

now, fresh, unused emery was added, the effect would be to scratch the half finished surface.

When the grinding is finished the common cast iron grinding blocks are removed and others are substituted having their embracing under sides faced with felt. To these is fed the ordinary marble polish of oxide of tin and water until the surface of the column shines like glass and reflects like a mirror. The entire time required to polish granite columns—dependent on the exactness of their chiseling—is from 40 to 50 hours, diameter and length making but little change, as the work is simultaneous and the surface speed a constant.

PALESTINE AS A ROUTE FOR A NEW SHIP CANAL.

The recent agitation for the building of an additional ship canal between the Mediterranean and the Red Sea has brought up for renewed consideration the project of building a canal through Palestine, commencing on the seashore at Acre, thence inland across the plain of Esdrælon, to the northerly end of the river Jordan a distance of about 25 miles, thence down the valley of the Jordan into and through the Dead Sea, about 150 miles, thence southerly along through the sands of the Waddy Arabah, about 100 miles to the head of the Gulf of Akabah, an arm of the Red Sea—in all about 275 miles. Mr. H. J. Marten, C. E., in writing to a member of Parliament on the subject, says:

"The crucial point, with reference to the project is that which relates to filling the immense depression in the valley of the Jordan with water up to the sea level, by means of a channel to be formed from the northern end of the Gulf of Akabah, along the Waddy-Arabah to the southern end of the Jordan valley depression.

"To fill this depression with water and to convert it into an inland sea of the same level as the Mediterranean and the Red Sea, in a period, say, of three years from the completion of the requisite channel, and to make at the same time due provision for evaporation, this southern channel would have to be large enough to convey over 1,000,000 cubic yards of water along it per minute during that period.

"To pass this quantity of water it is estimated that, with a fall at the rate of six feet per mile, this channel would have to be 480 yards wide and 20 feet deep, and it is assumed that a channel of this description may be cut through the loose sand which is said to compose the southern end of the Waddy-Arabah by means of the properly directed scour of an elementary channel having a bottom width of 50 feet, and carrying a solid body of water 10 feet in depth to begin with."

THE CHINESE JUNK.

JOHN R. CORYELL.

It would not be difficult by a judicious combination of philology and fact to apply the theory of evolution to Chinese naval architecture, and reach the war junk by a series of easy steps, beginning with the boat called the "sampan," for the sampan—literally three boards—is simple enough in construction to satisfy any reasonably exacting person that it was the primitive boat.

Evolution in this case, however, is unnecessary. Chinese annals furnish the cold statement that ship building was introduced into China by Ta Yu, the founder of the Hiaki dynasty. As this emperor reigned about twenty-two hundred years before the Christian era, it will be seen that the junk of China must antedate not only the celebrated Argo, but even the ark of Noah.

Cut up as China is by a great number of natural and artificial water courses, and having a long line of sea coast, it is only natural that the vehicles for water locomotion should assume a great variety of forms. Some of these forms prevail, with modifications, from one end of the empire to the other, but there are a number of boats that owe their origin to peculiarities in the needs of the people, and to the character of the streams upon which they are to be used, and are therefore purely local in design.

A striking example of the results produced by the character of the stream to be navigated is found in certain parts of the province of Nganhwui, where there are several rivers at once so shallow and so full of dangerous rapids that the ordinary boat is found to be useless. Peculiarly shaped rafts are used. The bow is turned up in a graceful curve, and the thin but tough structure, when once well laden, skims over the surface of the water or glides over protruding rocks with comparative ease and safety. These rafts are not much used by passengers, partly because of the giddy voyage they take, and partly because the water is frequently as much over as under the craft.

The most important as well as the most imposing of Chinese boats is the ocean-going war junk. This is the typical Chinese craft, inasmuch as it is constructed in such a manner as to present to the eye of a foreigner, at least, the very exaggeration of what he is accustomed to regard as peculiarly Chinese characteristics in naval architecture.

The poop and bow are exceedingly high and broad, and though the bulwarks are of good height, too, they seem low by comparison. The port-holes are usually of pentagonal shape bordered by a strip of red. The masts are three in number, and from the top of the main-mast streams a strip of red cloth fastened to the tail of a dolphin-shaped vane, and reaching almost to the deck. The safeguard of the junk is a flag fastened at an angle to the mainmast. This flag bears upon its surface a representation of the two great principles, the Yin and the Yang, or, translated, the male

and the female principles. There are also on the flag other favorable devices to secure good luck for the vessel. A triangular flag is displayed at the stern. Two great eyes in bass-relief, painted in black and white, ornament the bow.

