ROBERT MICHAEL BALLANTYNE

MAN ON THE OCEAN: A BOOK ABOUT BOATS AND SHIPS

Robert Michael Ballantyne

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Ballantyne R.

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R. M. Ballantyne
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Chapter One.
Treats of Ships in General

There is, perhaps, no contrivance in the wide world more wonderful than a ship—a full-rigged, well-manned, gigantic ship!

Those who regard familiar objects in art and nature as mere matters of course, and do not trouble themselves to wander out of the beaten track of everyday thought, may not at first feel the force or admit the truth of this statement. Let such folk endeavour to shake themselves vigorously out of this beaten track of everyday thought. Let them knit their brows and clench their teeth, and gaze steadfastly into the fire, or up at the sky, and try to realise what is involved in the idea of—a ship.

What would the men of old have said, if you had told them that you intended to take yonder large wooden house, launch it upon the sea, and proceed in it out of sight of land for a few days? "Poor fellow," they would have replied, "you are mad!" Ah! many a wise philosopher has been deemed mad, not only by men of old, but by men of modern days. This "mad" idea has long since been fulfilled; for what is a ship but a wooden house made to float upon the sea, and sail with its inmates hither and thither, at the will of the guiding spirit, over a trackless unstable ocean for months together? It is a self-sustaining movable hotel upon the sea. It is an oasis in the desert of waters, so skilfully contrived as to be capable of advancing against wind and tide, and of outliving the wildest storms—the bitterest fury of winds and waves. It is the residence of a community, whose country for the time being is the ocean; or, as in the case of the *Great Eastern* steamship, it is a *town* with some thousands of inhabitants launched upon the deep.

Ships are, as it were, the electric sparks of the world, by means of which the superabundance of different countries is carried forth to fill, reciprocally, the voids in each. They are not only the media of intercourse between the various families of the human race, whereby our shores are enriched with the produce of other lands, but they are the bearers of inestimable treasures of knowledge from clime to clime, and of gospel light to the uttermost ends of the earth.

But for ships, we should never have heard of the wonders of the coral isles and the beauties of the golden South, or the phenomena and tempests of the icy North. But for ships, the stirring adventures and perils of Magellan, Drake, Cook, etcetera, had never been encountered; and even the far-famed Robinson Crusoe himself had never gladdened, and saddened, and romantically maddened the heart of youth with his escapes, his fights, his parrots, and his philosophy, as he now does, and as he will continue to do till the end of time.

Some account, then, of ships and boats, with anecdotes illustrative of the perils to which they are frequently exposed, cannot fail, we think, to prove interesting to all, especially to boys, for whose particular edification we now write. Boys, of all creatures in this world, are passionately fond of boats and ships; they make them of every shape and size, with every sort of tool, and hack and cut their fingers in the operation, as we know from early personal experience. They sail them, and wet their garments in so doing, to the well-known sorrow of all right-minded mammas. They lose them, too, and break their hearts, almost, at the calamity. They make little ones when they are little, and big ones when they grow big; and when they grow bigger they not unfrequently forsake the toy for the reality, embark in some noble craft, and wed the stormy sea.

A word in your ear, reader, at this point. Do not think that because you fall in love with a *ship* you will naturally and necessarily fall in love with the *sea*! Some do, and some don't: with those who do, it is well; with those who don't, and yet go to sea, it is remarkably ill. Think *philosophically* about "going to sea," my lads. Try honestly to resist your own inclination *as long as possible*, and only go if you find that *you can't help it*! In such a case you will probably find that you are cut out for it—not otherwise. We love the sea with a true and deep affection, and often have we tossed upon her foam-topped waves; but we don't wish to be a sailor—by no manner of means!

And now, boys, come along, and we will conduct you as pleasantly and profitably as we can from a ship's cradle, through all her stormy existence, to her grave.

Chapter Two.
The Earliest Days of Water-Travelling

Once upon a time there were no ships. Men did not know the meaning of the word; they did not want them; and, for many, many centuries the sea-gulls had the ocean all to themselves. But *boats* are of very ancient date. Doubtless the *first* boats must have been constructed by the *first* men who dwelt on the earth. They consisted, probably—for we are now in the land of conjecture—of stumps of fallen trees, or bundles of rushes, seated astride of which the immediate descendants of our first parents ferried themselves over small lakes and across rivers.

Wet feet are not agreeable under any circumstances. We can conceive that prolonged voyages performed in this fashion—say several hundred yards or a mile—rendered those primitive mariners so uncomfortable, that they resolved to improve their condition; and, after much earnest thought, hit upon the plan of fastening several logs together by means of twigs, and thus they formed *rafts*.

AN ANCIENT MARINER.

As time progressed, and men began to display wisdom in making tools of stone and in the moulding of metal, we can imagine that they soon bethought themselves of flattening the surface of their rafts; and then, finding them unwieldy and difficult to manage, no doubt, they hit upon the idea of hollowing out the logs. Adzes were probably not invented at that time, so they betook themselves to the element of fire—which is at the present day used by savage nations for the same purpose—and burned out the insides of their logs. Thus *canoes* sprang into being.

But such canoes were clumsy and heavy, besides being liable to split; men therefore bethought themselves of constructing a light framework of wood, which they covered with bark or skin. Then artificers in iron invented saws; logs were ripped up; planks were formed; pitch oozed ready to hand from the trees; with grass, perchance, they caulked the seams;—and soon the first *boat* floated on

the water—clumsy and tub-like, no doubt, but serviceable withal—and youths of a hundred years old, and full-grown men of two or three hundred, capered and shouted on the shore with delight at the great invention; while venerable patriarchs, of seven or eight hundred summers, gazed in wonder, with almost prophetic solemnity, and exclaimed that they had never before seen the like of *that* in all the course of their long, long lives!

Those times are old now—so old that men can scarcely get their minds to realise how old they are; nevertheless, the craft that were used then are used even now, and that not only among the savages of distant lands, but by men living at our very doors.

THE CORACLE.

The *coracle*, a basket-boat of the most primitive description, is still occasionally met with in South Wales. It is neither more nor less than a large wicker basket covered with a hide, and is tub-shaped, and clumsy to a degree. When the Romans invaded Britain, this species of boat was in common use. Like the canoe of the North American Indian, it is easily upset, and we should think must be rather unmanageable; but as we are not likely ever again to be reduced to it in this country, we can afford to regard its faults with indifference.

From little boats to big boats there is but a step; and no doubt rivers were soon navigated, and new countries explored, while those who lived near the sea-coast dared even to launch their boats upon the ocean; but they "hugged the shore," undoubtedly, and seldom ventured to proceed at night unless the stars shone brightly in the sky.

Years rolled on, and dwellers on the sea-coast became more and more venturous in their voyages along the shore. It behoved them to have larger boats, or barges, with numerous rowers, who would naturally carry weapons with them to guard themselves from foes. War-galleys sprang into being. Strong winds sometimes carried these off-shore, and out of sight of land. Ah, reader! who can conceive the feelings of the first mariners who saw the solid land sink on the horizon, and beheld nothing substantial in all the waste of waters, save their own tiny bark that reeled beneath them on the heaving billows? Perchance these first adventurers on the deep found their way back to land, and afterwards tried the bold experiment of steering by the stars. Perhaps not; but at length it did come about that ships were built, and men were found bold enough to put to sea in them for days and weeks together.

The ark is the first ship of which we have any authentic account. We now leave the region of conjecture; for the ark was built by Noah under the immediate direction of the Almighty, and we have a minute account of it in the Bible.

More than two thousand three hundred years before our Lord and Saviour Jesus Christ came to earth, man's wickedness had attained to such a height that God resolved to destroy the inhabitants of the world by a deluge. But, in the midst of wrath, God remembered mercy. He spared Noah and his family, and saved them from destruction by placing them in the ark along with pairs of the lower animals.

Every reader of the Bible knows the story of the deluge; but everyone may not be aware that traditions of this deluge are found in every part of the earth. East, west, north, and south—civilised and savage—all men tell us of a great flood which once covered the world, and from which only one family was saved, in a boat, or a canoe, or an ark.

What the barbarous and savage nations know dimly from tradition, we know certainly and fully from the inspired Word of God. The ark was built; the flood came; Noah with his family and two of every living creature entered into it; and for months the first ship floated on a sea whose shoreless waves flowed round and round the world.

What the ark's form was we cannot precisely tell; but we know its dimensions pretty accurately.

Although it was not intended for voyaging, the ark must necessarily have been a perfect model of a vessel, meant to float upon the waters. To some extent, too, it must have been fitted to ride upon turbulent billows; for it "went upon the face of the waters" for upwards of seven months, and before it rested finally on the top of Mount Ararat, "God made a wind to pass over the earth, and the waters assuaged." In regard to its size, the most interesting way to consider it, perhaps, will be to compare it with the *Great Eastern*, the largest ship that has yet been built by man. Assuming a cubit to be about 18 inches, the length of the ark was about 450 feet, its breadth about 75 feet, and its depth about 45 feet.

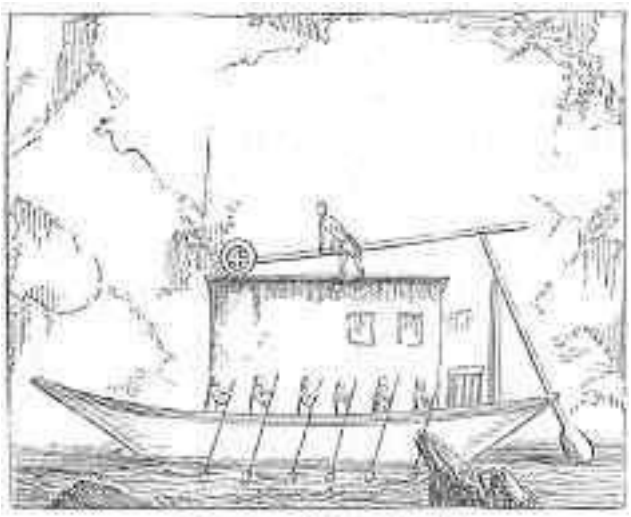
The *Great Eastern's* length is 680 feet, its breadth 83 feet, and its depth from deck to keel 60 feet.

The ark was built of gopher-wood, which is thought by some to be pine, by others cedar. It consisted of three stories, and had a window and a door, and was pitched within and without. But it had neither masts nor rudder; and it is evident that, although it was man's refuge, the ark was not designed to be managed by man, for after Noah and his family had entered in, God took on himself the guidance and preservation of their vessel. Thus our Saviour—of whom the ark was a type—specially guides and protects those who flee to him for refuge.

