggested that Forster should receive the £4,000 that had been voted by parliament to support the participation of a scientist, Banks again reacted strongly, threatening to use his influence with decision-makers. Sandwich forestalled him by going directly to the king. The Royal Society fell in behind the recommendation that Reinhold Forster be appointed as Naturalist, noting that he ‘from all hands is admitted to be one of the fittest persons in Europe for such an undertaking’. Forster was paid the £4,000.

So it was that the Forsters, father and son, joined the Resolution in July 1772. Cook, after dealing with the refit occasioned by Banks’s ‘castle’, ordered in a letter to the Navy Board on 15 June (Beaglehole, 1974, p.303) that the ‘two foremost cabbins under the quarter deck be rebuilt for father and son’. Almost immediately the senior Forster’s difficulties in interacting with his fellow sailors became apparent. He complained about the size of the cabins, then managed a swift falling out with the Master of the Resolution, one Joseph Gilbert, who in turn complained about Forster’s meddling and criticism of his own role—that of surveyor and chart-maker. Gilbert retaliated by refusing to caulk the seams in the deck above Forster’s cabin, ensuring that the naturalist would endure a soggy berth.

But the focus on science by both Forsters was diligent, meticulous and immediate. Forster senior took an interest in all aspects of the ship’s passage, documenting the birds in particular, but he by no means confined himself to the fauna and flora. While he passed botanical details and drawings on to his son Georg, who was ably assisted after Cape Town by the Swedish naturalist Anders Sparrman, the elder Forster provided descriptions of the abundance and distribution of plant species at all ports of call and of soils and vegetation structure. He reported too on things atmospheric, winds, storm passages and even meteors; his reports on geography included volcanic islands and their coral reefs; he produced a wealth of information on oceanography; his extensive reports on the human species included varieties of ‘colour, size, form, habit, and natural turn of mind in the natives of the South Sea Isles’ (Forster 1996, p. 153).
However, controversy surrounded Johann Reinhold Forster right to the end of this successful voyage and revolved around the authorship of the official account of the expedition. Such a volume, with illustrations by William Hodges, was anticipated to be a best-seller, an outcome that would have appealed to both Forster and his captain. Forster, however, was under the impression that he had publication rights to the narrative of the voyage. The Admiralty denied such a claim, demanding that all logs of the voyage written by its members be subject to their official control. Lord Sandwich saw Forster’s contribution—a description of the natural history—essentially as an appendix to the narrative to be penned by Cook himself. Forster, who also pointed out that his report would be more ‘philosophical’ in nature, and not simply a description of natural phenomena, vehemently resisted such an arrangement. Eventually, Forster avoided the strictures imposed by the Admiralty by publishing under the name of his son Georg. This volume contained criticisms of Cook for his singular focus on navigation: ‘The captain’s narrative will contain little more than nautical details such as how often we reefed or split a sail’.

The Forster volume, *A Voyage Round the World in His Britannic Majesty’s Sloop Resolution, Commanded by Capt. James Cook, during the Years 1772, 3, 4 and 5*, published under the name of the son but with a heavy imprint of the father’s hand, appeared some six weeks before Cook’s official narrative *A Voyage Towards the South Pole and Round the World* (1777).

The publication of this narrative drew lengthy criticisms from the astronomer William Wales—his criticisms ran to many pages, dealing with the senior Forster’s ill humour, and detailing his intolerance of the crew. He also claimed that Reinhold Forster offered regular comment on subjects, such as astronomical observations, about which he knew little. Young Georg Forster published, separately, a small volume in his father’s defence.

In spite of the rancour surrounding publication, taken together, both volumes provided a rich and comprehensive account of the voyage. Young Georg Forster’s account, perhaps independently of his father’s influence, includes anthropological observations as well as those of ‘natural history’. Cook’s account, drawn from his reworked journals, was, in his own words, that of a ‘plain man’ and comparatively lacking in literary skill. Nevertheless, Cook’s volume was more successful from a sales point of view, written by a man who was already perceived as a national hero.
The slower sales of Georg Forster’s account—which was perhaps richer in content—rankled with the senior Forster, who hoped for a significant boost to the family income through its publication.

