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# H.M.S. *Beagle*, 1820–1870

*“She belongs to that much-abused class, the ‘10-gun brigs’ ... notwithstanding which; she has proved herself, ... in all kinds of weather, an excellent sea boat.”*

—John Lort Stokes



Keith Stewart Thomson

*“After having been twice driven back by heavy southwestern gales, Her Majesty’s ship Beagle, a ten-gun brig, under the command of Captain FitzRoy, R.N., sailed from Devonport on the 27th of December 1831.”*

With these words, Charles Darwin began his account of one of the most important voyages made in the 19th century. More than 100 years later we know a great deal about the voyage and about Charles Darwin, and we have learned quite a lot about Robert FitzRoy. But about the *Beagle* herself—a tiny vessel only 90 feet long which made three enormously important surveying voyages between 1826 and 1843—very little is known.

I first began to read about the *Beagle* in the course of my work as an evolutionary biologist, and as I learned more and more, I was struck by the fact that so many statements about her, in works on Darwin and others connected with the second voyage, contradict each other. For example, in one book we read that the *Beagle* was sold to Japan and used as a training ship. In another we find that she ended her days at Southend—or was it Paglesham—in Essex. She was nominally a 10-gun brig but for most of her career was rigged as a three-masted bark. Why the conversion? Authorities cannot even agree when the change was made. No plans of the *Beagle* were known to exist, and there are few contemporary illustrations.

The aim of this article is to bring together for the first time some important information about the *Beagle*, together with an outline of her career and some notes on her sailing characteristics. I hope that these pages will provide students of Darwin and of 19th-century exploration with a clearer

idea of the ship, of the conditions under which Darwin and others worked, and, thereby, a further measure of their immense achievements.

## The Origin of the *Beagle*

In order to present a full description of the *Beagle*, we must first give brief attention to the general nature of naval ships of the time—their design and the purposes for which they were used.

A bark has three masts: fore, main, and mizzen. The first two carry square sails, whereas the mizzenmast carries only a driver. The word *sloop* is used rather loosely to describe any small man-of-war of fewer than 20 guns.

The Royal Navy, during the period of “transition” in the first half of the 19th century, changed from fleets dominated by many large ships of the line—three-deckers or more, armed

*Editors’ note:* *American Scientist* occasionally revisits articles from the magazine’s archive to tie present research to its history. To complement this issue’s articles on evolution (“On the Trail of the First Placental Mammal,” page 190) and conservation (“War and Redemption in Gorongosa,” page 214), we are reprinting a classic investigation into the story of the H.M.S. *Beagle*, the ship that carried Charles Darwin on his famous voyage to the Galapagos Islands.

This article is also the first written for *American Scientist* by Keith Stewart Thomson. He followed this endeavor with a nearly 30-year run as a regular contributor to *American Scientist*’s Marginalia column. Many of Keith’s columns, including several on Darwin, are available on *American Scientist*’s website. Keith recently retired, and we take this opportunity to highlight his glowing career at the magazine.

Thomson recounts: “I had been delving into *Beagle* history ever since chancing upon the lost original plans for the ship at the National Maritime Museum in London. My essay touches upon all my favorite subjects: biology, evolution, Darwin, exploration, and the history of science. I hope we now know much more about the conditions under which Darwin and his shipmates labored and also have captured at least a little of the romance of discovery, whether in the field or the library.”

Since the article’s publication in 1975 several new pieces of scholarship regarding the *Beagle* have come to light. Keith published a full book about the ship in 1995. Studies in the early 2000s may have found the *Beagle*’s resting place after it was scrapped, along with some of her repurposed timbers incorporated into nearby onshore buildings. And beginning in 2012, the Nao Victoria Museum in Chile began construction of a full-size replica of the ship. That replica is now nearing completion.

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A vessel is defined as a *ship* if it is fully squarerigged (with transversely set square sails) on three masts or more. A *brig* has two masts, both square-rigged but with a fore-and-aft driver on the main (after) mast as well.

mainly with long guns—to those in which the smaller brigs and frigates predominated. The reasons were manifold. First, there was a change in the pattern of naval warfare during the wars with France, when the major Brit-

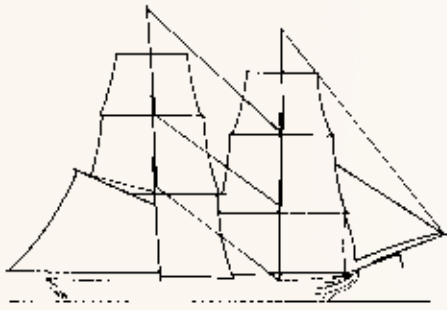


Figure 1. Sail plan of a typical 10-gun brig. This is possibly how the *Beagle's* sails were rigged before she was converted to a bark.

ish vessels were tied up blockading the French fleets in their home ports. Principally, however, the emergence of the smaller "cruisers" can be traced to the invention of a new lightweight gun, the carronade, which allowed even small vessels to carry an immense firepower deliverable at short range. The carronade is named for the town of Carron, Scotland, where they were manufactured. They were light in weight, with a short broad barrel. A heavy charge was carried, but the effective range was short, less than 100 yards. Even a small sloop could now take on a large merchantman or a moderate-sized man-of-war or privateer.

