# 1 INTRODUCTION

In December 1831, the Royal Navy's HMS *Beagle* left England on its second surveying voyage. On board was a young man called Charles Darwin. During the voyage, he took every opportunity to examine the geological formations and the myriad forms of plants and animals, both living and fossil, in the different parts of the world visited by the *Beagle*.

The many observations made by Darwin during the voyage led him to question conventional wisdom on the origin of species, and sowed the seeds for his thinking about evolution. Combining his *Beagle* observations with masses of information collected after his return to England, Darwin gradually developed an idea as to how evolution could have occurred, and in 1859 he published his revolutionary book, *On the Origin of Species by Means of Natural Selection*. By providing Darwin with the initial impetus for the development of his far-reaching ideas, the *Beagle*'s voyage has become an important event in world history.

During this voyage, the *Beagle* visited Australia, giving Darwin an opportunity to examine and explore the infant colony. Owing mainly to his own understated account of the visit in his published *Journal* (1839 and 1845), the general view has emerged that Darwin did and saw nothing of importance in Australia; that the visit was of no consequence. However, examination of all the relevant material, much of it unpublished, reveals that he was actually very active and observant during his visit, that he collected numerous specimens of animals and rocks, and that he made a number of observations that played a role in the development of his ideas on evolution.

Darwin's Australian visit is also important because it provides a view of the colony through the eyes of someone who at the time was a young and unknown naturalist, but who has since become a leading figure in the history of science.

In addition, the story of the *Beagle*'s visit to Australia provides a focus on the lives of a number of people who are now remembered for their prominent achievements in science, arts, and politics.

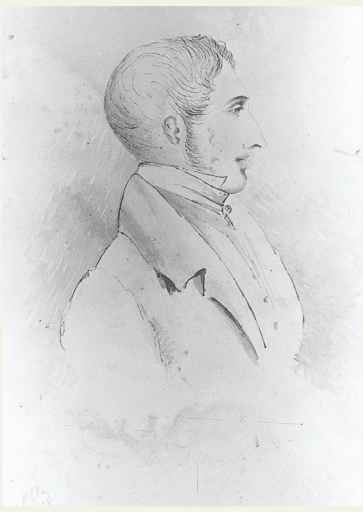
Among those on board the *Beagle* when it visited Australia was its commanding officer, Captain Robert FitzRoy, who later became Governor of neighbouring New Zealand, and who is now remembered as the father of weather forecasting; the person who, among other things, originated the synoptic chart and the publication of daily weather forecasts in newspapers. There was also Lieutenant John Wickham, who commanded the *Beagle* in the initial stages of its third surveying voyage, and who later settled in Australia, becoming magistrate and then Government Resident in Moreton Bay, which is now the city of Brisbane. There was Midshipman Philip Gidley King (Jnr), grandson of a former Governor of the colony, who had been born near Sydney, and who later became a leading figure in the political life of the colony, as a member of the Legislative Council, and close friend of Sir Henry Parkes. And there was Syms Covington, Darwin's servant, who emigrated to the south coast of New South Wales, and is now remembered chiefly for the letters that survive from the correspondence he maintained with Darwin for many years after emigrating.

Living in the colony at the time of the *Beagle*'s visit was Phillip Parker King,[1] the Australian-born commander of the *Beagle*'s first surveying voyage, father of the

*Beagle*'s midshipman, and one of the Royal Navy's most capable surveyors. Another local resident was Conrad Martens, formerly a shipmate on the *Beagle*, and one of Australia's best known colonial artists. Martens had been employed on the *Beagle* following the indisposition of the *Beagle*'s original artist, Augustus Earle, who also has a place in the art history of Australia. Others involved with the *Beagle*'s visit to Australia were Hannibal Macarthur, prominent landowner, member of the Legislative Council, and chairman of the Bank of Australia; Major Thomas Mitchell, explorer and Surveyor-General of New South Wales; Alfred Stephen, Solicitor-General of Van Diemen's Land and later Chief Justice of New South Wales; George Frankland, Surveyor-General of Van Diemen's Land; and Sir Richard Spencer, Government Resident at King George Sound.

The story of the *Beagle*'s visit to Australia gives a fresh perspective on these people by presenting them in the context of their interactions with Charles Darwin.

In order to appreciate these interactions, we first need to understand a little of the background to the *Beagle*'s voyage.



Captain Robert FitzRoy at around 30 years of age. A sketch made by Philip Gidley King (Jnr) just prior to or during the *Beagle*'s visit to Sydney.