William Hodges and the art of the voyage

For artist, the young William Hodges was appointed to the voyage. He replaced Banks’s choice of Johan Zoffany, who was then popular as a portrait painter in contemporary London, and to whom Banks had promised £1,000 for the voyage. Cook, clearly approving of the Navy’s replacement, reported:

The Admiralty shewed no less attention to science in general, by engaging Mr William Hodges, a landscape painter, to embark in this voyage, in order to make drawings and paintings of such places in the countries we should touch at, as might be proper to give a more perfect idea thereof, than could be formed from written descriptions only. (Cook 1777, p.34)

Figure 5.2. *The Resolution and Adventure 4 Jan 1773. Taking in Ice for Water, Lat 61.S.* Ink and watercolour by William Hodges.
Hodges’s output throughout the voyage was prodigious, although always touched with classicism. Often working from Cook’s ‘great cabin’ in the vessel’s stern, he made drawings, watercolour sketches and oil paintings. His paintings of Table Mountain at Cape Town and of Dusky Bay in New Zealand are among his best known. While in Antarctic waters he made a series of pen and watercolour washes depicting the ‘ice islands’ as Cook called icebergs. The crew took advantage of these floating islands to replenish the vessels’ water supplies.

Hodges had been trained by the British landscape painter Richard Wilson and had also received training in drawing by an Italian master, a training that is evident in the classical composition of most of the landscape paintings he produced during and after the voyage. Strangely, Hodges produced only a handful of watercolour paintings of the icebergs encountered; this is odd because the vessels were in high and icy latitudes for long periods, and these particular seascapes would have been novel to English eyes. The frenzied activity surrounding collecting ice for water did draw Hodges’s attention, and he recorded it in two paintings, the best known perhaps being his watercolour Taking in Ice for Water of 4 January 1773 (Figure 5.2). Even this image—the original of which is held in the Mitchell Library in Sydney—shows the careful composition of the classical artist; the way in which the shape of the drooping sail is echoed in the reflections below the ice cave is but one example. In an engraving made from another watercolour sketch—and simply titled Ice Islands—painted on 9 January 1773, we see sailors in several of the vessels’ boats armed with pickaxes breaking icy chunks from a small floating berg, while others scoop smaller fragments into the boat by hand. Cook reported that the water so gathered was found to be surprisingly sweet:

The pieces we took up were hard, and solid as a rock; some of them were so large, that we were obliged to break them with pickaxes, before they could be taken into the boats. The salt water which adhered to the ice, was so trifling as not to be tasted, and, after it had lain on the deck a short time, entirely drained off; and the water which the ice yielded, was perfectly sweet and well-tasted. (Cook 1777, p.37)
Figure 5.3. *Ice Islands with Ice Blink*. Gouache by Georg Forster, February 1773.

While Hodges held the official position of artist, other members of the expedition contributed their own drawings and paintings, as was common, indeed encouraged, in the British navy. Thus we have an expressive gouache that has been attributed to the young Georg Forster—his painting *Ice Islands with Ice Blink* in which the iceberg shapes come close to the fantastic. Nevertheless this scene reflects for the first time the brightness above the horizon associated with distant ice floes—some science has crept in to the art. The Master of the *Adventure*, Peter Fannin, was another artist, contributing awkward yet expressive drawings of the two vessels among icebergs.

**To the Cape, then into the ice**

*Resolution* and *Adventure* set sail from Plymouth on 13 July 1772 and made their way south. They touched port at Madeira and took on wine and fruit; at Porto da Praia in the Cape Verde Islands they replenished their water supply and further provisioned the vessels. On Saturday 30 October the Cape of Good Hope hove into view, with Table Mountain visible over Cape Town.
The stay in the Cape benefited both sloops and crew. The vessels were recaulked, and the crews ‘were served every day with new baked bread fresh Beef or Mutton and as much greens as they could eat’ (Cook, *Journal*, 30 October).

After a short delay waiting for the bread they wanted to be baked and ‘spirits to be brought out of the country’, Cook left the Cape of Good Hope on 23 November 1772. By January 1773 he was among icebergs—his ‘ice islands’. It was shortly after this—on 17 January 1773—that the *Resolution* crossed the Antarctic Circle at 66°36′S, the first known ship to do so, and recorded thickening ice at that latitude. It was not long after this ‘furthest South’ that the *Resolution* and *Adventure* parted company in thick fog on 8 February, not to rendezvous again before reaching New Zealand.