With the enthusiastic endorsement of the carronade by Lord Melville (First Lord of the Admiralty, 1808–1827; 1828–1830), new classes of smallish sloops-of-war, armed almost exclusively with carronades, quickly came into existence. They were cheap to build, easy to handle with a small crew, could operate in shallow waters as well as deep, and were restricted in oceanic operations only by their limited capacity to carry stores. These vessels, armed with 10 to 18 guns, were used in escort duties, reconnaissance work, routine patrols, as packets, and even as troop ships.

The increase in smaller vessels began, naturally enough, with relatively large ship-rigged sloops of 18 guns. But very soon the brig-sloops came into service, one of the most successful being the 18-gun brig armed with two 6-pounder long guns and 16 32-pounder carronades. These were followed by 16- and 14-gun brig-sloops. In 1808, a new class, the 10-gun brig-sloop, designed by Sir Henry Peake (Surveyor to the Navy, 1806–1822), came into being and was given the class name Cherokee. The *Achates* was the first to be launched, on February 1 of that year, and orders for the *Parthian*, *Cherokee*, *Cadmus*, and *Rolla* were sent out in the same period.

One hundred and seven 10-gun brigs were built between 1808 and 1838; the *Beagle*, laid down in June 1818 and completed on May 11, 1820, was the 41st. They were small vessels of 235 tons "burthen" (in the old-fashioned sense of the builder's measurement of displacement), 90 feet long overall, and 73 feet, 7 inches at the keel. The maximum breadth was 24 feet, 6 inches, and the depth of the hold was 11 feet. Little workhorse ships built to an inferior design, they were scorned by those who sailed in greater ships and detested—or at best viewed with an affectionate alarm—by those who sailed in them. The proponents of the "big ship" school, to whom the change was anathema, felt that "the substitution of carronades for long guns" increased "the numerical strength of a man-of-war ... at the expense of her fighting efficiency." William James, in his *Naval History*, flatly states that "as little judgment has been employed in modelling the hull as in establishing the armament." Although the new small brigs gave good service in the wars with France, they were considered too frail to be risked against the powerful American frigates during the War of 1812.

In the Pax Britannica that followed 1815, policy centered around an open world trade which was principally seaborne. To permit safe commerce, the Royal Navy set about putting down piracy and slaving and tackled the mammoth task of accurately charting the oceans and coasts of the world. The resulting maps were made freely available through the Admiralty. During this period, the 10-gun brigs were pressed into a variety of services, principally routine naval patrolling in the eastern North Atlantic and as packets. Several were used in extensive overseas surveying. Such work offered the most interesting challenges to young naval officers, and some of the best men available took part, including Robert FitzRoy. The *Beagle* was one of the brigs used for this purpose, and, like her sister ships, she was not at all well designed for the task.

### The *Beagle* as a Brig

H.M.S. *Beagle* was launched on May 11, 1820, at Woolwich naval dockyard on the Thames. As it was peacetime, there was no immediate call for her service, and for the first five years she lay "in ordinary" at Woolwich, some of her timbers already starting to decay. Even so,

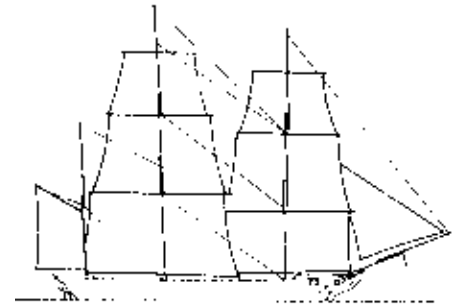


Figure 2. Sail plan for the *Beagle* rigged as a bark. Compare with Figure 1.

she did gain one mark of fame. In July 1820, Great Britain celebrated the coronation of King George IV, and among the festivities was a review of naval vessels on the Thames. The spanking new *Beagle* was included in this great parade and, in passing up the river, became the first man-of-war to pass fully rigged under the (old) London Bridge. It is a minor distinction, and certainly no one would then have guessed that the name of this little brig would be known the world over 150 years later.

For many years it was thought that the original plans of the *Beagle* no longer existed—they had either been lost or destroyed before the present vast collection of ships' drafts was assembled at the National Maritime Museum in London. One's disappointment was, of course, somewhat lessened by the fact that the *Beagle* never sailed as a brig. But unfortunately, the plans for her conversion to a bark are also missing.