But although we have noticed the ark as being the first ship, we cannot with propriety place it in the front of the history of navigation. After the flood the ark seems to have been soon forgotten, or at least imperfectly remembered, and men reverted to their little canoes and clumsy boats, which sufficed for all their limited wants. It was not until about a thousand years later in the world's history that men built ships of considerable size, and ventured on prolonged *coasting*-voyages, for the purposes of discovery and commerce. Navigation had been practised, and the art of ship-building

had made very considerable progress, long before men dared to lose sight of the shore and venture out upon the mysterious bosom of the great unknown sea.

To the ancients the Mediterranean was the ocean; and among its bays, and creeks, and islands, maritime enterprise sprang into being and rose into celebrity. Among the Phoenicians, the Egyptians, and Hebrews, we find the earliest traces of navigation and commerce. The first of these nations, occupying the narrow slip of land between Mount Lebanon and the Mediterranean, rose into fame as mariners between the years 1700 and 1100 before Christ—the renowned city of Sidon being their great sea-port, whence their ships put forth to trade with Cyprus and Rhodes, Greece, Sardinia, Sicily, Gaul, and Spain. Little is known of the state of trade in those days, or of the form or size of ancient vessels. Homer tells us, in his account of the Trojan War, that the Phoenicians supplied the combatants with many articles of luxury; and from Scripture we learn that the same enterprising navigators brought gold to Solomon from Ophir in the year 1000 B.C.



ANCIENT EGYPTIAN BOAT.

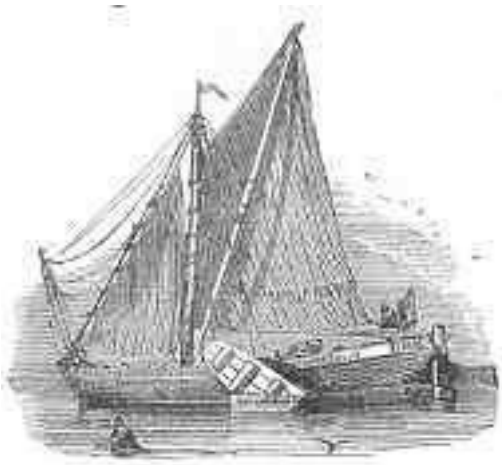
A short time previous to this the Phoenicians ventured to pass through the Strait of Gibraltar, and for the first time beheld the great Atlantic Ocean. Proceeding along the coast of Spain, they founded Cadiz; and, not long after, creeping down the western coast of Africa, established colonies there. But their grandest feat was achieved about 600 years B.C., when they sailed down the Red Sea and the eastern coast of Africa, doubled the Cape of Good Hope, sailed up the western coast, and returned home by the Strait of Gibraltar. Bartholomew Diaz must hide his diminished head before this fact; for, although he gets all the credit, the Phoenicians of old “doubled the Cape” at least twenty centuries before him!

That long voyages were made by the men of old, before authentic history began, seems highly probable. The expedition of the *Argonauts* to Colchis in the year 1250 B.C., in search of the “Golden Fleece,” is the first ancient voyage that lays claim to authenticity. What the Golden Fleece was is uncertain; some think it was a term used to symbolise the mines of precious metals near the Black Sea. Whatever it was, the *Argonauts* went in search of it: whether or not they found it is unrecorded in history. Jason, son of the King of Thessaly, was the leader of this expedition, which consisted of one ship and fifty men. A man named *Argus* built the ship, which from him was named the Argo, hence the name of *Argonauts*.

In treating of ancient vessels, we may as well proceed on the principle suggested by a sagacious child, who, when his mother was about to tell him a story, usually begged of her to “bedin at the bedinning.” We shall begin at the beginning.

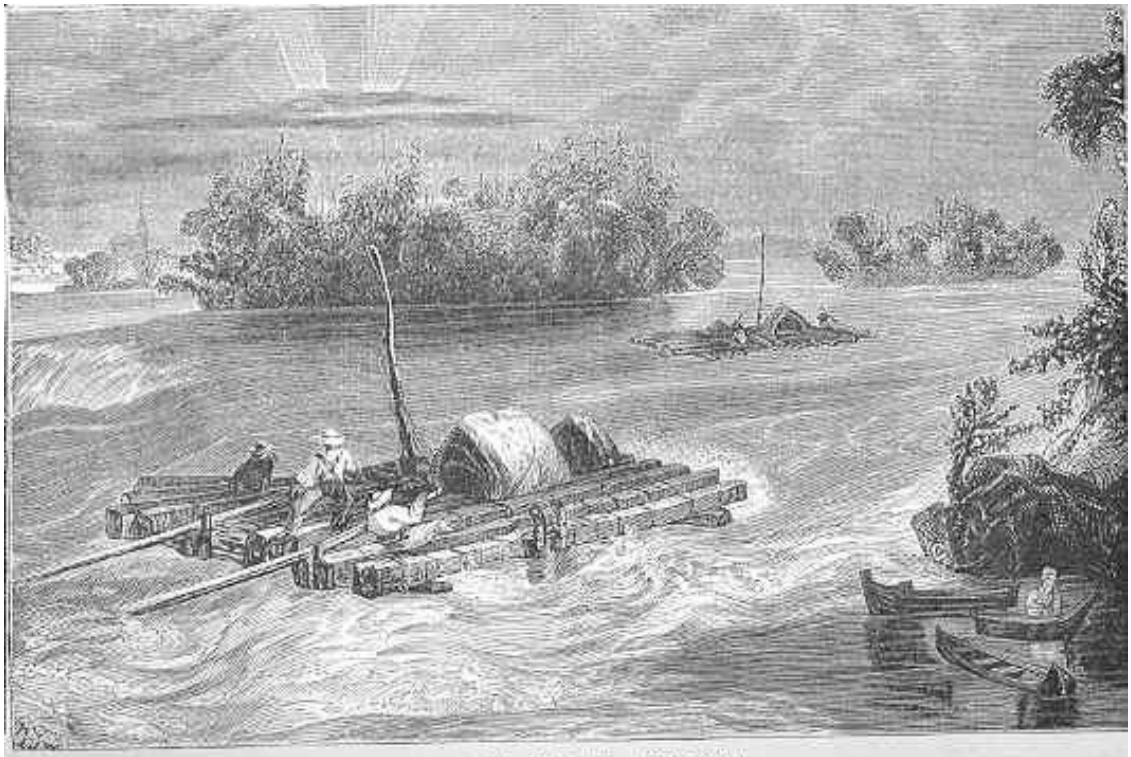
Chapter Three.
Rafts and Canoes

Rafts, as we have already remarked, must undoubtedly have been the beginning of navigation. But they have not, like many other species of ancient craft, been altogether superseded by modern inventions. True, we do not nowadays carry on war on rafts, but we still carry on trade with them in many parts of the world. How the rafts of ancient times were formed we cannot tell precisely, though we can easily guess; but one thing we know, and that is, that the first improvement made in such craft was the thrusting of a few thick planks down into the water, to the depth of three or four feet, between the logs which composed the raft. These acted the part of a keel, and, by pressing against the water *side-ways* when a *side* wind blew, prevented the raft from making much of what is called *leeway*—that is, drifting in the direction in which the wind happened to be blowing. Some sorts of Dutch vessels use lee-boards for this purpose at the present time.



DUTCH BOAT WITH LEE-BOARD.

The rafts now in use on the great rivers of America are exceedingly curious in many respects. One peculiarity of many of them is that they float *themselves*, not goods, to market—the pine logs of which they are constructed being the marketable commodity. Some of these “lumber-rafts,” as they are called, are of great size; and as their navigators have often to spend many weeks on them, slowly floating down the rivers, they build huts or little cottages on them, cook their provisions on board, and, in short, spend night and day in their temporary floating-homes as comfortably as if they were on the land.

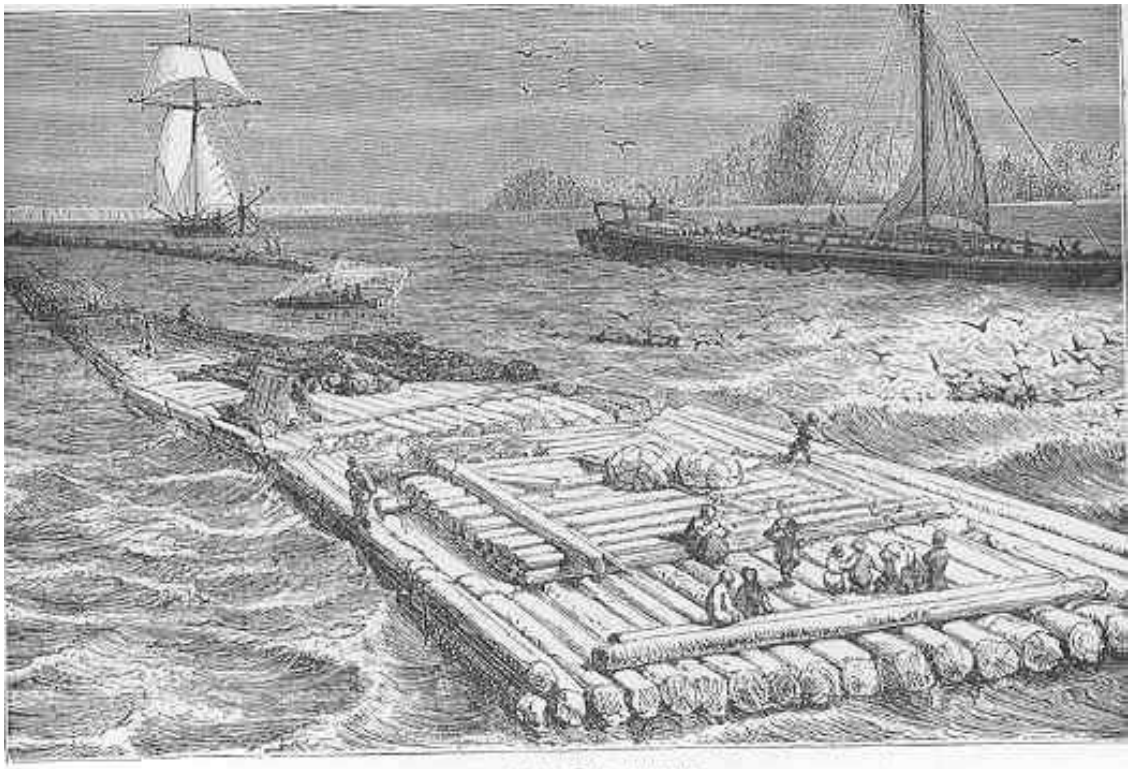


RAFTS ON THE ST. LAWRENCE. *Page 9.*

When these rafts approach a waterfall or a rapid, they unfasten the lashings and allow several logs tied together to run down at a time. After the rapid is passed, the loose logs are collected together, the raft is reconstructed, and the voyage down to the sea continued. Of course, huts are built only on rafts which navigate the largest rivers, and are not thus liable to be taken to pieces.