In 1825, the Admiralty commissioned two vessels, the *Adventure* and the *Beagle*, to survey the southern coasts of South America. In command of the *Adventure* and of the whole expedition was Captain Phillip Parker King, whose four surveying voyages in Australian waters from 1817 to 1822 had established his reputation in the Royal Navy, and earned him a Fellowship of the Royal Society at the relatively young age of 32.[2] The South American survey voyage commenced in May 1826, and achieved notable success. However, the often harsh environment took its toll: the commander of the *Beagle*, Captain Pringle Stokes, committed suicide at the southern-most tip of the mainland in August 1828. The *Adventure* and *Beagle* returned to Rio de Janeiro, where Robert FitzRoy, a twenty-three year old lieutenant, was appointed as Stokes's replacement. During the final two years of the surveying voyage, FitzRoy experienced the harsh environment of Tierra del Fuego at first hand – at one stage conducting surveys in an open boat for thirty-three days in the middle of winter – but proved himself to be equal to the task.[3]

On the return journey to England, the *Beagle* had more than its usual ship's company on board: there were four natives from Tierra del Fuego as well. These Fuegians had been taken hostage by FitzRoy for the return of a boat stolen by their fellow country-men. Having failed to find the boat, but having decided that some good might come from exposing his captives to English 'civilization', FitzRoy decided to take the Fuegians home with him, and after some education, to return them to their homeland.[4]

In embarking on this plan, FitzRoy believed that another surveying voyage would soon be sent to the southern coasts of South America. But the Admiralty had no such intention, and eight months after arriving in England, FitzRoy took a year's leave of absence and engaged a private vessel at his own expense in order to return his three surviving charges (one having died) to Tierra del Fuego. Before the vessel could depart, however, an influential uncle interceded with the Admiralty, and FitzRoy was commissioned to take the *Beagle* on a second surveying voyage.[5]

Such were the somewhat unusual circumstances that led to the *Beagle*'s second voyage.

Having taken the decision, however unwillingly, the Admiralty determined to make the best of it, and the newly appointed Hydrographer to the Navy, Captain Francis Beaufort, issued FitzRoy with a long list of instructions.[6] Not only was he to complete the surveys of the southern coast of South America and of the Falkland Islands, he was also to circumnavigate the world, in order to obtain an unbroken chain of longitudes, all determined by the one set of chronometers (nautical timekeepers), at as many places as possible. Since the use of chronometers for the determination of longitude is a recurring theme in the story of the *Beagle*'s visit to Australia, it is necessary to provide a little background information on the method.[7]

The technique of determining longitude by chronometer was relatively new at that time. For centuries, sailors had been able to obtain accurate determinations of latitude simply by measuring with a sextant the height of the sun above the horizon at noon local time, i.e. when the sun was at its zenith (highest point). But the determination of longitude had remained an unsolved problem for far too long. So much so that in 1715, the English Government had offered prize money of up to £20 000 to anyone who could invent a method of determining longitude.

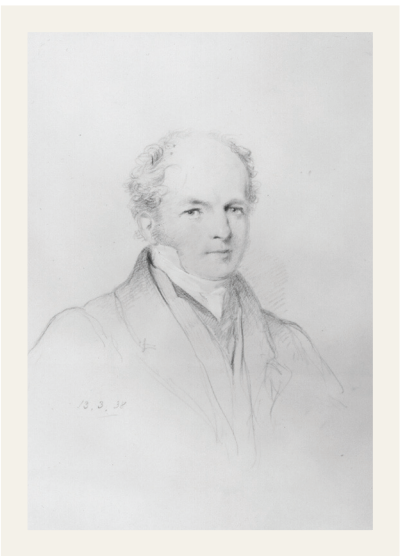
Since the earth revolves once every 24 hours, and since its circumference had been arbitrarily divided into 360 degrees of longitude, it followed that each degree of longitude was equivalent to one 360th of twenty-four hours, which equals four minutes. Thus if the sun reached its zenith at one location eight minutes later than at another location, then those two locations must be separated by two degrees of longitude. As soon as an arbitrary reference point of zero degrees longitude had

been agreed upon (the English chose the Greenwich Observatory), the problem of determining longitude became a matter of determining the difference between time at Greenwich and the local time at the place whose longitude was to be determined.

Soon after the announcement of the reward, it became evident that the most likely way to win it would be to invent a clock (chronometer) that would keep accurate time (Greenwich time) despite being subjected to extreme changes of temperature and atmospheric conditions during long voyages in tossing ships.