When I became interested in the *Beagle*, my first task seemed to be to examine the plans of her sister ships in order to try to reconstruct what the *Beagle* might have looked like when she was first built. I decided to look at plans of the first of the brigs and, quite mistakenly (as I later discovered), thought that this must have been the *Cadmus* (launched February 26, 1808). Half an hour after I entered the museum, I had the plans for the *Cadmus* in my hands, and to my great surprise I was able to make out, among many scrawled corrections and notes, the following words: "16 July 1817. Copies ... to Woolwich for the *Barracouta*, *Beagle* ..." A note on the back of the plans states that these are the original drawings of the 10-gun brigs, and there follows a complete list of vessels constructed from them or from copies of them. (These annotations seem mostly to have been made in 1817, when the plans were brought up to date by Sir

Robert Seppings.) There is another draft, dated July 1817, that shows a modification of the construction of the frames and floors and a raising of the height of the bulwarks. This also bears the annotation that a copy was sent to Woolwich for the construction of the *Beagle*. Therefore, the master plans from which the *Beagle* was constructed do exist, and we can get a clear idea of the ship as she was first designed.

Like all brigs, the *Beagle* originally had two masts: the mainmast carrying a large fore-and-aft driver, or spanker, in addition to a full set of square sails comparable to those on the foremast (Figure 1). The squaresail complement was typically a mainsail, topsail, and topgallant, but possibly royals were added, and there was one large jib. She was, of course, built of oak; the main wale measured 4 inches thick, and the bottom planking, 3 inches. The *Beagle* was no doubt painted in the standard navy fashion of the time—black sides with a broad yellow stripe around the upper parts and touches of gold and scarlet outlining the beak and possibly the stern. There was a minimum of external decoration; none of the elaborate scrollwork seen on ships of the line graced the appearance of a lowly 10-gun brig. There was no figurehead.

The *Beagle* was originally flush-decked, with only two tiny cupboard-like enclosures at the stern containing a flag and signal locker and a water closet. Also, there were two hatches—a main and fore hatch—companionways just in front and behind the mainmast, bits, the chimney from the galley, a scuttle to the bread room in the stern, and a couple of winches. Of course, the guns were also carried on the main deck, so the tiny space would not have been uncrowded! The *Beagle* was designed to carry eight 18-pounder carronades and two 6-pounder long guns. Her bulwarks were pierced with six gunports on each side and two at the stern. In normal times, the carronades were mounted down the sides, and the long guns were used as stern or bow “chasers.”

The landlubber would notice the total lack of skylights to the lower deck. Apart from any light and air that may have reached the lower deck via the companionways and hatches, it must have been pretty dark and dismal down there. In fine weather a system of canvas screens was doubtless erected in order to direct fresh air below, but in stormy weather, everything was

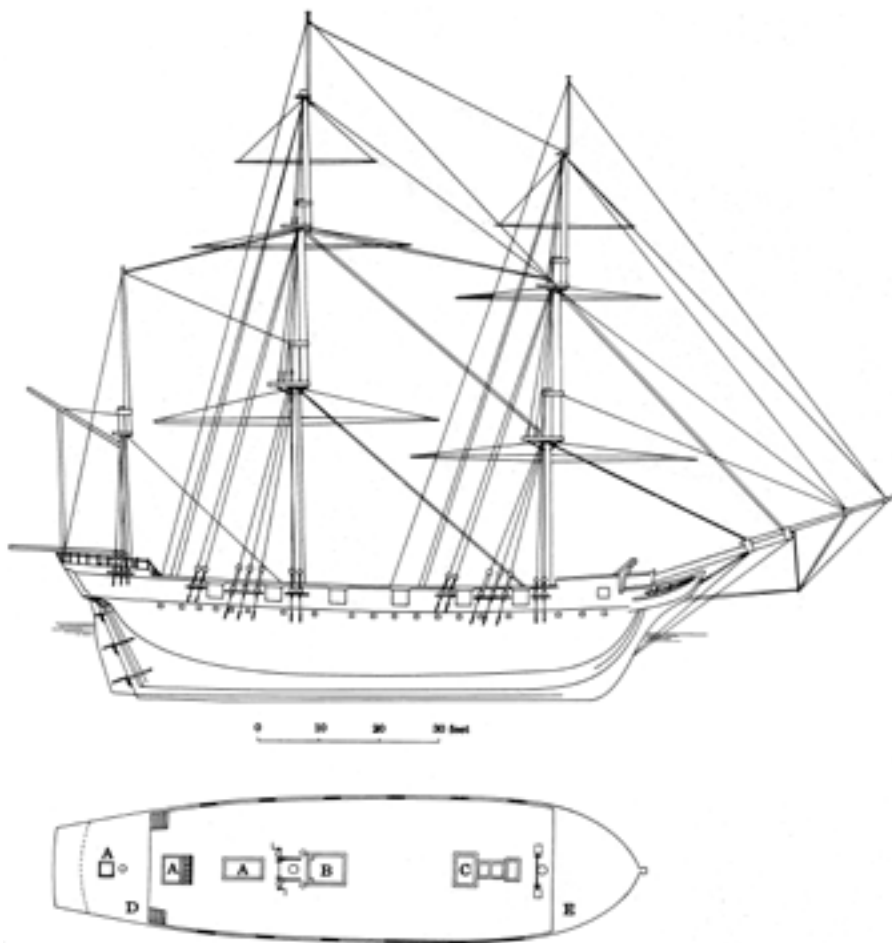


Figure 3. The *Beagle* as she probably looked after 1825. Among the changes, a mizzenmast, large poop cabin, and fo’c’sle were added. The lower rigging reproduced here follows that of a sister ship, the *Barracouta*. The plan of the main deck shows: A, sky lights; B, main hatch; C, fore hatch; D, poop deck; E, fo’c’sle [forecastle]. (Hull based on Admiralty Drafts 3976, Box 56, and 4052, Box 56; courtesy of the National Maritime Museum.)

battened down. It is hard to imagine which would be worse: being battened down in the penetrating cold of a North Atlantic winter gale or in the stifling heat of a tropical storm.