When the logs reach the sea, they are shipped to various parts of the world where timber is scarce. Large quantities are imported into Great Britain from Canada and other parts of America.

A bold thing has occasionally been done. Instead of shipping the logs in vessels, enterprising and ingenious men built them into a *solid ship*, leaving a small space to serve as a cabin and a hold for provisions; then, erecting masts, they hoisted sail, and in this singular craft crossed the Atlantic. On arriving at port they broke up their raft-ship and sold it.



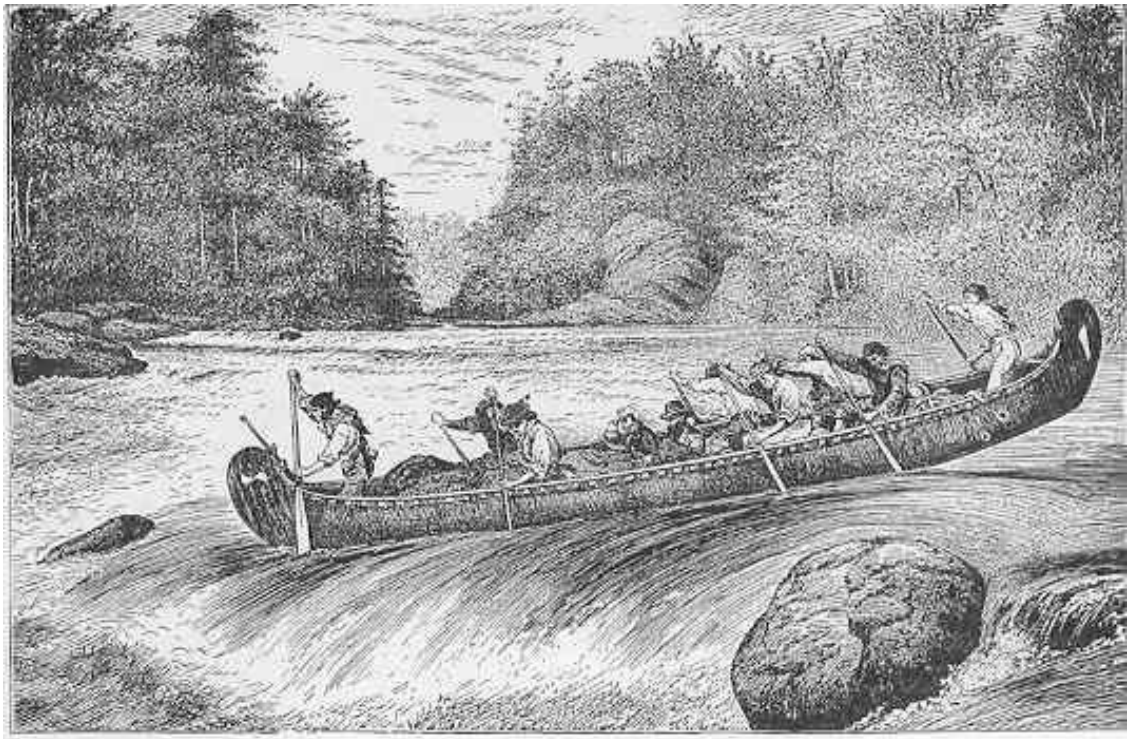
RAFTS ON THE DWINA.

The immense size of the rafts which are floated down some of the great rivers of the world may be gathered from the following engraving, which represents a raft on the Dwina, one of the great rivers of Russia.

Rafts, however, have not been confined to the purposes of traffic. They have frequently been the means of saving the lives of shipwrecked mariners; but too often they have been the means only of prolonging the wretched existence of those who have ultimately perished at sea.

Turning now from the consideration of rafts, we shall describe canoes.

Canoes must, we think, have been invented after rafts. They were formed, as we have said, out of logs, of bark and of skins stretched upon frames of wood. Of ancient canoes we can say little. But it is probable that they were similar in most respects to the canoes used by savage nations at the present time; for man, in his lowest or most savage condition, is necessarily the same now that he was in ancient times. We shall, therefore, take a glance at the canoes of savage nations now existing, and thus shall form a good idea, we doubt not, of what canoes were in days of old.



CANADIAN CANOE. Page 37.

Simplest among them all, perhaps, are the canoes of the North American Indians. These are built of thin laths and ribs of wood, and are covered with the bark of the birch-tree. The sheets of bark are not a quarter of an inch thick. Several sheets are used in the covering of one canoe. They are sewed together with the long pliant roots of the pine, and the seams are rendered tight with gum procured from the same tree. So light are these canoes, that two men can carry on their shoulders one capable of holding eight or ten men, with their provisions, etcetera, for a voyage of many months. They are of various sizes—from the hunting canoe which holds one Indian, to the largest canoe that carries fourteen. They are propelled by short paddles instead of oars.

Many and terrible are the risks run by *voyageurs* who travel through the lakes and rivers of North America in these canoes.

The following anecdote is related of a narrow escape made by some fur-traders while descending one of the rivers in the backwoods of the Hudson Bay Territory:– One fine evening in autumn, a north-canoe was gliding swiftly down one of the noble bends in the river referred to. New, beautiful, and ever-changing scenes were being constantly opened up to the view of the *voyageurs*, whose plaintive and beautiful canoe-songs were rolling over the waters. Suddenly the song ceased as the distant roar of a waterfall struck their ears, and the steersmen—for there are usually two, one in the bow and one in the stern—prepared to land and "*make a portage*,"—that is, carry the canoe and lading past the falls by land, and re-launch and re-load in the smooth water below.

The approach to the landing-place at the head of the fall was somewhat difficult, owing to a point of rock which projected into the stream in the direction of the fall, and round which point it was necessary to steer with some dexterity, in order to avoid being drawn into the strong current. The fearless guides, however, had often passed the place in former years in safety, and accordingly dashed at the point with reckless indifference, their paddles flinging a circle of spray over their heads as they changed from side to side with graceful but vigorous rapidity. The swift stream carried them quickly round the point of danger, and they had almost reached the quiet eddy near the landing-place when the stem of the canoe was caught by the current, which instantly whirled it out from the shore and carried it down stream like an arrow. Another moment, and the gushing water dragged

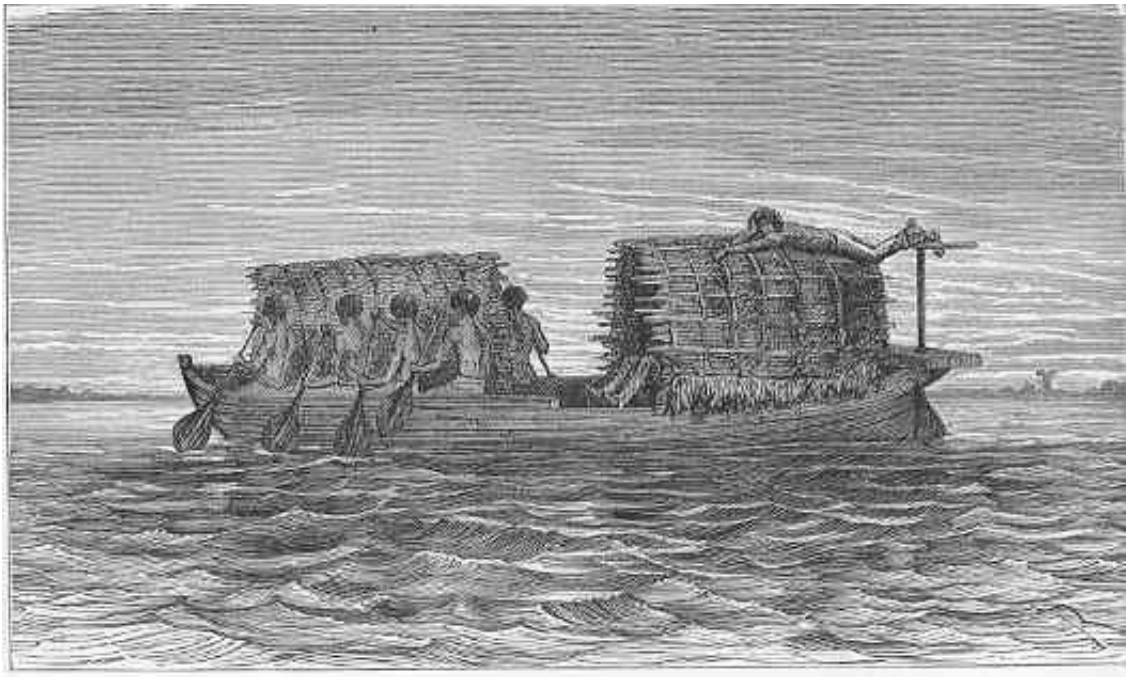
them to the verge of the fall, which thundered and foamed among frightful chasms and rocks many feet below. It was the work of a moment. The stern of the canoe almost overhung the abyss, and the voyageurs plied their paddles with the desperation of men who felt that their lives depended on the exertions of the next awful minute. For a few seconds the canoe remained stationary, and seemed to tremble on the brink of destruction—the strength of the water and the power of the men being almost equally balanced—then, inch by inch, it began slowly to ascend the stream. The danger was past! A few nervous strokes, and the canoe shot out of the current like an arrow, and floated in safety in the still water below the point.

The whole thing, from beginning to end, occurred in a few seconds; but who can describe or comprehend the tumultuous gush of feeling aroused during those brief moments in the bosoms of the *voyageurs*? The sudden, electric change from tranquil safety to the verge of what appeared certain destruction—and then, deliverance! It was one of those thrilling incidents which frequently occur to those who thread the wildernesses of this world, and is little thought of by them beyond the moment of danger; yet it was one of those solemn seasons, more or less numerous in the history of all men, when the Almighty speaks to his careless creatures in a voice that cannot be mistaken, however much it may be slighted; awakening them, with a rough grasp, to behold the slender cord that suspends them over the abyss of eternity.