After a lifetime devoted to this cause, John Harrison, a carpenter from the Lincolnshire village of Barrow, with no formal training in clock making, was grudgingly rewarded by the Government in 1773. Captain Cook was the first to take a chronometer on a long surveying voyage, using a copy by Larcum Kendall of Harrison's fourth instrument with great success during his second and third voyages. Captain Bligh used this same chronometer on the ill-fated voyage of the *Bounty*.

In 1818, the Admiralty began issuing chronometers to its ships, and by the time of the *Beagle*'s first surveying voyage, King was able to take twelve with him on the *Adventure*, and a further three on the *Beagle*.[8] The virtue in taking more than one instrument lay in the fact that not all of the instruments were equally reliable, and not all could be guaranteed to continue functioning during a long voyage.



Captain Francis Beaufort, who, as hydrographer to the Royal Navy, issued the instructions for the *Beagle*'s second surveying voyage.

For the *Beagle*'s second voyage, FitzRoy collected together no fewer than twenty-two chronometers.[9] As Captain Beaufort said in his instructions to FitzRoy, 'Few vessels will have ever left this country with a better set of chronometers, both public and private, than the Beagle'. With such an unprecedented battery of instruments, Beaufort hoped that FitzRoy would be able to resolve the many conflicting longitude determinations that still then existed.

Once the South American surveys were completed, the *Beagle*'s chronometers were to be put to further use, in obtaining longitude determinations at various islands across the Pacific Ocean, from the west coast of South America to Port Jackson on the east coast of Australia. Having arrived in Port Jackson, FitzRoy was instructed to check his chronometer measurements against those of the observatory at Parramatta,

15 miles (24 kilometres) west of Sydney, which was then regarded as 'being absolutely determined in longitude'. As Beaufort noted, if this were done, then 'all those intervening islands will become standard points to which future casual voyagers will be able to refer their discoveries or correct their chronometers'. Depending on the time of year, FitzRoy was then to check the longitude at Hobart in Van Diemen's Land, and at the settlement of King George Sound, on the south-western tip of Australia. He was then to proceed home via the Keeling Islands, Mauritius, the Cape of Good Hope, and various islands in the Atlantic Ocean, using his chronometers to check the longitude at each port of call.

FitzRoy followed these instructions very closely, and thereby obtained, as he stated in his report to the Admiralty, 'a connected chain of meridian distances around the globe, the first that has ever been completed, or even attempted, by means of chronometers alone'.[10]

The reason for the *Beagle*'s visit to Australia is now clear: the settlements of Sydney, Hobart, and King George Sound were regarded as important reference points in the global chain of longitude determinations.

There is one more aspect of the instructions issued to FitzRoy that merits some attention. After describing how the surveys should be carried out and the chain of longitudes determined, and then giving some general guidelines regarding tides, trade winds, and astronomical observations, Beaufort inserted two paragraphs describing how meteorological records should be kept.[11]

This was a subject close to Beaufort's heart. In 1806 he had developed a scale of wind force and a weather code by which meteorological observations could be recorded easily in a standard manner. But it was not until he became Hydrographer to the Admiralty in 1829 that he was in a position to have his wind scale and weather code adopted by others. In fact, the first time they were used officially was when FitzRoy commenced his log on the *Beagle* in December 1831. Beaufort could not have chosen a more suitable captain to test his wind scale and weather code: FitzRoy was already very interested in meteorology, and in later life he was instrumental in establishing the world's first regular weather forecasting service. Thanks to Beaufort's instructions, and FitzRoy's dutiful following of them, we have a complete picture of the weather during every day of the *Beagle*'s voyage, including the time spent in Australia. Beaufort's wind scale proved so successful that it was adopted internationally in 1854, and is still in use today.[12]

During his preparation for the voyage, FitzRoy was aware of the harsh conditions that would be encountered in the waters off the southern coast of South America, which had led his predecessor to suicide. With this apparently in mind, he decided that it would be very useful to have a civilian companion on board; someone

FIGURES

TO DENOTE THE FORCE OF THE WIND.

0 Calm.

1 Light Air..... Or just sufficient to give steerage way.

2 Light Breeze ....
3 Gentle Breeze ..
4 Moderate Breeze
Or that in which a man-of-war, with all sail set, and clean full, would go in smooth water from
1 to 2 knots.
3 to 4 knots.
5 to 6 knots.

5 Fresh Breeze ....
6 Strong Breeze....
7 Moderate Gale ..
8 Fresh Gale .....
9 Strong Gale.....
Or that to which a well-conditioned man-of-war could just carry in chase, full and by
Royals, &c.
Single-reefed topsails and top-gall. sails.
Double-reefed top-sails, jib, &c.
Treble-reefed top-sails, &c.
Close-reefed topsails and courses.