The general picture of crowding and discomfort is not alleviated by close examination of the arrangement of the lower deck. The height between decks at midship was only 63 inches! The captain’s cabin was at the stern, and above and beside it, in the oddly shaped space where the stern quarters rose up, was the storage for bread. Immediately forward was a small passageway with a scuttle to the magazine and armory below; a marine sentry would have stood guard there. Along the port side of the passage leading forward, sleeping spaces were marked off for the master and surgeon. The messroom was in the center of the vessel, and it led, on the starboard side, to sleeping spaces for the first and second lieutenants. Sleeping space for the purser, the steward’s room, and the

access to the spirit rooms, the well, and the gunner’s storeroom were grouped near the main mast.

The main part of the lower deck was taken up with a large sailroom, the carpenter’s and boatswain’s storage bins, and the general sleeping and eating area for the crew. The galley was forward of the fore hatch, and the boatswain’s, carpenter’s, and gunner’s cabins were right at the bow. The hold was reached via the main and fore hatches, and individual scuttles provided access to several separate areas.

Given the fact that some 65 officers, men, and boys lived in these close quarters, it is evident that some highly structured social organization was necessary. The social code, applied relatively easily on ships of the line, was rigorously enforced on these smaller, cramped vessels; indeed, it was vital for iron discipline. The captain dined separately from the rest of the officers, except when he invited them to share his table. The other officers ate in the

messroom, as did the purser, surgeon, and chaplain. There was no separate gunroom, no marines' quarters, no separate messes for the warrant officers (the gunner, carpenter, and boatswain); a complex arrangement for the division of space available, and probably also the time of eating, must have been necessary in order to maintain the delicate hierarchy among the noncommissioned officers, crew, and servants. Each person on board came to know his fellows extremely well, and during the second voyage—the one we know most about—although there were the customary desertions and transfers during the first weeks of the cruise, there was an impressive loyalty to the *Beagle*.

We have some idea of the stores carried on a fully equipped 10-gun brig, and they are not impressive. The ship could carry 19 tons of water in iron casks, which had been generally introduced into the navy in 1815 and were a vast improvement over wooden casks, whose contents were usually completely fetid in a few days. She carried about six tons of coal and wood for the galley and could take on only about six and a half tons of provisions, spirits, and slops (crew's clothing). For a fighting ship, the weight of the gunner's stores—powder, shot, cases, and so on—amounted to another 10 tons. Also on board were about 2,000 yards of spare canvas for sails, and some two tons of spare masts, yards, and gear were lashed to the main deck. Typically, a brig would carry three bower anchors (two with iron cables), one stream anchor, and one kedge anchor.

The 10-gun brigs were not capable of cruises of more than three months away from well-established bases of supply. When these little vessels came to be used for survey work in the 1820s to 1840s, the lack of range was a great problem. On her first survey cruise, to South America, the *Beagle* was accompanied by a mother ship, the *Adventure*, which carried more ample stores. On her second and third voyages, the *Beagle* worked alone, and the supply problem added a major burden to the responsibilities of her captains.

The main disadvantage of the 10-gun brigs was not their accommodations, size, or range. After all, no one entered the Royal Navy in those days expecting a comfortable life at sea, especially in a small ship. The problem was the handling characteristics; they were fundamentally dangerous in



Figure 4. Conrad Martens, an official artist on the second voyage, did this drawing of the *Beagle* laid ashore at the mouth of the river Santa Cruz in Southern Argentina. When repairs to the hull were necessary after the ship had struck a rock, the ship was beached and the work was performed between high tides. (Image courtesy of the Beinecke Rare Book and Manuscript Library, Yale University.)

stormy weather. It was not long after the first ships of the class were in service that they acquired the sobriquet "coffin brigs." Another name for them was "half-tide rocks." Admiral Sir B. J. Sullivan, who served on the *Beagle* as a midshipman and lieutenant on the first two voyages (1830–1836), described them in a letter dated December 12, 1884 to Francis Darwin, son of the naturalist, as "very deep-waisted, that is, had high bulwarks for their size, so that a heavy sea breaking over them was the more dangerous."

Because the 10-gun brig had no fo'c'sle [forecastle], it had a tendency to ship any really big sea taken over the bow. A great weight of water could become trapped in the very high bulwarks on the main deck, and the brig would wallow and lose steerage way, with the resulting danger that it would turn broadside to the weather. With the bulwarks only 6 feet from the water line, a second wave shipped before the first had cleared the deck could bring it to a standstill; a third would have it completely at its mercy, and it would probably founder. Therefore, very careful sailing was necessary in bad weather.