The canoes used by the Eskimos who inhabit the Polar Regions are made of a light framework of wood, which is covered entirely over with seal-skin—a round hole being left in the centre, in which the Eskimo sits. Round this hole there is a loose piece of skin, which is drawn up by the man and fastened round his waist. The machine is thus completely water-tight. No waves can dash into, although they can sweep over it; and if by chance it should upset, the Eskimo can turn it and himself up into the proper position by one dexterous sweep of his long, double-bladed paddle. The paddle, which varies from ten to fifteen feet, is simply a pole with a blade at each end. It is grasped in the centre, and each end dipped alternately on either side of the *kayak*, as this canoe is called. Eskimo kayaks are first-rate sea-boats. They can face almost any sort of weather. They are extremely light, and are propelled by the natives very swiftly. In these frail canoes the natives of the Polar Regions pursue seals and whales, and even venture to attack the walrus in his native element. The kayak is used exclusively by the men. The oomiak, or women's canoe, is of much larger and clumsier construction, somewhat like a boat. It is open above, and can hold a large family of women and children. Like the kayak, it is a framework of wood covered with seal-skin, and is propelled by means of short paddles of the spoon form.

ESKIMO KAYAK.

The famous “Rob Roy” canoe, which is now so much in vogue among boys and young men of aquatic tendency, is constructed and managed on precisely the same principles with the Eskimo kayak; the only difference between the two being that the “Rob Roy” canoe is made of thin wood instead of skin, and is altogether a more elegant vessel. An account of it will be found in our chapter on “Boats.” The South Sea islanders also use a canoe which they propel with a double-bladed paddle similar to that of the Eskimos. They are wonderfully expert and fearless in the management of this canoe, as may be seen from the annexed woodcut.



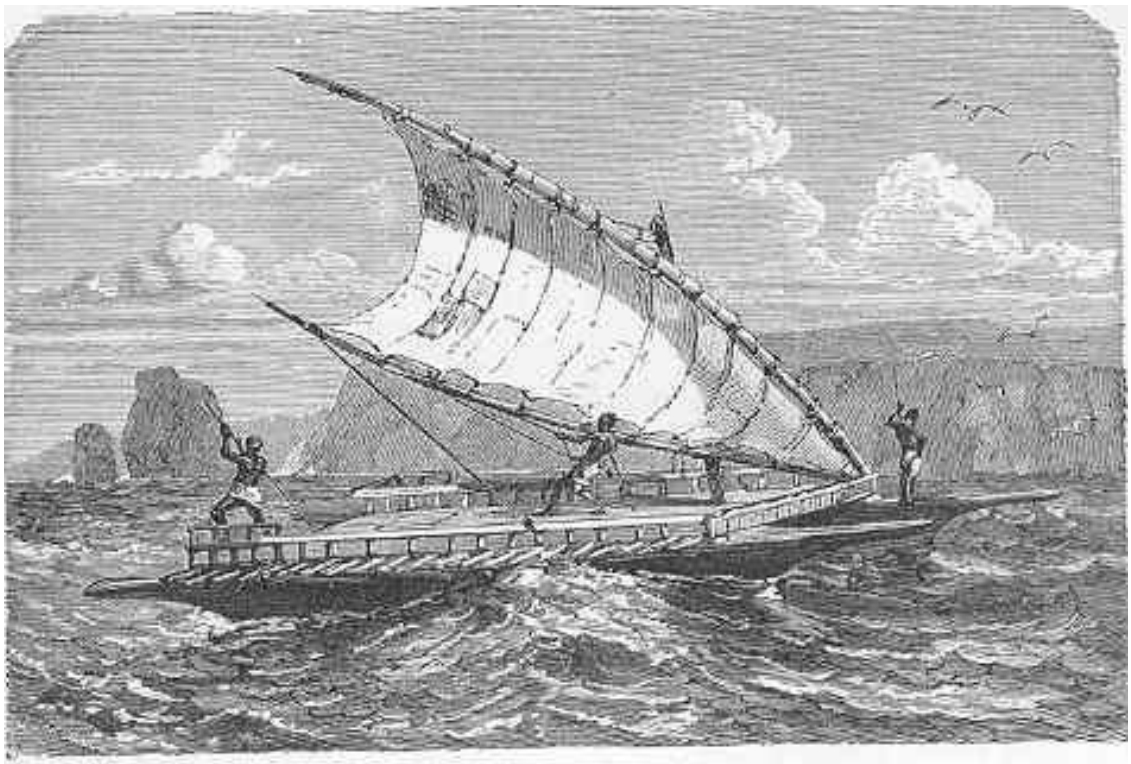
BOAT IN USE ON THE AMAZON. Page 41.

In order to show that the paddle of the canoe is more natural to man than the oar, we present a picture of the canoe used by the Indians of the Amazon in South America. Here we see thar the savages of the south, like their brethren of the north, sit with their faces to the bow and urge their bark forward by neans of short paddles, without using the gunwale as a fulcrum. The oar is decidedly a more modern and a more scientific instrument than the paddle, but the latter is better suited to some kinds of navigation than the former.

Very different indeed from the light canoes just described are the canoes of the South Sea islanders. Some are large, and some are small; some long, some short; a few elegant, a few clumsy; and one or two peculiarly remarkable. Most of them are narrow, and liable to upset; in order to prevent which catastrophe the natives have ingeniously, though clumsily, contrived a sort of "*outrigger*," or plank, which they attach to the side of the canoe to keep it upright. They also fasten two canoes together to steady them.

One of these *double canoes* is thus described by Cheever in his "Island World of the Pacific:"—"A double canoe is composed of two single ones of the same size placed parallel to each other, three or four feet apart, and secured in their places by four or five pieces of wood, curved just in the shape of a bit-stock. These are lashed to both canoes with the strongest cinet, made of

cocoa-nut fibre, so as to make the two almost as much one as same of the double ferry-boats that ply between Brooklyn and New York. A flattened arch is thus made by the bow-like cross-pieces over the space between the canoes, upon which a board or a couple of stout poles laid lengthwise constitute an elevated platform for passengers and freight, while those who paddle and steer sit in the bodies of the canoes at the sides. A slender mast, which may be unstepped in a minute, rises from about the centre of this platform, to give support to a very simple sail, now universally made of white cotton cloth, but formerly of mats."



DOUBLE CANOE OF NEW CALEDONIA. *Page 45.*

The double canoes belonging to the chiefs of the South Sea islanders are the largest,—some of them being nearly seventy feet long, yet they are each only about two feet wide and three or four feet deep. The sterns are remarkably high—fifteen or eighteen feet above the water.

The war canoes are also large and compactly built; the stern being low and covered, so as to afford shelter from stones and darts. A rude imitation of a head or some grotesque figure is usually carved on the stern; while the stem is elevated, curved like the neck of a swan, and terminates frequently in the carved figure of a bird's head. These canoes are capable of holding fifty warriors. Captain Cook describes some as being one hundred and eight feet long. All of them, whether single or double, mercantile or war canoes, are propelled by paddles, the men sitting with their faces in the direction in which they are going.

As may be supposed, these canoes are often upset in rough weather; but as the South Sea islanders are expert swimmers, they generally manage to right their canoes and scramble into them again. Their only fear on such occasions is being attacked by sharks. Ellis, in his interesting book, "Polynesian Researches," relates an instance of this kind of attack which was made upon a number of chiefs and people—about thirty-two—who were passing from one island to another in a large double canoe:– "They were overtaken by a tempest, the violence of which tore their canoes from the horizontal spars by which they were united. It was in vain for them to endeavour to place them upright again, or to empty out the water, for they could not prevent their incessant overturning. As their only

resource, they collected the scattered spars and boards, and constructed a raft, on which they hoped they might drift to land. The weight of the whole number who were collected on the raft was so great as to sink it so far below the surface that they stood above their knees in water. They made very little progress, and soon became exhausted by fatigue and hunger. In this condition they were attacked by a number of sharks. Destitute of a knife or any other weapon of defence, they fell an easy prey to these rapacious monsters. One after another was seized and devoured, or carried away by them, and the survivors, who with dreadful anguish beheld their companions thus destroyed, saw the number of their assailants apparently increasing, as each body was carried off until only two or three remained.

"The raft, thus lightened of its load, rose to the surface of the water, and placed them beyond the reach of the voracious jaws of their relentless destroyers. The tide and current soon carried them to the shore, where they landed to tell the melancholy fate of their fellow-voyagers."

Captain Cook refers to the canoes of New Zealand thus:—

"The ingenuity of these people appears in nothing more than in their canoes. They are long and narrow, and in shape very much resemble a New England whale-boat. The larger sort seem to be built chiefly for war, and will carry from forty to eighty or a hundred armed men. We measured one which lay ashore at Tolaga; she was sixty-eight and a half feet long, five feet broad, and three and a half feet deep. The bottom was sharp, with straight sides like a wedge, and consisted of three lengths, hollowed out to about two inches, or one inch and a half thick, and well fastened together with strong plaiting. Each side consisted of one entire plank, sixty-three feet long, ten or twelve inches broad, and about one inch and a quarter thick; and these were fitted and lashed to the bottom part with great dexterity and strength.

"A considerable number of thwarts were laid from gunwale to gunwale, to which they were securely lashed on each side, as a strengthening to the boat. The ornament at the head projected five or six feet beyond the body, and was about four and a half feet high. The ornament at the stern was fixed upon that end as the stern-post of a ship is upon her keel, and was about fourteen feet high, two broad, and one inch and a half thick. They both consisted of boards of carved work, of which the design was much better than the execution. All their canoes, except a few at Opoorage or Mercury Bay, which were of one piece, and hollowed by fire, are built after this plan, and few are less than twenty feet long. Some of the smaller sort have outriggers; and sometimes two are joined together, but this is not common.

"The carving upon the stern and head ornaments of the inferior boats, which seemed to be intended wholly for fishing, consists of the figure of a man, with the face as ugly as can be conceived, and a monstrous tongue thrust out of the mouth, with the white shells of sea-ears stuck in for eyes. But the canoes of the superior kind, which seem to be their men-of-war, are magnificently adorned with openwork, and covered with loose fringes of black feathers, which had a most elegant appearance. The gunwale boards were also frequently carved in a grotesque taste, and adorned with tufts of white feathers placed upon black ground. The paddles are small and neatly made. The blade is of an oval shape, or rather of a shape resembling a large leaf, pointed at the bottom, broadest in the middle, and gradually losing itself in the shaft, the whole length being about six feet. By the help of these oars they push on their boats with amazing velocity."