Two more ventures below the Antarctic Circle ensued. On 20 December 1773 the *Resolution* reached 67°31′S before turning north again; on the third crossing, on 26 January 1774, the vessel reached further south than any ship had gone previously. Blocked by ice, Cook, in his journal, apologised for not proceeding further:

> Since therefore we could not proceed one inch further South no other reason need be assigned for our tacking and stretching back to the North, being at that time in the Latitude of 71°10′ South, Longitude 106°54′w.

‘Pick up and drop off’; the tale of Anders Sparrman

Sometime after the *Resolution* arrived in the Cape of Good Hope the Forsters, father and son, were introduced to a Swedish naturalist, Anders Sparrman. This young man was at that time supporting himself as tutor to the children of the Dutch Resident, teaching them a philosophy that embraced nature studies and, appropriately for the time, the marvels of creation. It was at the Resident’s country estate, Alphen, near Constantia, close to Table Mountain, that the Forsters encountered Sparrman and were impressed by his enthusiasm for natural history and his medical background. Almost on the spot, but with Cook’s approval, Reinhold Forster engaged Sparrman as assistant to himself and his son Georg on the voyage. His costs were to be met from Forster’s own pocket.
Sparrman’s story has been popularised in a novel by Swedish writer Per Wästberg, *The Journey of Anders Sparrman* (translated edition, 2010). This vividly evokes the naturalist’s life, based on the extensive journals Sparrman kept, both of his time in Africa and of his unexpected voyage south. Wästberg presents Sparrman as a modest, somewhat self-effacing man, with a profound curiosity about the natural world, but with a ‘reverence for the world’s cornucopia’. The son of a country clergyman, he had been enrolled at the age of 14 at Uppsala University, where he undertook medical studies and, importantly, came under the influence of Carolus Linnaeus, originator of the binomial system of nomenclature for all things biological. Sparrman was perhaps overshadowed throughout his life as a botanist by having Linnaeus as his mentor. In southern Africa, it was the more established and ambitious Swedish botanist Carl Peter Thunberg to whom Sparrman deferred.

After a voyage to China in 1765, travelling as a ship’s doctor and collecting, preserving and describing the flora and fauna he encountered, Sparrman voyaged to Cape Colony in 1772. He travelled as one of the ‘Apostles’ of Linnaeus, a select group of students who carried out collecting studies throughout the world largely at the bidding of Linnaeus, and with the botanical master’s approval. These were often perilous expeditions, and seven of the 17 disciples died in the process. After the first death Linnaeus only approved the participation of unmarried men in these ventures.

Sparrman’s journals are alive with colourful descriptions of his life on board the *Resolution*. In the first place, he wrestled with the unexpected invitation to sail so soon after his arrival at the Cape. Considering the options, he reflected:

> Occupied by reflections of this kind, I passed the night, more restless than will be easily imagined. The next morning, by daybreak, the distraction of my thoughts carried me to my chamber window: here I fixed my eyes on the adjacent meadows, as though I meant to ask the plants and flowers that grew on them, whether I ought to part with them so hastily. They had for a long time been almost my only joy, my sole friends and companions, and now it was these only, which in a great measure prevented me from making the voyage.

> At length I came to the resolution of undertaking it…

(Wästberg 2010, pp.107–108)
On board the *Resolution* Sparrman appears to have enjoyed a comfortable relationship with both Forsters, in spite of initial language difficulties. He became notably friendly with young Georg, a friendship that survived well after the voyage. He was impressed with the library of over 200 volumes that Reinhold Forster had brought with him; ‘possibly more books than there were in the whole of Cape Colony!’ To pass the time at sea, Sparrman and Georg Forster translated into English *The Diseases of Children and Their Remedies*. Nils Rosén von Rosenstein, the Swedish physician, founder of paediatrics and friend of Linnaeus, published this popular work in 1764. In a letter to Linnaeus, penned after his journey to the Antarctic, Sparrman used this work of translation to prove to his mentor that he had not neglected medicine entirely; this at a time when his former student friends were practising doctors, with ‘degrees bestowed on them by the great Linnaeus’ (see *The Linnaean Correspondence*; published by the Linnean Society, London). He also mentions, in the same letter to Linnaeus, that during the Antarctic expedition the naturalists always followed his teacher’s principles, and often drank to his health.