FitzRoy, after some initial close shaves, mastered the art of maintaining a minimal press of sail in order to keep under way and thereby managed to establish a record of great safety over his two voyages. It is easy to imagine that a less vigilant captain and less dedicated officers and crew would have had a different fate. Ample con-

firmation of the difficulty of handling the 10-gun brigs is given in the reports of those who served in them and in the silent testimony of the wrecks. Of the 107 ships of the Cherokee class, none were directly lost to enemy action, one—the *Redpole*, of 1808—was sunk by the pirate ship *Congress* in 1828, but 26 were lost at sea by wrecking on rocks, by foundering, or through unknown cause.

The following observations by Charles Darwin in his *Diary*, dated July 10, 1832, probably may be taken as typical of the performance of a 10-gun brig.

Almost a gale ... we first lowered the top-gallant yards and then struck the masts ... The *Beagle* glided over the waves, appearing as if by her own choice she avoided the heavy shocks. As the night came on, the sky looked very dirty, and the waves with their white crests dashed angrily against the ship's sides. In the little watch, however the wind fell and was succeeded by a calm; this is always the worst part of a gale, for the ship, not being steadied by the wind pressing on the sails, rolls in a most uncomfortable manner between the troughs of sea.

In a full gale off Tierra del Fuego, he wrote in a letter dated March 30, 1833:

I was remarking that a gale of wind was nothing so very bad in a good sea-boat: the captain told me to wait until we shipped a sea; it was

pathetic; for at noon we shipped a great one, and it is a sight for a landman to remember, one of our boats was knocked to pieces and was immediately cut away; the water being deep on the deck.

The account is continued better in his diary for that day: "The same sea filled our decks so deep that if another had followed it, it is not difficult to guess the result. ... At last the ports were knocked open and she again rose buoyant to the sea."

A further problem with the sailing of the *Beagle* was that, like any square-rigged vessel, even when converted to a bark rig, she could not sail close-hauled into the wind. Thus, on both South American voyages, the eastern entrance to the Strait of Magellan posed a serious problem: a narrow dangerous channel to be tackled with very strong, directly contrary winds.

### Bark Rig and First Voyage

The *Beagle's* first surveying voyage was to South America (1826–1830) in an expedition led by Captain Philip Parker King in the H.M.S. *Adventure*, a large transport brig. The *Beagle* was commanded by Lieutenant Pringle Stokes, who committed suicide at the Strait of Magellan on August 12, 1828; Lieutenant Robert FitzRoy was then appointed to the command. This voyage ended with the well-known kidnapping of three Fuegians, who were transported to London for education. FitzRoy was also the captain of the *Beagle* on her second surveying voyage, which took her around the world (1831–1836). This is, of course, the expedition that Darwin accompanied. The third voyage, to Australia and the East Indies (1841–1843), was under the command first of Lieutenant John Clements Wickham and then, from 1841, under John Lort Stokes (no relative

18-gun brigs, which, like the 10s, had the mainmast rigged aft of the center, reports that these brigs sailed much better with a mizzenmast: "It then became the fashion to rig our ships as barques ... the government thought it was better for surveying purposes." Also, it was found that the bark rig could be managed by a smaller crew.

The modification to a bark rig required removing the boom and running rigging for the main driver from the mainmast and adding a small mizzenmast, which then bore a smaller driver. Although we do not have any plan to show the exact placement of the mizzenmast in the *Beagle*, it must have been in the same place as in the *Barracouta*—a sister brig converted for survey work—for which plans have survived and have been used here to make drawings for the *Beagle* as a bark (Figure 3). The new sail plan would have been as depicted in Figure 2.

The rebuilding of the *Beagle* also included the addition of two most important features: a large poop cabin and a fo'c'sle. Such additions to a brig were less common but very sensible. The design of naval ships of the period still emphasized flush decks; however, fewer guns were needed for the survey service, and, as the decks were rarely if ever "cleared for action," arguments in favor of flush decks did not apply.

Also, the poop cabin was highly desirable because there was no spacious cabin or well-lit area in the 10-gun brig of typical design where charts could be drafted, notes worked up, and sketches turned into finished drawings. The captain's cabin was poorly suited to such work, even if a large skylight were installed. The addition of the poop cabin—10 by 11 feet—gave room in the *Beagle* for a large charting table as well as accommodations for the extra surveying officers (and supernumeraries such as Darwin). It was well lit and, for a ship of that size, extremely spacious. Furthermore, the poop deck provided an excellent high platform from which observations could be made.

The addition of the fo'c'sle made the ship safer to handle and the main deck much drier, because it tended to deflect large seas shipped over the bow. It also provided additional storage space for equipment and a place where the men could get out of the elements.

The fourth major change in the *Beagle* was the addition of a large skylight for the gunroom, which must have



Figure 5. Although this side-elevation of the *Beagle* by Philip Gidley King, midshipman on the second voyage, is not in correct proportion, it does give an idea of the organization of some of the crew and storage areas below deck. 1, Darwin's seat in the captain's cabin; 2, Darwin's seat in the poop cabin; 3, Darwin's drawers in the poop cabin; 4, azimuth compass; 5, captain's cabin skylight; 6, gunroom skylight. (Image courtesy of Sir Geoffrey Keynes.)