Mr Ellis, to whose book reference has already been made, and who visited the South Sea Islands nearly half a century later than Cook, tells us that the *single canoes* used by some of the islanders are far safer than the *double canoes* for long voyages, as the latter are apt to be torn asunder during a storm, and then they cannot be prevented from constantly upsetting.

Single canoes are not so easily separated from their outrigger. Nevertheless they are sometimes upset in rough seas; but the natives don't much mind this. When a canoe is upset and fills, the natives, who learn to swim like ducks almost as soon as they can walk, seize hold of one end of the canoe, which they press down so as to elevate the other end above the sea, by which means a great part of the water runs out; they then suddenly loose their hold, and the canoe falls back on the water, emptied in

some degree of its contents. Swimming along by the side of it, they bale out the rest, and climbing into it, pursue their voyage.

Europeans, however, are not so indifferent to being overturned as are the savages. On one occasion Mr Ellis, accompanied by three ladies, Mrs Orsmond, Mrs Barff, and his wife, with her two children and one or two natives, were crossing a harbour in the island of Huahine. A female servant was sitting in the forepart of the canoe with Mr Ellis's little girl in her arms. His infant boy was at its mother's breast; and a native, with a long light pole, was paddling or pushing the canoe along, when a small buhoe, with a native youth sitting in it, darted out from behind a bush that hung over the water, and before they could turn or the youth could stop his canoe, it ran across the outrigger. This in an instant went down, the canoe was turned bottom upwards, and the whole party precipitated into the sea.

The sun had set soon after they started from the opposite side, and the twilight being very short, the shades of evening had already thickened round them, which prevented the natives on shore from seeing their situation. The native woman, being quite at home in the water, held the little girl up with one hand, and swam with the other towards the shore, aiding at the same time Mrs Orsmond, who had caught hold of her long hair, which floated on the water behind her. Mrs Barff, on rising to the surface, caught hold of the outrigger of the canoe that had occasioned the disaster, and calling out loudly for help, informed the people on shore of their danger, and speedily brought them to their assistance. Mrs Orsmond's husband, happening to be at hand at the time, rushed down to the beach and plunged at once into the water. His wife, on seeing him, quitted her, hold of the native woman, and grasping her husband, would certainly have drowned both him and herself had not the natives sprung in and rescued them.

Mahinevahine, the queen of the island, leaped into the sea and rescued Mrs Barff; Mr Ellis caught hold of the canoe, and supported his wife and their infant until assistance came. Thus they were all saved.

The South Sea islanders, of whose canoes we have been writing, are—some of them at least—the fiercest savages on the face of the earth. They wear little or no clothing, and practise cannibalism—that is, *man-eating*—from choice. They actually prefer human flesh to any other. Of this we are informed on most unquestionable authority.

Doubtless the canoes which we have described are much the same now as they were a thousand years ago; so that, by visiting those parts of the earth where the natives are still savage, we may, as it were, leap backward into ancient times, and behold with our own eyes the state of marine architecture as it existed when our own forefathers were savages, and paddled about the Thames and the Clyde on logs, and rafts, and wicker-work canoes.

Chapter Four.
Ancient Ships and Navigators

Everything must have a beginning, and, however right and proper things may appear to those who begin them, they generally wear a strange, sometimes absurd, aspect to those who behold them after the lapse of many centuries.

When we think of the trim-built ships and yachts that now cover the ocean far and wide, we can scarce believe it possible that men really began the practice of navigation, and first put to sea, in such grotesque vessels as that represented on page 55.

In a former chapter reference has been made to the rise of commerce and maritime enterprise, to the fleets and feats of the Phoenicians, Egyptians, and Hebrews in the Mediterranean, where commerce and navigation first began to grow vigorous. We shall now consider the peculiar structure of the ships and boats in which their maritime operations were carried on.

Boats, as we have said, must have succeeded rafts and canoes, and big boats soon followed in the wake of little ones. Gradually, as men's wants increased, the magnitude of their boats also increased, until they came to deserve the title of little ships. These enormous boats, or little ships, were propelled by means of oars of immense size; and, in order to advance with anything like speed, the oars and rowers had to be multiplied, until they became very numerous.

In our own day we seldom see a boat requiring more than eight or ten oars. In ancient times boats and ships required sometimes as many as four hundred oars to propel them.

The forms of the ancient ships were curious and exceedingly picturesque, owing to the ornamentation with which their outlines were broken, and the high elevation of their bows and sterns.

We have no very authentic details of the minutiae of the form or size of ancient ships, but antiquarians have collected a vast amount of desultory information, which, when put together, enables us to form a pretty good idea of the manner of working them, while ancient coins and sculptures have given us a notion of their general aspect. No doubt many of these records are grotesque enough, nevertheless they must be correct in the main particulars.

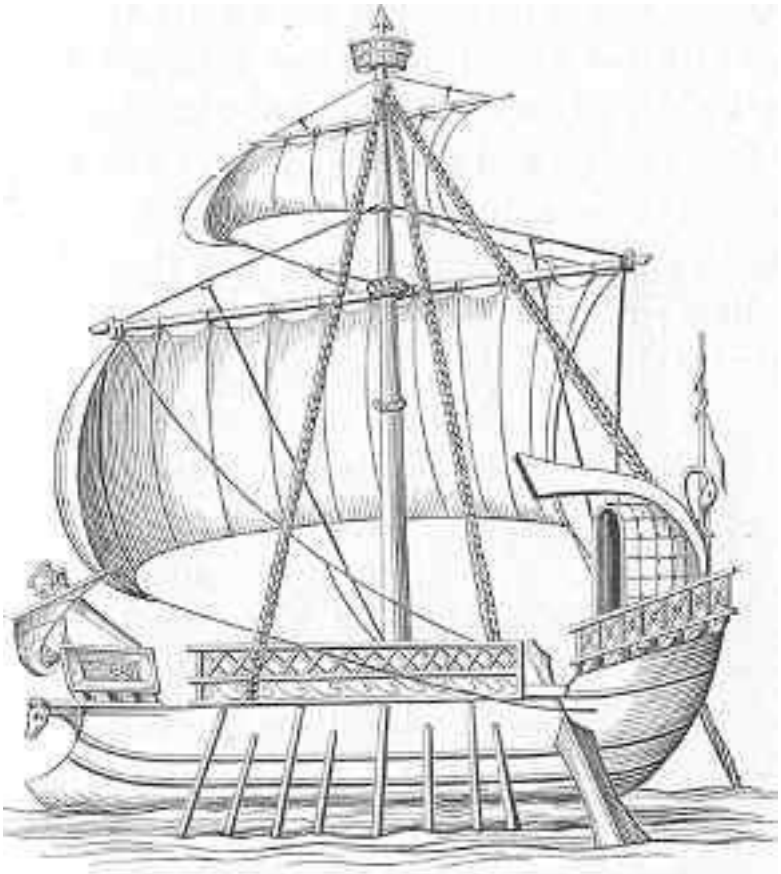
Homer, who lived 1000 B.C., gives, in his "Odyssey," an account of ship-building in his time, to which antiquarians attach much importance, as showing the ideas then prevalent in reference to geography, and the point at which the art of ship-building had then arrived. Of course due allowance must be made for Homer's tendency to indulge in hyperbole.

Ulysses, king of Ithaca, and deemed on of the wisest Greeks who went to Troy, having been wrecked upon an island, is furnished by the nymph Calypso with the means of building a ship,—that hero being determined to seek again his native shore and return to his home and his faithful spouse Penelope.

"Forth issuing thus, she gave him first to wield
A weighty axe, with truest temper steeled,
And double-edged; the handle smooth and plain,
Wrought of the clouded olive's easy grain;
And next, a wedge to drive with sweepy sway;
Then to the neighbouring forest led the way.
On the lone island's utmost verge there stood
Of poplars, pines, and firs, a lofty wood,
Whose leafless summits to the skies aspire,
Scorched by the sun, or seared by heavenly fire
(Already dried). These pointing out to view,

The nymph just showed him, and with tears withdrew.

“Now toils the hero; trees on trees o’erthrown
Fall crackling round, and the forests groan;
Sudden, full twenty on the plain are strewed,
And lopped and lightened of their branchy load.
At equal angles these disposed to join,
He smoothed and squared them by the rule and line.
(The wimbles for the work Calypso found),
With those he pierced them and with clinchers bound.
Long and capacious as a shipwright forms
Some bark’s broad bottom to outride the storms,
So large he built the raft; then ribbed it strong
From space to space, and nailed the planks along.
These formed the sides; the deck he fashioned last;
Then o’er the vessel raised the taper mast,
With crossing sail-yards dancing in the wind:
And to the helm the guiding rudder joined
(With yielding osiers fenced to break the force
Of surging waves, and steer the steady course).
Thy loom, Calypso, for the future sails
Supplied the cloth, capacious of the gales.
With stays and cordage last he rigged the ship,
And, rolled on levers, launched her on the deep.”



ROMAN SHIP.

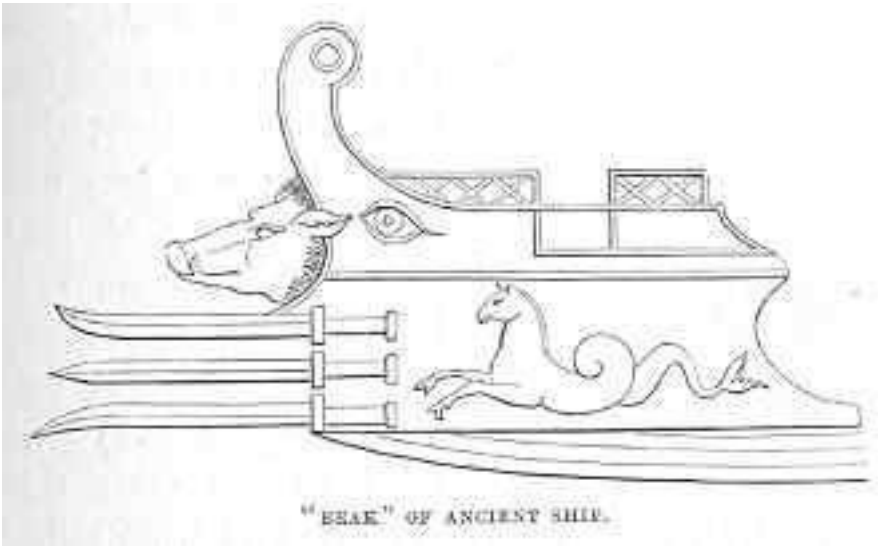
The ships of the ancient Greeks and Romans were divided into various classes, according to the number of "ranks" or "banks," that is, *rows*, of oars. *Monoremes* contained one bank of oars; *biremes*, two banks; *triremes*, three; *quadriremes*, four; *quinqueremes*, five; and so on. But the two latter were seldom used, being unwieldy, and the oars in the upper rank almost unmanageable from their great length and weight.