10 Whole Gale ....Or that with which she could scarcely bear close-reefed main-topsail and reefed fore-sail.

11 Storm .....Or that which would reduce her to storm stay-sails.

12 Hurricane .....Or that which no canvass could withstand.

LETTERS

TO DENOTE THE STATE OF THE WEATHER.

b Blue Sky; (whether clear, or hazy, atmosphere).
c Clouds; (detached passing clouds).
d Drizzling Rain.
f Foggy——f Thick fog.
g Gloomy (dark weather).
h Hail.
l Lightning.
m Misty (hazy atmosphere).
o Overcast (or the whole sky covered with thick clouds).
p Passing (temporary showers).
q Squally.
r Rain (continued rain).
s Snow.
t Thunder.
u Ugly (threatening appearances).
v Visible (clear atmosphere).
w Wet Dew.
. Under any letter, indicates an extraordinary degree.

By the combination of these letters, all the ordinary phenomena of the weather may be expressed with facility and brevity.

Examples :—Bcm, Blue sky, with passing clouds, and a hazy atmosphere.

Gv, Gloomy dark weather, but distant objects remarkably visible.

Qpdlt, Very hard squalls, with passing showers of drizzle, and accompanied by lightning with very heavy thunder.

The first published versions of Beaufort's wind scale and weather code, as they appeared in FitzRoy's volume of the *Narrative*.

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| Day. | Hour. | Winds. | Force | Weather. | Sympr. | Barom. | Attd. Ther. | Temp. Air. | Temp. Water. | Locality. |
|---|---|---|---|---|---|---|---|---|---|---|
| January, 1836. | | | | | Inches. | Inches. | ° | ° | ° | Lat. S. Long. W. |
| 12 | Noon. | E. | 2 | b c | | 29·99 | 71·5 | | 68·5<br>70·5<br>70·5 | Sydney Cove. |
| 13 | 9 A.M. | S. | 1 | c g t l p | 30·19 | 30·04 | 71·5 | 63 | | .. |
| 14 | .. | S.S.W. | 2 | c g p | 30·20 | 30·03 | 72 | 64 | | .. |
| 15 | .. | N. | 2 | b c g | 29·87 | 29·79 | 73·5 | 70 | | .. |
| 16 | .. | S. | 2 | b c | 29·95 | 29·81 | 69 | 66 | | .. |
| 17 | .. | W.S.W. | 4 | b c | 30·01 | 29·84 | 68·5 | 65 | | .. |
| 18 | .. | VBLE. | 1 | c g | 30·21 | 30·08 | 71·5 | 69 | | .. |
| 19 | .. | N.E. | 1 | c g | 30·25 | 30·12 | 72 | 69 | | .. |
| 20 | .. | .. | 1 | b c | 29·86 | 29·84 | 74 | 72 | | .. |
| 21 | .. | VBLE. | 1 | b c g | 29·83 | 29·80 | 75 | 72·5 | | .. |
| 22 | .. | E.N.E. | 2 | b c | 30·15 | 30·06 | 76 | 72 | | .. |
| 23 | .. | N.E. | 5 | b c g | 30·37 | 30·22 | 73·5 | 72 | | .. |
| 24 | .. | N.W. | 2 | b c | 29·97 | 29·96 | 74 | 72 | | .. |
| 25 | .. | S.E. | 4 | c g p d | 30·40 | 30·16 | 72 | 63 | | .. |
| 26 | 6 A.M. | S.S.W. | 1 | b c | 30·56 | | | 58·5 | | .. |
| 27 | 9 A.M. | N.N.W. | 1 | b c g | 30·69 | 30·43 | 71·5 | 64 | | .. |
| 28 | .. | W.N.W. | 1 | b c g p | 30·63 | 30·41 | 71·5 | 63 | | .. |
| 29 | .. | N.E. by E. | 2 | b c | 30·37 | 30·25 | 72·5 | 67 | | .. |
| 30 | Noon. | N.E. | 4 | b c | 30·21 | 30·16 | 74 | 70 | 71<br>70·5<br>69·5<br>68 | Port Jackson. |
| 31 | 10 A.M. | N. | 4 | o m | 30·24 | 30·18 | 73·5 | 70 | 68<br>67·5 | 36·32 151·17 |

Daily weather records collected by FitzRoy, using Beaufort's wind scale and weather code, covering the period of the *Beagle*'s stay in Sydney.