Also, the *Beagle* could not be handled easily close to shore under many conditions. The official *Narrative* of the first two voyages is full of accounts of how the ship, unable to find a safe anchorage at night, was forced to keep out to sea under way. For these reasons FitzRoy liked to work with auxiliary schooners—borrowed, hired, or bought outright. The Admiralty, having sent out what they considered a fully adequate ship, looked upon these adventures with disfavor and refused to reimburse him. FitzRoy's methods proved sound, however; almost none of his detailed inshore surveying was made directly from the *Beagle*, but much of the detail of his work from auxiliary craft survives in South American charts of recent vintage.

of the first captain of the *Beagle*). J. L. Stokes is the author of the only published account of this final expedition.

Many people have assumed that the *Beagle* was modified from a brig-sloop to a bark especially for her second surveying voyage. However, the records make it perfectly clear that she was converted to bark rig for the first voyage. For example, not only does the *Narrative* state flatly that the *Beagle* was a bark, but Sullivan, who joined the *Beagle* a few weeks after FitzRoy took over command, notes in his diary for December 11, 1827: "Exchanged numbers with H.M. Barque *Beagle*: 0.40 A.M., anchored near H.M.B. *Beagle*."

In fact, such modification was common at the time. The naval explorer Sir Edward Belcher, referring to the

made conditions below considerably more pleasant. An additional skylight was also provided for the captain's cabin. The ship's wheel remained in front of the mizzenmast, but the addition of the poop deck made life more comfortable for the helmsman because it was constructed with a large overhang, or break, protecting the wheel and two binnacle compasses. A large azimuth compass was mounted on the break of the poop.

A new source of information about the *Beagle* is a contemporary plan of the poop cabin, with annotations in Darwin's hand, that was found recently in the Darwin archives at Cambridge University. It was probably drafted for Darwin during the voyage by either John Lort Stokes or Philip G. King. It shows bookcases on the starboard and after walls of the cabin, chests and seats on the port side, and chests of drawers, a cabinet for instruments, and a washstand on the forward wall. The cabin was dominated by the large drafting table that was built over the steering gear, and the mizzenmast rose through the cabin just in front of the table.

For the first surveying voyage, according to Commander King's official narrative, the *Beagle* carried six guns, but it is not clear what the nature of these guns was. There must have been at least one signal gun of small caliber, but was this one of the six? Probably the six were 18-pounder or 12-pounder carronades with perhaps one long gun. The *Adventure* is listed as unarmed but, again, probably carried a signal gun. We are as equally uninformed about the total number of small boats carried by the *Beagle*, although we know there were several; the surveying work demanded a largish cutter (carried amidships) and two or three smaller whaleboats for work in shallow waters.

We have little direct information about the special internal fittings, equipment, or stores of the *Beagle* for the first surveying voyage. The *Adventure* was the storeship for the expedition, and we do know that she was well supplied with the relatively new preserved meats, soups, and vegetables. The use of preserved food was just coming into wide acceptance in the navy. Although the basic elements of the cause and cure of scurvy were known, most naval officers (FitzRoy being a notable exception) failed to use dietary regimes adequate to prevent it. Perhaps this was in part due to the



Figure 6. Map of the Essex coast, showing the last mooring place of the *Beagle*, on the River Roach, as a Watch Vessel in the Coastguard service.

innate conservatism of the men, who preferred their salt beef and hardtack.

W. H. B. Webster, the surgeon of the *Chanticleer*, a sister brig engaged in survey work, offered a gastronomic criticism of the new delicacies: "The preserved mutton is excellent and makes an admirable pie; but the beef is insipid and overboiled. The soups are capital and afforded us many an excellent meal; the sight moreover of fresh English meat on the table went far to cheer us midst our gloomy solitude." The name Donkin Cove, given to a remote region of Otway Water, off the Strait of Magellan, evidently stems from Donkin's brand of preserved meats! For relief of scurvy, the contemporary medicine chest included sulfate of quinine (8 to 10 grains daily in a little port wine) and lime juice. Although the new preserved foods were an improvement over the traditional diet, the paucity of supplies of both fresh and preserved food—"a small half-pint canister of soup was a man's allowance for two days"—made illness the rule rather than the exception for vessels working for long periods in the high southern latitudes. The *Beagle* and the *Adventure* were relatively well supplied, but widespread sickness nearly brought the expedition to disaster.

#### Modifications for the Darwin Voyage

When the *Beagle* returned from the first surveying voyage, on October 14, 1830, the crew was paid off, and she was cleared out completely and put in ordinary again at Devonport dockyard. Here she might have stayed, because when FitzRoy finally managed to persuade the government to send out a second expedition to South America (among other purposes to return his three Fuegian "charges"), the Admiralty first intended to send the *Chanticleer*.