Ptolemy Philopator of Egypt is said to have built a gigantic ship with no less than forty tiers of oars, one above the other! She was managed by 4000 men, besides whom there were 2850 combatants; she had four rudders and a double prow. Her stern was decorated with splendid paintings of ferocious and fantastic animals; her oars protruded through masses of foliage; and her hold was filled with grain!

That this account is exaggerated and fanciful is abundantly evident; but it is highly probable that Ptolemy did construct one ship, if not more, of uncommon size.

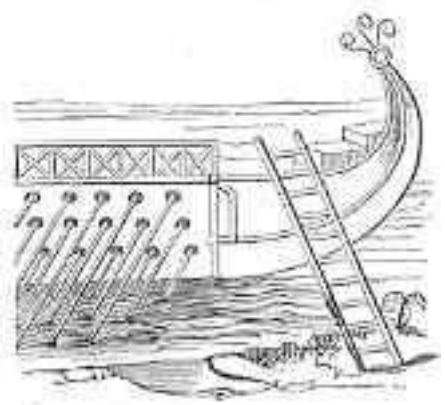
MODE OF STEERING ANCIENT SHIP.

The sails used in these ships were usually square; and when there was more than one mast, that nearest the stern was the largest. The rigging was of the simplest description, consisting sometimes of only two ropes from the mast to the bow and stern. There was usually a deck at the bow and stern, but never in the centre of the vessel. Steering was managed by means of a huge broad oar, sometimes a couple, at the stern. A formidable “beak” was affixed to the fore-part of the ships of war, with which the crew charged the enemy. The vessels were painted black, with red ornaments on the bows; to which latter Homer is supposed to refer when he writes of red-cheeked ships.



"BEAK" OF ANCIENT SHIP.

Ships built by the Greeks and Romans for war were sharper and more elegant than those used in commerce; the latter being round bottomed, and broad, in order to contain cargo.



TRIREME.

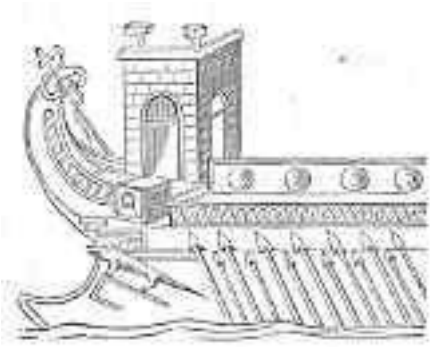
The Corinthians were the first to introduce *triremes* into their navy (about 700 years B.C.), and they were also the first who had any navy of importance. The Athenians soon began to emulate them, and ere long constructed a large fleet of vessels both for war and commerce. That these ancient ships were light compared with ours, is proved by the fact that when the Greeks landed to commence the siege of Troy they *drew up their ships on the shore*. We are also told that ancient mariners, when they came to a long narrow promontory of land, were sometimes wont to land, draw their ships bodily across the narrowest part of the isthmus, and launch them on the other side.

Moreover, they had a salutary dread of what sailors term "blue water"—that is, the deep, distant sea—and never ventured out of sight of land. They had no compass to direct them, and in their coasting voyages of discovery they were guided, if blown out to sea, by the stars.

The sails were made of linen in Homer's time; subsequently sail-cloth was made of hemp, rushes, and leather. Sails were sometimes dyed of various colours and with curious patterns. Huge ropes were fastened round the ships to bind them more firmly together, and the bulwarks were elevated beyond the frame of the vessels by wicker-work covered with skins.

Stones were used for anchors, and sometimes crates of small stones or sand; but these were not long of being superseded by iron anchors with teeth or flukes.

The Romans were not at first so strong in naval power as their neighbours, but in order to keep pace with them they were ultimately compelled to devote more attention to their navies. About 260 B.C. they raised a large fleet to carry on the war with Carthage. A Carthaginian quinquereme which happened to be wrecked on their coast was taken possession of by the Romans, used as a model, and one hundred and thirty ships constructed from it. These ships were all built, it is said, in six days; but this appears almost incredible. We must not, however, judge the power of the ancients by the standard of present times. It is well known that labour was cheap then, and we have recorded in history the completion of great works in marvellously short time, by the mere force of myriads of workmen.



TOWER ON BOARD ANCIENT SHIP.

The Romans not only succeeded in raising a considerable navy, but they proved themselves ingenious in the contrivance of novelties in their war-galleys. They erected towers on the decks, from the top of which their warriors fought as from the walls of a fortress. They also placed small cages or baskets on the top of their masts, in which a few men were placed to throw javelins down on the decks of the enemy; a practice which is still carried out in principle at the present day, men being placed in the "tops" of the masts of our men-of-war, whence they fire down on the enemy. It was a bullet from the "top" of one of the masts of the enemy that laid low our greatest naval hero, Lord Nelson.

From this time the Romans maintained a powerful navy. They crippled the maritime power of their African foes, and built a number of ships with six and even ten ranks of oars. The Romans became exceedingly fond of representations of sea-fights, and Julius Caesar dug a lake in the Campus Martius specially for these exhibitions. They were not by any means sham fights. The unfortunates who manned the ships on these occasions were captives or criminals, who fought as the gladiators did—to the death—until one side was exterminated or spared by imperial clemency. In one of these battles no fewer than a hundred ships and nineteen thousand combatants were engaged!

Such were the people who invaded Britain in the year 55 B.C. under Julius Caesar, and such the vessels from which they landed upon our shores to give battle to the then savage natives of our country.

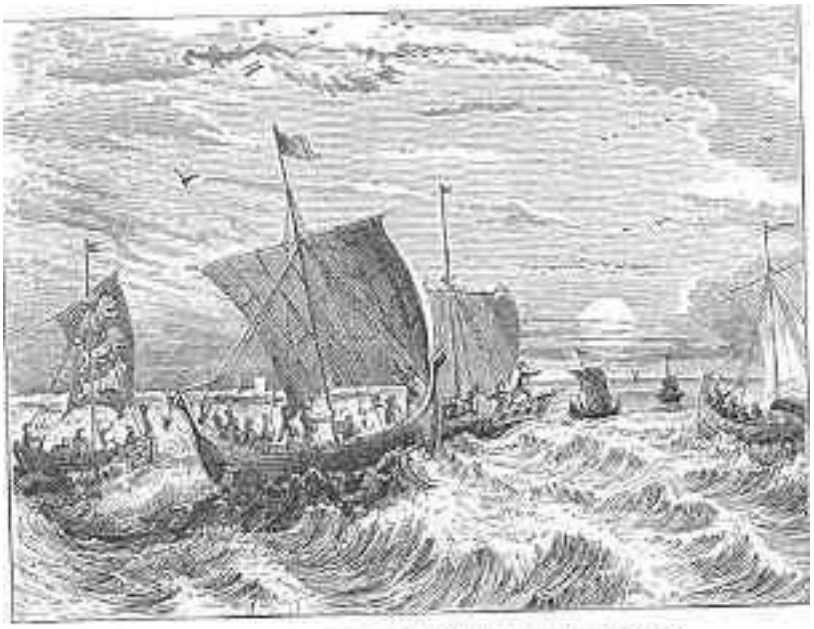
It is a curious fact that the crusades of the twelfth and thirteenth centuries were the chief cause of the advancement of navigation after the opening of the Christian era. During the first five hundred years after the birth of our Lord, nothing worthy of notice in the way of maritime enterprise or discovery occurred.

But about this time an event took place which caused the foundation of one of the most remarkable maritime cities in the world. In the year 476 Italy was invaded by the barbarians. One tribe, the Veneti, who dwelt upon the north-eastern shores of the Adriatic, escaped the invaders by fleeing for shelter to the marshes and sandy islets at the head of the gulf, whither their enemies could not follow by land, owing to the swampy nature of the ground, nor by sea, on account of the shallowness of the waters. The Veneti took to fishing, then to making salt, and finally to mercantile enterprises. They began to build, too, on those sandy isles, and soon their cities covered ninety islands, many of which were connected by bridges. And thus arose the far-famed city of the waters —"Beautiful Venice, the bride of the sea."

Soon the Venetians, and their neighbours the Genoese, monopolised the commerce of the Mediterranean.

The crusades now began, and for two centuries the Christian warred against the Turk in the name of Him who, they seem to have forgotten, if indeed the mass of them ever knew, is styled the Prince of Peace. One of the results of these crusades was that the Europeans engaged acquired a taste for Eastern luxuries, and the fleets of Venice and Genoa, Pisa and Florence, ere long crowded the Mediterranean, laden with jewels, silks, perfumes, spices, and such costly merchandise. The

Normans, the Danes, and the Dutch also began to take active part in the naval enterprise thus fostered, and the navy of France was created under the auspices of Philip Augustus.



ENGLISH SHIPS OF THE TIME OF THE CRUSADES.

The result of all this was that there was a great moving, and, to some extent, commingling of the nations. The knowledge of arts and manufactures was interchanged, and of necessity the knowledge of various languages spread. The West began constantly to demand the products of the East, wealth began to increase, and the sum of human knowledge to extend.

Shortly after this era of opening commercial prosperity in the Mediterranean, the hardy Northmen performed deeds on the deep which outrival those of the great Columbus himself, and were undertaken many centuries before his day.

NORSE GALLEY.

The Angles, the Saxons, and the Northmen inhabited the borders of the Baltic, the shores of the German Ocean, and the coasts of Norway. Like the nations on the shores of the Mediterranean, they too became famous navigators; but, unlike them, war and piracy were their chief objects of pursuit. Commerce was secondary.

In vessels resembling that of which the above is a representation, those nations went forth to plunder the dwellers in more favoured climes, and to establish the Anglo-Saxon dominion in England; and their celebrated King Alfred became the founder of the naval power of Britain, which was destined in future ages to rule the seas.

It was the Northmen who, in huge open boats, pushed off without chart or compass (for neither existed at that time) into the tempestuous northern seas, and, in the year 863, discovered the island of Iceland; in 983, the coast of Greenland; and, a few years later, those parts of the American coast now called Long Island, Rhode Island, Massachusetts, Nova Scotia, and Newfoundland. It is true they did not go forth with the scientific and commercial views of Columbus; neither did they give to the civilised world the benefit of their knowledge of those lands. But although their purpose was simply selfish, we cannot withhold our admiration of the bold, daring spirit displayed by those early navigators, under circumstances of the greatest possible disadvantage—with undecked or half-decked boats, meagre supplies, no scientific knowledge or appliances, and the stars their only guide over the trackless waste of waters.