Sparrman held Cook in high regard, admiring him for his self-control, his systematic mind and his style of discipline. In his journal Cook mentions Sparrman occasionally, notably his encounter with natives in Tahiti, when ‘Mr Sparrman, being out alone botanizing was set upon by two men who striped him of everything he had but his Trowsers’ (Cook, *Journal*, 6 September 1773). Lengthy negotiations followed in an attempt to recover the lost objects.

For Anders Sparrman, his own sense of high achievement came with the recognition that he had travelled further south than any other human being, through a quirk in his shipboard accommodation. His cabin at the stern of the vessel meant that he was closer to the pole than any of his companions when the ship swung round to head north again after a third crossing of the Antarctic Circle on 28 January 1774:

> Since we had got as close to the ice as we dared (at 71°14′S) we began to turn the ship from there and northwards. In order to avoid the usual noise and bustle during such a manoeuvre, I went below to my cabin to watch more calmly from its window the boundless ice theatre. That is how it happened, as my travel companions remarked, that I went a little further south than any of the others in the ship, because, while turning, a ship always lags a little sternwards before she can make speed under the new tack as the sails fill out. (Wästberg 2010, p.122)
In March 1775 the Resolution returned to Cape Town. Sparrman resumed collecting and tutoring there, saving enough to finance another journey, this time into the Eastern Cape. Returning to Sweden in 1776, he was honoured with election to the Swedish Academy of Sciences and was appointed curator of that institute’s collections; these, however, appear to have been meagrely funded.

He travelled again to Africa, this time to West Africa in 1787, as part of his ongoing concern with the practices of slavery, which developed in his time at the Cape. Somewhat later, he resumed his medical practice, devoting himself to the poor, and finding solace with his housekeeper Charlotta Fries. Of his several publications, an Ornithology of Sweden appeared in 1806, but his accounts of his travels in Africa and with Cook are his best-known works. He died in poverty in 1820.

Finding longitude at sea

The second aim of Cook’s voyage arose from the continuing need to calculate longitude at sea. To this end, Cook was instructed to test the reliability of a copy of John Harrison’s chronometer H4, a copy made by the watchmaker Larcum Kendall.

Finding one’s place on the globe depends on knowing both latitude and longitude. These are the lines of the imaginary grid that measures both distance from the equator (latitude) and from a fixed, arbitrary north–south line extending from pole to pole (longitude). For latitude, its determination at sea was relatively easy. The height of the sun at noon (where the sun was visible through clouds) could be measured, and this angle checked against tables of declination available for the day. Alternatively, at night, bearings taken on the position of the pole star—Polaris—gave another check, although this was less reliable as Polaris does not sit precisely at the north pole. Unfortunately, no single star in the southern hemisphere constellations is as effective as Polaris, and combinations of stars within the constellation of the Southern Cross, or Crux, must be used.

The tools available for these procedures of celestial navigation were of ancient origin. Bearings of the sun were taken with a mariner’s astrolabe, an instrument of Arab origin that had come to Europe via the Mediterranean. A somewhat simplified version of the astrolabe used by sailors consisted of two metal plates bearing a circular scale; when a ray of the sun went
directly through the plates the angle between the horizon and the sun could be read from the scale. Computing latitude from the sun’s angle would then have followed referral to a series of computational or ‘lookup’ tables. These were initially produced by Portuguese and Spanish navigators who developed and refined the mathematics involved.

Latitude could thus be determined with relative ease, and ships would sail along lines of latitude in a circuitous search for their destination. The estimated ‘eastings’ or ‘westings’ of this navigational shortcut were clumsy and dangerous, and resulted in many marine disasters. The wreck of much of the British fleet, under Sir Cloudesley Shovell, off the Isles of Scilly in 1707, with the loss of 2,000 sailors has been attributed to a reliance on imperfect latitude calculations, and an inability to calculate longitude. This was one prompt that led to a prolonged search for ways of measuring longitude and to the Longitude Act of 1714. The Board of Longitude was established and instituted a series of prizes for inventors who provided solutions—the value of the cash prizes offered increased with the increasing accuracy of the instruments.