However, when examined, the *Chanticleer* proved unfit, and the second obvious choice was the *Beagle*. Unfortunately for the Lords Commissioners (and the taxpayers), the Admiralty nonetheless found itself in for considerable expense: The *Beagle* was also in poor condition, and a major rebuilding was required. According to the Admiralty Progress Book the total bill was £7,583—only £220 less than her original cost.

The refit of the *Beagle* took a long time and considerably delayed the start of the voyage—so much so, in fact, that the Admiralty became restive and demanded to know why. The reason was that FitzRoy was personally supervising the work. He wrote in his *Narrative* of 1839 that he was "resolved to spare neither expense nor trouble in making our little Expedition as complete with respect to material and preparation, as my means and exertion would allow, when supported by the considerate and satisfactory arrangements of the Admiralty."

The *Beagle* ("almost completely rotten") was stripped right down to her timbers and carefully rebuilt. In the process, by FitzRoy's request, the upper deck was raised 8 inches aft and 12 inches forward. This "proved to be of greatest advantage to her as a sea boat, besides adding so materially to the comfort of all on board." A man could now stand upright in the lower deck! Her bottom was also reinforced with 2-inch fir, a coating of felt, and new copper, which added about 15 tons to her displacement.

There were many other modifications, including a newly designed rudder; a galley stove, recently patented, that did not have to be put out in rough weather; and lightning conductors of a design that was the forerunner of modern conductors. All showed that FitzRoy was completely on top of the latest develop-

ments in nautical materials. The *Beagle* was rigged with extra-strong crosstrees and heavier rigging “than is usual in a vessel of her tonnage. Chains were used where found to answer and in no place was a block or sheave allowed which did not admit the proper rope or chain freely.... Our ropes, sails and spars were the best that could be procured.” In addition to the usual sail plan, FitzRoy added “large trysails between the masts, made of stout canvas, with several reefs, and very useful we found them.” Extra anchors were also included.

On the main deck, FitzRoy carried seven guns at first. These caused some trouble with the Admiralty. Not only did FitzRoy insist on carrying a pretty full armament, he also insisted that the

of them FitzRoy’s personal property—and a dinghy. A curious note may be added about boat terminology. In the naval jargon of the day, the term *dinghy* was not in general use. An Indian word, it was then in use only on vessels of the East India Company. FitzRoy is generally credited with introducing the term to the Royal Navy to replace *jolly boat*. During the second voyage, FitzRoy also introduced the word *port*, in preference to *larboard*, a very useful change which eliminated the possibility of confusion in shouted orders.

The poop cabin was the focal point for Darwin, being both his work area—whenever he could get space away from the surveying officers—and his sleeping quarters, which he shared with

win had at his disposal in the cramped ship was a locker in the fo’c’sle where he stored specimens (see Figure 5).

In his enthusiasm for his expedition, FitzRoy wrote that “perhaps no vessel ever quitted her own country with a better or more ample supply (in proportion to her probable necessities) of every kind of useful provision and stores than the little ship.” He did not spare the Admiralty in ensuring that the best instruments were obtained. The hydrographer to the navy, Captain Francis Beaufort, stated: “Few vessels will have ever left this country with a better set of chronometers.” Chronometers were fundamentally important to the expedition because only by having exact time could longitude be determined with accuracy. One of the main scientific objectives of the voyage was to make a complete circle of observations around the world to fix exactly the positions of major navigational features. In their first leg, they found that contemporary French maps had the position of what is now Salvador, Brazil, off by five nautical miles.

FitzRoy took 24 chronometers with him; 3 were still working perfectly when the *Beagle* returned. Each was “suspended in gimbals, as usual, within a wooden box,” and then all were “placed in sawdust, divided and retained by partitions, upon one of two wide shelves” of the little locker set aside for them near the captain’s cabin. According to FitzRoy, they were completely free of vibration and shock, even when the guns were fired. It has to be admitted, however, that he fired the guns as infrequently as possible, because of the necessity of protecting the delicate instruments. When a signal or salute was called for, one of the six-pounders was used at the foremost gunport.

### The Third Voyage and Home Waters

Despite the rather mixed record of the *Beagle* on the first voyage, when several men were lost through drowning or sickness and her captain committed suicide, and despite the known dangers of working in the stormy uncharted waters around Cape Horn, five officers as well as the surgeon, boatswain, carpenter, and several men and marines who had completed the first voyage with FitzRoy took part in the second. When the third voyage, to Australia, under Wickham’s command, was being prepared, four officers and several men from the second voyage took part. We



In 2012, construction began on a full-size replica of the *Beagle* at the Nao Victoria Museum in Chile. Updates can be seen at <http://hmsbeagle.cl/>.

guns be of brass so they would not interfere with the compasses. In the end, faced with the refusal of the Admiralty to comply completely with his request, FitzRoy provided two nine-pounders at his own expense, adding them at Rio de Janeiro. Actually, the guns were never fired in earnest, although they were run out for a display of intent on at least one occasion, during an incident at Buenos Aires in 1832.