In the course of time, one or two adventurous travellers pushed into Asia, and men began to ascertain that the world was not the insignificant disc, or cylinder, or ball they had deemed it. Perhaps one of the chief among those adventurous travellers was Marco Polo, a Venetian, who lived in the latter part of the thirteenth century. He made known the central and eastern portions of Asia, Japan, the islands of the Indian Archipelago, part of the continent of Africa, and the island of Madagascar, and is considered the founder of the modern geography of Asia.

The adventures of this wonderful man were truly surprising, and although he undoubtedly exaggerated to some extent in his account of what he had seen, his narrations are for the most part truthful. He and his companions were absent on their voyages and travels twenty-one years.

Marco Polo died; but the knowledge of the East opened up by him, his adventures and his wealth, remained behind to stir up the energies of European nations. Yet there is no saying how long the world would have groped on in this twilight of knowledge, and mariners would have continued to “hug the shore” as in days gone by, had not an event occurred which at once revolutionised the science of navigation, and formed a new era in the history of mankind. This was the invention of the mariner’s compass.

Chapter Five.
The Mariner's Compass—Portuguese Discoveries

"What *is* the compass?" every philosophical youth of inquiring disposition will naturally ask. We do not say that all youths will make this inquiry. Many there are who will at once say, "Oh, I know! It's a needle with a card on the top of it—sometimes a needle with a card under it—which always points to the north, and shows sailors how to steer their ships."

Very well explained indeed, my self-sufficient friend; but you have not answered the question. You have told us what a compass is like, and one of the uses to which it is applied; but you have not yet told what it *is*. A man who had never heard of a compass might exclaim, "What! a needle! Is it a darning needle, or a knitting needle, or a drawing-through needle? And which end points to the north—the eye or the point? And if you lay it on the table the wrong end to the north, will it turn round of its own accord?"

You laugh, perhaps, and explain; but it would have been better to have explained correctly at first. Thus:—

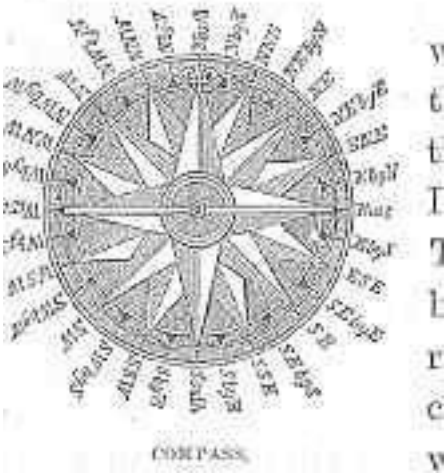
The mariner's compass is a small, flat bar of magnetised steel, which, when balanced on a pivot, turns one of its ends persistently towards the north pole—the other, of course, towards the south pole; and it does this in consequence of its being magnetised. A card is fixed above, sometimes below, this bar of steel (which is called the needle), whereon are marked the cardinal points—north, south, east, and west—with their subdivisions or intermediate points, by means of which the true direction of any point can be ascertained.

"Aha!" you exclaim, "Mr Author, but you yourself have omitted part of the explanation. *Why* is it that the magnetising of the needle causes it to turn to the north?"

I answer humbly, "I cannot tell;" but, further, I assert confidently, "Neither can anybody else." The fact is known, and we see its result; but the reason why magnetised steel or iron should have this tendency, this polarity, is one of the mysteries which man has not yet been able to penetrate, and probably never will.

Having explained the nature of the compass, as far as explanation is possible, we present our reader with a picture of one.

It will be seen that there are four large points—N, S, E, and W—the cardinal points above referred to, and that these are subdivided by twelve smaller points, with one little black triangular point between each, and a multitude of smaller points round the outer circle. To give these points their correct names is called "boxing the compass,"—a lesson which all seamen can trip off their tongues like A, B, C, and which most boys could learn in a few hours.



For the sake of those who are anxious to acquire the knowledge, we give the following explanation: Let us begin with north. The large point midway between N and E (to the right) is *north-east*. The corresponding point midway between N and W (to the left) is *north-west*. A glance will show that the corresponding points towards the south are respectively *south-east* and *south-west* (usually written S.E. and S.W., as the two former points are written N.E. and N.W.). Now, to read off the compass with this amount of knowledge is very simple. Thus: *North*, *north-east*, *east*, *south-east*, *south*, *south-west*, *west*, *north-west*, *north*. But be it observed that, in the language of the sea, the *th* is thrown overboard, except when the words north and south occur alone. When conjoined with other points they are pronounced thus: nor'-east, sou'-east; and so on.

To come now to the smaller subdivisions, it will suffice to take a quarter of the circle. The point midway between N.E. and N. is "nor'-nor'-east" (N.N.E.), and the corresponding one between N.E. and E. is "east nor'-east" (E.N.E.). These points are again subdivided by little black points which are thus named:– The first, next the N., is "north by east" (N. by E.); the corresponding one next the E. is "east by north" (E. by N.). The second *black* point from N. is "nor'-east by north" (N.E. by N.), and the corresponding one—namely, the second black point from east—is "nor'-east by east" (N.E. by E.). Thus, in reading off the compass, we say—beginning at north and proceeding to east—North: north by east; nor'-nor'-east; nor'-east by north; nor'-east; nor'-east by east; east nor'-east; east by north; east;—and so on with the other quarters of the circle.

So much for "boxing the compass." The manner in which it is used on board ship, and the various instruments employed in connection with it in the working of a vessel at sea, will be explained shortly; but first let us glance at the history of the compass.

It is a matter of great uncertainty when, where, and by whom the mariner's compass was invented. Flavio Gioia, a Neapolitan captain or pilot, who lived about the beginning of the fourteenth century, was generally recognised throughout Europe as the inventor of this useful instrument; but time and research have thrown new light on this subject. Probably the Neapolitan pilot was the first who brought the compass into general notice in Europe; but long before 1303 (the year in which it was said to have been invented) the use of the magnetic needle was known to the Chinese.

Loadstone, that mineral which has the mysterious power of attracting iron, and also of imparting to iron its own attractive power, was known to the Chinese before the year 121, in which year a famous Chinese dictionary was completed, wherein the word *magnet* is defined as "the name of a stone which gives direction to a needle." This proves not only that they knew the attractive properties of the loadstone, and its power of imparting these properties to metal, but also that they were aware of the polarity of a magnetised needle. Another Chinese dictionary, published between the third and fourth centuries, speaks of ships being guided in their course to the south by means of the magnet; and in a medical work published in China in 1112, mention is made of the *variation* of the needle,

showing that the Chinese had not only used the needle as a guide at sea, but had observed this one of its well-known peculiarities—namely, the tendency of the needle to point in a *very slight degree* away from the true north.

In the thirteenth century, too, we find mention made of the needle by a poet and by two other writers; so that whatever Flavio Gioia may have done (and it is probable he did much) in the way of pushing the compass into notice in Europe, he cannot be said to be the inventor of it. That honour doubtless belongs to the Chinese. Be this as it may, the compass was invented; and in the fourteenth century it began that revolution in maritime affairs to which we have alluded.

The first compasses were curiously formed. The Chinese used a magnetised needle, which they placed in a bit of rush or pith, which was floated in a basin of water, and thus allowed to move freely and turn towards the poles. They also made needles in the form of iron fish. An Arabian author of the thirteenth century thus writes:– "I heard it said that the captains in the Indian seas substitute for the needle and reed a hollow iron fish magnetised, so that, when placed in the water, it points to the north with its head and to the south with its tail. The reason that the iron fish does not sink, is that metallic bodies, even the heaviest, float when hollow and when they displace a quantity of water greater than their own weight."

The use of the compass at sea is so simple, that, after what has been said, it scarcely requires explanation. When a ship sets sail for any port, she knows, first of all, the position of the port from which she sets sail, as well as that to which she is bound. A straight line drawn from the one to the other is her true course, supposing that there is deep, unobstructed water all the way; and if the compass be placed upon that line, the point of the compass through which it passes is the point by which she ought to steer. Suppose that her course ran through the east point of the compass: the ship's head would at once be turned in that direction, and she would continue her voyage with the needle of the compass pointing straight *across* the deck, and the east and west points straight *along* it.

But various causes arise in the actual practice of navigation to prevent a ship keeping her true course. Winds may be contrary, and currents may drive her either to the one side or the other of it; while land—promontories, islands, and shallows—compel her to deviate from the direct line. A vessel also makes what is called "leeway;" which means that, when the wind blows on her side, she not only advances forward, but also slides through the water sidewise. Thus, in the course of a day, she may get a considerable distance off her true course—in sea parlance, "make a good deal of leeway."

To perform the voyage correctly and safely in the face of these obstacles and hindrances is the aim and end of navigation; and the manner of proceeding is as follows:—

The hour is carefully noted on setting sail, and from that moment, night and day, to the end of the voyage, certain observations are made and entered in the ship's journal, called the log. Every hour the rate at which the ship is going is ascertained and carefully noted. The point of the compass towards which the ship is to be steered is given by the captain or officer in command to the steersman, who stands at the wheel with a compass always before him in a box called the "*binnacle*." The course is never changed except by distinct orders from those in command; and when it is changed, the hour when the change is made and the new course to be steered are carefully noted down. Thus, at the end of the day, or at any other time if desired, the position of the ship can be ascertained by her course being drawn upon a chart of the ocean over which she is sailing,—correct charts, or maps, being provided by the captain before starting.

The estimate thus made is, however, not absolutely correct. It is called the "*dead-reckoning*," and is only an approximation to the truth, because allowance has to be made for leeway, which can only be guessed at. Allowance has also to be made for variations in the rate of sailing in each hour, for the winds do not always blow with exactly the same force during any hour of the day. On the contrary, they may vary several times within an hour, both in force and in direction. Those variations have to be watched and allowed for; but such allowance may be erroneous in a greater or less degree. Currents, too, may have exerted an unseen influence on the ship, thus rendering the calculation still

less correct. Nevertheless, dead-reckoning is often the only guide the sailor has to depend upon for days at a time, when storms and cloudy skies prevent him from ascertaining his true position by other means, of which we shall speak presently.