The system of rewards was established not only in Britain. King Louis XIV, who founded the Académie Royale des Sciences de Paris in 1666, offered prizes for improvements in navigation in 1715. Philip II of Spain offered the same as long ago as 1567.

As science writer Dava Sobel explained in her award-winning 1995 book *Longitude*, to know longitude at sea one needs to know what time it is aboard ship and the time at a fixed point—on land—at the same time. This idea is based on the Earth’s rotation. Since the Earth rotates 360 degrees in 24 hours—one hour is 1/24th of 360 degrees, or 15 degrees of longitude. But of course, in terms of distance, measurement of a degree shrinks with latitude, decreasing towards the poles. Measuring time aboard ship can be determined by measuring the height of the sun at noon. But the clocks against which the seaborne time can be measured, that is the comparative clocks which record the time at a land-based fixed point, need to be accurately read at sea, protected from ships’ rolling or changes in temperature.

The successful development of such clocks was the lifetime achievement of John Harrison. This clockmaker, with no formal education or apprenticeship, painstakingly constructed a series of clocks that were friction-free, rust free and constant in their action, regardless of the
pitching environment and variable temperatures encountered at sea. They provided a constant rate, and were, as Dava Sobel described, ‘a clock that would carry the true time from the home port, like an eternal flame, to any remote corner of the world’.

For much of his life Harrison struggled to overcome the human obstacles surrounding the longitude prize. This was evident from the time he presented his first clock in 1737—the enormous, clumsy but efficient model that he dubbed H1. The board was bedevilled throughout by professional jealousies, and, no doubt, by class prejudices. There were references to clockmakers as mere ‘mechanics’; these comments were from astronomers, who felt that the field should be theirs.

It was not until 1773, some 40 years after his first attempts, that Harrison was able to claim his deserved monetary award. This came after his clocks; H1 had been followed by H2 and H3, and finally by H4. This, with a diameter of 5 inches, weighed a mere 3 pounds. While sea tests of the watch had been carried out through a number of voyages to the West Indies, the Board of Longitude had thrown still more hurdles in front of Harrison before he could claim his prize. Among other restrictions, they demanded that the small clock showed ‘reproducibility’. Thus the watchmaker Marcum Kendall enters the story. His version of H4—known as K1—was completed in 1770. This was the timepiece that the Board of Longitude directed was to sail with Cook on board the Resolution, along with three other cheaper imitations by clockmaker John Arnold.

Cook was as precise in the security with which he surrounded the running of the chronometers as he was in all aspects of navigation. He appointed the astronomers William Wales and William Bayley custodians of the keys to the boxes containing the instruments. In his journal Cook described the initial delivery and setting of the timepieces, and the double checking regime to be followed at sea for their daily winding. From his journal we read:

Before leaving England, the timepieces were to be set, as follows:

During our stay at Plymouth, Messrs Wales and Bayley, the two astronomers, made observations on Drake’s Island, in order to ascertain the latitude, longitude, and true time for putting the time-pieces and watches in motion …
On the 10th of July the watches were set a-going in the presence of the two astronomers, Captain Furneaux, the first lieutenants of the ships, and myself, and put on board. The two on board the Adventure were made by Mr Arnold, and also one of those on board the Resolution; but the other was made by Mr Kendal, upon the same principle, in every respect, as Mr Harrison’s time-piece. The commander, first lieutenant, and astronomer, on board each of the ships, kept each of them keys of the boxes which contained the watches, and were always to be present at the winding them up, and comparing the one with the other; or some other officer, if at any time, through indisposition, or absence upon any other necessary duties, any of them could not conveniently attend. (Cook 1777, pp.4–5)

On their return from the voyage both Cook and Wales were full of praise for Kendall’s timepiece; ‘Kendall’s watch exceeded all expectations’, Cook reported to the Admiralty in 1775. He also described it in his log as ‘our trusty friend the Watch’, ‘our never-failing guide the Watch’. K1 had come through with flying colours, proving to a doubting and troubled scientific establishment that the success of Harrison’s H4 was no accident.