A full complement of small boats further cluttered up the decks, so much so that work during very bad weather must have been difficult indeed. Amidships were two sizable boats, a yawl of about 24 feet and a slightly smaller cutter stowed inside it. In addition, the *Beagle* carried four whaleboats—one

Midshipman King. The two slung their hammocks in the cabin, with only about two feet between their faces and the deck above. Darwin was well over six feet tall, and in order to have room for his hammock he had to take out the top drawer from the set in the forward wall of the cabin; the hooks for attaching the hammock were inside. Because the poop cabin overhung the stern, every movement of the ship must have been magnified. Darwin suffered dreadfully from seasickness throughout the whole voyage, and many times left his hammock up during the day “when the sea was at all rough, that he might lay in it with a book in hand when he could no longer sit at the table.” Apart from the poop cabin, the only space that Dar-



do not know of any major changes to the *Beagle* during this third voyage.

After returning, the *Beagle*'s crew was paid off for the last time, and she was removed to Sheerness dockyard on October 20, 1843. Her career seemed to be over. John Lort Stokes wrote in his *Discoveries in Australia* of 1846, "I naturally parted from her with regret. Her movements, latterly, have been anxiously watched, and the chances are that her ribs will separate, and that she will perish in the river where she was first put together." The *Beagle* was now 25 years old. Most of her sister ships had long since left the service and had either been dispatched to the breaker's yard or cut down for barge and storage duty. But despite Stokes's fears, the hull of the *Beagle* was relatively sound, and there was one last role for her to play. On June 14, 1845, the dockyard workers started to copper her bottom again, and on July 11 she set sail from Sheerness on what was to be her last voyage.

It was a short trip. They headed out of the Thames and passed cautiously northeast along the Essex coast, past the tiny fishing village of Southend, past Shoeburyness, around Foulness Point into the mouth of the River Crouch, and then south into the River Roach, which is the landward definition of Foulness Island. When they came to the small arm of the Roach called Paglesham Pool, which leads north to the little village of Paglesham sitting in the marshland of coastal Essex, they dropped the anchors (Figure 6). The last phase of the *Beagle*'s career had begun; she was now the *Beagle Watch Vessel*, assigned to the Coastguard Service—nothing more than a stationary hulk to be used as an observation post, for storage, and perhaps as quarters for the men of the service.

Luckily a small sample of the customs records for the region have survived, which show that supplies and a new stove and hearth were provided for the *Beagle*. In September 1845, a caboose—a small cookhouse—was installed, cluttering up the decks of which FitzRoy had been so proud. Orders for painting, headlights, and many minor repairs are quite frequent in the records for the next few years, but then mention of the *Beagle* declines. Although this is in part due to a change in the nature of what was recorded in the letter books, it no doubt also reflects a gradual decrease in attention paid to the ship, which was slowly rotting.

When the *Beagle* was first established at Paglesham, she was stripped down and her upper masts and spars were taken away because she was not expected to be moved again. However, in 1850 there was a small flurry of activity: On June 12 a group of "Oyster Company Captains"—merchants of the Burnham area—petitioned the collector at Maldon that the *Beagle* be removed. She was moored in the middle of a rather narrow river, and at low tide vessels had difficulty getting around her and often fell foul of her moorings. This was confirmed by the "chief officer of the *Beagle*" (actually a boatman), and it was suggested that she be moved to the shore. Eventually, after much correspondence, she was tied up on the Paglesham side of the river. Five years pass before the next reference to the *Beagle*. Although an official agreement had been drawn up for the use of the land adjoining the ship, the fees had never been paid. Lawyers for the landowner, Lady Olivia Sparrow, were naturally suing for payment, which, after more delays, was made. After this we learn no more from the customs records.

In 1859 the navy took over the operation of the Coastguard, and following this change, the watch vessels were stripped of the last vestiges of their former individuality and character. On May 25, 1863, all watch vessels were given numbers; H.M.S. *Beagle* became W.V.7. In 1870, even the decaying hulk of W.V.7 became superfluous, and on May 13 what remained of her was sold to Murray and Trainer for £525. After that, her fate is unknown. (Some authors state that the *Beagle* was sold to the Japanese navy as a training ship. In fact, this was the fate of the next ship in the history of the Royal Navy to bear the name *Beagle*, a paddle vessel armed with two 68-pound mortars, which saw service in the Crimean War in 1854. She was sold to Japan in 1863 and renamed *Kanko*. Of the nine vessels to have borne the name *Beagle*, the vessel in which Darwin and FitzRoy sailed was the third.)

Perhaps the *Beagle* was cut down to be used as a barge, but most probably the 50-year-old vessel was towed from Paglesham around to the mud flats of the Thames estuary and there, alongside the ribs of a hundred other old ships, broken up for scrap. The story would have a better ending if some remnant of her still existed, es-

pecially the ship's wheel, with August Earle's painting of Neptune at the center, or the "great table" of the poop cabin where Darwin, Wickham, Pringle Stokes, John Lort Stokes, FitzRoy, Sullivan, and Philip Gidley King all worked. But the *Beagle*, "not at all a particular ship" (as Darwin had called her), was not destined for a special resting place, and it is too late to look for her now, except in the pages of books.

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