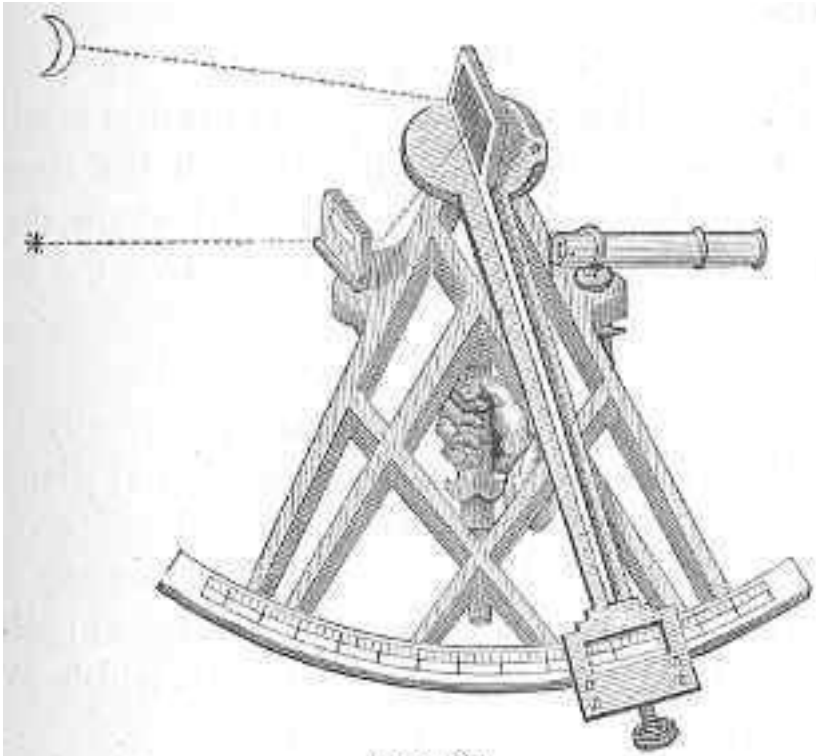
Of course, in the early days of navigation there were no charts of the ocean. The navigator knew not whither he was hurrying over the wild waste of waters; but by observing the relative position of some of the fixed stars to his course while sailing out to sea, he could form a rough idea of the proper course to steer in order to return to the port whence he had started.

The compass, then, shows the sailor the course he has been going, and the *log* (of which more presently) enables him to ascertain the rate at which he has proceeded; while his chronometers, or time-keepers, tell him the *time* during which the course and rate of sailing have been kept up. And many a long cruise on the unknown deep has been successfully accomplished in days of old by bold seamen, with this method of dead-reckoning; and many a mariner at the present day depends almost entirely on it, while *all* are, during thick, stormy weather, dependent on it for days and sometimes weeks together.

The *log*, to which we have referred, is the instrument by which is determined the rate at which a ship is progressing. It is a very simple contrivance: a triangular piece of wood about the size of a large saucer, with a piece of stout cord fastened to each corner, the ends of the cords being tied together, so that when held up, the "log," as it is called, resembles one of a pair of scales. One of the cords, however, is only temporarily attached to its corner by means of a peg, which when violently pulled comes out. One edge of the triangle is loaded with lead. The whole machine is fastened to the "log-line,"—a stout cord many fathoms long, which is wound on a large reel.

"Heaving the log," as we have said, takes place every hour. One sailor stands by with a sand-glass which runs exactly half a minute. Another holds the wooden reel; and a third heaves the log overboard, and "pays out" line as fast as he can make the reel spin. The instant it is thrown the first sailor turns the sand-glass. The log, being loaded on one side, floats perpendicularly in the water, remaining stationary of course; while the man who hove it watches sundry knots on the line as they pass over the stern of the ship, each knot representing a mile of rate of speed in the hour. As the last grain of sand drops to the bottom of the glass the first sailor gives a sharp signal, and the second clutches and checks the line, examines the knot nearest his hand, and thus knows at once how many knots or miles the ship is sailing at that time. The sudden stoppage of the line jerks the peg, before referred to, out of the log, thereby allowing the other two fixed cords to drag it flat and unresisting over the surface of the sea, when the line is reeled up and put by. The flight of another hour calls for a repetition of the heaving of the log.

As scientific knowledge advanced, instruments of peculiar and more complicated form were devised to enable navigators to ascertain more correctly their position on the surface of the sea; but they did not, and never will, supersede the method by dead-reckoning—for this reason, that the latter can be practised at all times, while the former are useless unless the sun, moon, or stars be visible, which in some latitudes they are not for many days and weeks, when clouds and fogs shroud the bright sky from view.



QUADRANT.

The *Quadrant* is the chief of those instruments. It is represented on next page. To give a succinct account of this would take up more space than we can spare. It may suffice the general reader to say that by observing the exact position of the sun at noon, or of the moon or a star, in relation to the horizon, the precise *latitude* of a ship—that is, her distance north or south of the equator—is ascertained. The method of "taking an observation" is complicated, and difficult to explain and understand. We refer those who are curious on the point to treatises on navigation.

Chronometers are exceedingly delicate and perfect time-keepers, or watches, which are very carefully set at the commencement of a voyage. Thus the *time* at the *meridian* whence a vessel starts is kept up during the voyage. By means of an observation of the sun with the quadrant, or sextant (a somewhat similar instrument), the true time at any particular point in the voyage may be ascertained. A *difference* is found to exist between the time at the spot where the observation is taken, and the time of the chronometer. A calculation founded on this difference gives the ship's *longitude*—that is, her distance east or west of the meridian that passes through Greenwich. That meridian is an imaginary line drawn round the world longitudinally, and passing through the north and south poles, as the equator is a line passing round it latitudinally.

When a ship's latitude and longitude have been ascertained, and a line drawn through the first parallel to the equator, and another line through the second parallel to the first meridian, the point where these two lines intersect is the *exact* position of the ship upon the sea.

The size and form of ships having gradually improved, the compass and other scientific appliances having been discovered, cannon also and gunpowder having been invented, seamen became more courageous and venturesome; and at last the Portuguese nation began that career of maritime enterprise which won for it the admiration of the world.

About the beginning of the fourteenth century (1330), the Canary Islands, lying off the west coast of Africa, were re-discovered by the accident of a French ship being blown off the coast in a storm, and finding shelter amongst them. This group had been known to the ancients under the name of the Fortunate Islands, but had been forgotten for more than a thousand years. During the course of the century the Spaniards plucked up courage to make discoveries and settlements upon

them, although by so doing they were compelled to undergo that much-dreaded ordeal—sailing *out of sight* of their once fondly "hugged" land!

In the beginning of the next century arose a prince, Don Henry, son of John the First of Portugal, whose anxiety to promote discovery, and to find a passage by sea round the coast of Africa to India, induced him to send out many expeditions, all of which accomplished something, and many of which added very extensively to the geographical knowledge of the world at that time. Navigators, sent out by him from time to time, discovered the Madeira Islands; sailed along the western coast of Africa a considerable distance; ascertained the presence of gold-dust among the savages on the Gulf of Guinea; discovered the Azores, besides numerous other islands and lands; crossed the equator, and approached to within about eighteen hundred miles of the south-most cape of Africa.

The discovery of gold-dust stirred up the energies of the Portuguese in a remarkable degree, and caused them cheerfully to undertake ventures which, without that inducement, they would probably never have undertaken at all. Moreover, they had now learned to quail less at the idea of losing sight of land; and towards the end of the fifteenth century (1486), Bartholomew Diaz, an officer of the household of John the Second, achieved the grand object which had long been ardently desired by the Portuguese—he doubled the great southern cape of Africa, which King John named the "Cape of Good Hope," although Diaz had named it the "Cape of Tempests." The circumstance is thus alluded to by a poet of that period—

> "At Lisboa's court they told their dread escape,
> And from her raging tempests named the Cape.
> 'Thou southmost point,' the joyful king exclaimed,
> '*Cape of Good Hope* be thou for ever named!'"

Chapter Six.
Boats, Model-Boat Making, etcetera

Leaving the subject of ancient ships and navigation, we shall now turn our attention to the more recent doings of man on the ocean, and, before entering into the details of ships and ship-building, devote a little time and space to the consideration of boats.

There are great varieties of boats—as regards shape, size, material, and use—so that it is not easy to decide on which we shall first fix our attention. There are large and small, long and short boats; flat, round, sharp, and bluff ones,—some clumsy, others elegant. Certain boats are built for carrying cargo, others for purposes of war. Some are meant for sailing, some for rowing; and while many kinds are devoted to business, others are intended solely for pleasure. Before we refer to any of these, perhaps our young readers will not object to be told how to construct:—

A Model Boat

We need scarcely say that it is not expedient for a boy to attempt to build a model boat in the same manner as a regular boat-builder constructs one for actual service. It would be undertaking an unnecessary amount of labour to lay a keel and form ribs and nail on planks in the orthodox fashion, because, for all practical purposes, a boat cut out of a solid block of wood is quite as useful, and much more easily made.

Fig. 1.

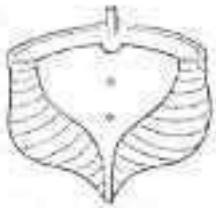


Fig. 2.

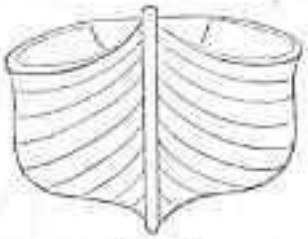


Fig. 3.

Fig. 4.

The first thing you have to do, my young boat-builder, then, is to go and visit a harbour or beach where varieties of boats are to be found, and, having settled in your mind which of them you intend to copy, make a careful drawing, in outline, of its form in four different positions. First, a side view, as in Figure 1. Then the stern, with the swelling sides of the boat visible, as in Figure 2. The bow, as in Figure 3; and a bird's-eye view, as in Figure 4. The last drawing can be made by mounting on some neighbouring eminence, such as a bank or a larger boat, or, if that is impossible, by getting upon the stern of the boat itself, and thus looking down on it. These four drawings will be of great service in enabling you to shape your model correctly; for as you proceed with the carving you can, by holding the model up in the same position with any of the drawings, ascertain whether you are progressing properly; and if you get the correct form of your boat in these four positions, you will be almost certain to make a good boat. If, on the other hand, you go to work without drawings, the probability is that your boat will be lopsided, which will prevent it from floating evenly; or crooked, which will tend to check its speed in sailing, besides being clumsy and not "ship-shape," as the sailors have it.

Конец ознакомительного фрагмента.