**An ancient mariner**

James Cook was satisfied that he had fulfilled the stated aims of his second expedition. He had made a circuit of the Southern Ocean at the highest possible latitude, and had laid to rest the idea of a vast southern continent—Terra Australis Incognita—that was surmised to span much of the southern hemisphere. He established too that if such a continent did exist, then it must be very near the pole, and ‘wholly inaccessible on account of ice’.

The records of the voyage, provided in visual form by the young William Hodges and in the reports of the naturalists Johann and Georg Forster, illuminated the fauna and flora and the humanity of the more temperate regions traversed.

Impressive as these outcomes were, the voyage provided one other contribution—this time to the realms of popular culture. Samuel Taylor Coleridge’s epic poem *The Rime of the Ancient Mariner*—one of the best known in the English language—almost certainly has its origins in Cook’s voyage. The *Rime* was published first in 1798, in *Lyrical Ballads*, a collaborative volume with William Wordsworth.
The art historian Bernard Smith, writing in 1960 in his study of art and ideas in the Pacific, raised the possibility that Coleridge’s poem, with its vivid imagery, may owe much to the influence of William Wales, astronomer on the Resolution. Wales on his appointment already enjoyed a high reputation as a mathematician. He had, for example, in 1772 revised and corrected the standard textbook on navigation in English: John Robertson’s Elements of Navigation, containing the Theory and Practice, first published in 1764. On the voyage, it was Wales who held one of the keys to the boxes holding the chronometers that were so vital to navigation, and it was he who constantly checked measurements and was present at the daily winding of the instruments.

William Wales’s journal of the voyage, held in the Mitchell Library in Sydney, provided Bernard Smith with much of the evidence for his argument surrounding the origin of the Rime of the Ancient Mariner. On his return to London, Wales was employed as the mathematics master at Christ’s Hospital School. It was there that he taught the young Coleridge, who was enrolled at the school from the age of 10. A number of contemporary testimonials describe Wales’s effectiveness as a teacher, his jovial personality and his love of storytelling.

Further, Wales was teaching pupils destined for the navy, as Christ’s Hospital was also a naval seminary. His own naval career had been confined entirely to scientific expeditions. It is highly likely that his teaching influenced the young Coleridge; Bernard Smith surmises that the precision and clarity of Coleridge’s imagery derives much from the precision and clarity of Wales’s atmospheric observations.

The events outlined in the poem align with the narrative set out in Wales’s journal, supporting the idea that the ballad broadly follows the description of the voyage of the Resolution. For example, Coleridge notes the position of the sun with respect to the vessel, an orientation that can only reflect the southerly track of the early part of the voyage:

The sun came up upon the left,
Out of the sea came he!
And he shone bright, and on the right
Went down into the sea.
In a complementary way, the position of sun and sea reverses as the vessel retreats northwards. Moreover, the sight and sound of icebergs—the ‘ice islands’ of Cook’s journal—precisely echo the reality of the Antarctic seas:

And through the drifts the snowy clifts
Did send a dismal sheen,
Nor shapes of men nor beasts we ken
The ice was all between.

The ice was here the ice was there,
The ice was all around;
It cracked and growled, it roared and howled,
Like noises in a swound!

It was Wales, too, who gave a vivid description of a sea snake, the animals that feature so ominously in the poem. But other references in the ballad could be drawn from the journals of other members of the expedition. For example, Cook’s own journals could well have been a resource for the imagery; it was he who recorded the first sightings of albatross, just as the expedition was encountering the ice islands. And Georg Forster reports the catching of these birds with baited hooks.

Unsurprisingly, there are other suggestions about the derivation of the poem. One of these is that the idea of the death of the albatross, with the allegory of crime and redemption, came from Wordsworth on one of his walks with Coleridge. Wordsworth had been reading the journal of one George Shelvocke, a navy officer and later a privateer, who, in his A Voyage Round the World by Way of the Great South Sea, recounts the story of the shooting of an albatross. Was it Wordsworth’s recounting of the story to Coleridge that inspired the poem? Whatever the source, Coleridge imbued the story with a dream-like quality, which, some say, might reflect his own regular use of opium.
Figure 5.4. *The ice was here, the ice was there, The ice was all around.*
Wood engraving by Gustave Doré.
Source: Courtesy of Princeton University Library.