with whom he could share his meals and his worries; someone who would be outside the normal pyramid of command, at the top of which the captain by necessity had to lead a somewhat isolated existence. Since FitzRoy certainly considered himself to be a scientist (he was later to become a Fellow of the Royal Society), and since the voyage was considered to be a scientific one, it made good sense to try to find a scientist who could fill the companion's role. Moreover, since a civilian companion would have no official duties on board ship, he would be free to pursue scientific interests as the need arose, thereby maximising the chances of useful discoveries being made.[13]

In FitzRoy's own words:

> *Anxious that no opportunity of collecting useful information, during the voyage, should be lost; I proposed to the Hydrographer that some well-educated and scientific person should be sought for who would willingly share such accommodations as I had to offer, in order to profit by the opportunity of visiting distant countries yet little known. Captain Beaufort approved of the suggestion, and wrote to Professor Peacock, of Cambridge, who consulted with a friend, Professor Henslow, and he named Mr. Charles Darwin, grandson of Dr. Darwin the poet, as a young man of promising ability, extremely fond of geology, and indeed all branches of natural history. In consequence an offer was made to Mr. Darwin to be my guest on board, which he accepted conditionally; permission was obtained for his embarkation, and an order given by the Admiralty that he should be borne on the ship's books for provisions. The conditions asked by Mr. Darwin were, that he should be at liberty to leave the Beagle and retire from the Expedition when he thought proper, and that he should pay a fair share of the expenses of my table.*[14]

Charles Darwin was born in Shrewsbury on 12 February 1809, the fifth child of a popular and prosperous local doctor. The grandfather referred to by FitzRoy as 'Dr. Darwin the poet' was Erasmus Darwin (1731–1802), who was not only one of the leading physicians of his generation, but was also a noted poet, inventor, and natural scientist. Among his many achievements, he was one of the first writers to suggest that existing species might have evolved from earlier forms of life. Unlike his grandson, however, Erasmus Darwin was not able to propose a feasible mechanism by which evolution could have occurred.

Charles Darwin commenced his education at Shrewsbury School. Rather fortunately as it turned out, his father removed him from school when he was only 16, and, taking advantage of the fact that Charles's older brother Erasmus was moving from Cambridge to Edinburgh to complete his medical degree, sent Charles along as well, also to study medicine. Although not particularly taken by medicine, Charles

became friendly with a number of naturalists who greatly stimulated his interests in natural history, to the extent that in his second year at Edinburgh, he was able to report some original discoveries about marine organisms to the Plinian Society.[15]

After two years at Edinburgh, it was evident that Charles was not going to follow in his father's and grandfather's medical footsteps. Instead, he was sent to Christ's College, Cambridge, with the aim of preparing for the ministry. After three years, he obtained a creditable result in his final exams, ranking tenth in the group of 178 students who passed. More importantly, during the years at Cambridge he became interested in geology, and greatly extended his understanding of natural history. In these extracurricular fields, he gained much knowledge through the close friendships he developed with John Stevens Henslow, the Professor of Botany, and Adam Sedgwick, the Woodwardian Professor of Geology. After passing his final exams, he had to stay in Cambridge for two more terms to satisfy the degree requirements. These he occupied very fully, in effect as a postgraduate student in geology and natural history. He obviously impressed his mentors, for, as FitzRoy's account shows, it was through Henslow that Darwin was offered the post of naturalist on board the *Beagle*.[16]

In addition to FitzRoy and Darwin, there were, as mentioned previously, several other members of the ship's company who are relevant to the story of the *Beagle*'s visit to Australia. One of these was Augustus Earle.

As FitzRoy himself stated:

> *Knowing well that no one actively engaged in the surveying duties on which we were going to be employed, would have time—even if he had ability—to make much use of the pencil, I engaged an artist, Mr. Augustus Earle, to go out in a private capacity; though not without the sanction of the Admiralty, who authorized him also to be victualled.*[17]

Augustus Earle was born on 1 June 1793, in London, the son of an American artist, James Earl.[18] After taking lessons at the Royal Academy, Earle travelled the world as a painter, spending time in the Mediterranean, North America, and Brazil. On 17 February 1824, he left Rio de Janeiro on board the *Duke of Gloucester*, which was bound for the Cape of Good Hope. In the middle of March, the ship called in at the south Atlantic island of Tristan da Cunha. A few days later, much to Earle's consternation, it sailed without him.[19]

After he had spent eight lonely months on the island, with only six other adults for company, his frantic signals to passing ships were finally heeded by the *Admiral Cockburn*, which was bound for Van Diemen's Land. He arrived in Hobart on 18 January 1825. Four months later he was in Sydney, where, among other things, he