Although tub-like, and very different in model from our modern clippers, the Chinese junk bears a striking resemblance in general outline to European vessels of several centuries ago. It is supposed that the original model of the junk was some great sea monster, fortunately no longer met with. The outlines of resemblance to this fabulous creature are traced somewhat in this wise: The teeth on the cutwater define the mouth; the long boards which project beyond the bow, and on which the eyes are painted, represent the gills; the masts and sails are the fins, and the high stern is the tail flourishing aloft.

Instead of being laid out by means of decks into long compartments, running the length of the vessel, the hold is cut up into a series of water-tight spaces, by wooden bulkheads. In this, as in the matter of the compass, it would seem as if the Chinese had taken the lead of the European. The Chinese claim, as is well known, to have made use of the mariner's compass as long ago as twenty-six hundred and thirty-four years before our era. It is difficult to understand, however, just what use the mariner's compass could have served more than four hundred years before ship building was introduced.

Each mast is frequently of one solid piece of timber. The sails are usually made of matting, though cotton is sometimes used, and are strengthened at intervals by poles stretched across the entire width, thus precluding bending to the wind, and giving the set sail that peculiar ribbed appearance so suggestive of China. The rigging is of rattan, bamboo, hemp, or cocoanut fiber. The enormous cables are most often made of rattan.

Owing, perhaps, to the peculiarity of the rigging, and to the fact that no square sails are used, the junk is unable to sail to windward, though it frequently attains a remarkable speed when sailing before the wind. Another odd feature of the junk is the seeming effort to make the rudder supply the lack of keel. There is almost no keel at all, but the rudder is of enormous size. It is naturally not easy to work such a rudder, and consequently to facilitate its passage through the water it is perforated in a number of places.

To be a sailor is to be superstitious. To be a Chinaman is to be superstitious. What then is it to be a Chinese sailor! From the time the keel of a junk is laid until the vessel goes to the bottom, where all junks seemingly do go eventually, prayers and spells are employed in its behalf. Mid spells and incantations a lucky day for launching is chosen. A shrine to the goddess Tien-how, the tutelary deity of the sailor, is carried in every junk. Propitiatory sentences and prayers are inscribed on various parts of the vessel.

Notwithstanding the use of all these preventives, however, storms will overtake the junks. Instead of then blaming the goddess, or losing faith in the efficacy of the spells showered about the craft, the sailors usually search among themselves for a particularly wicked fellow. If such a one be found, he is likely to be tossed overboard as the cause of the trouble.

Although the most imposing, the war junks are by no means the largest of Chinese craft. The merchantmen are sometimes built of very great size, with a carrying capacity of several thousand tons each. Some of them carry five masts, two of which, however, are hardly worthy of the name. One of these is lashed to the side not far from the bow and forward of the foremast. The other is very small in size, and is placed between the main and mizzen masts.

These very large junks, while in most particulars like the war junks, have some interesting peculiarities. The bow and stern are built of unusual height, and bulwarks are entirely lacking. The consequence of this arrangement is that in a high sea the decks amidships are continually swept with water. For the safety of the sailors a light rail of rope is passed across the gaps where the bulwarks should be. The hatches are protected from the wash of waves by coverings, light but strong.

To heave to or bring the head of such a clumsy craft as this to the wind in a heavy gale is no trifling matter, and by ordinary means would be impossible. The device adapted by the Chinese sailors is simple and crude, but effective. A large, stout basket, so attached to ropes that it will hold a fixed position, is thrown over the side to the windward. After a sufficient length of rope has been allowed it, it is permitted to drag. The effect is precisely that of a loaded parachute in the air. The head of the junk is brought up to the wind quite as effectively as if anchored. And in a shifting wind, such as is common in the China seas, no doubt the basket is superior to the anchor.

Each trading vessel is obliged to have its name painted or otherwise delineated on the stern, and must bear a plain indication on its sides of the province from which it hails. This indication is usually the color which the bulwarks are painted. As this paint must by law be renewed every two years, it is a fairly easy matter, in passing a junk at sea, to determine from what part of the empire she hails. Instead of naming their vessels from persons or objects, the Chinese merchants endeavor to beguile success by presaging it. "Bountiful Return" and "Golden Profit" are fair examples of the names of junks.

The Chinese sailor has been spoken of as unusually superstitious. A recital of the variety of odd practices resulting from this trait would fill a volume; but there is one prac-

tice, which, as it passes the bounds of mere oddity, and is, moreover, fraught with great danger to himself and foreign vessels as well, may be specially noticed.

For some reason, quite as fantastic in proportion no doubt as its outcome is dangerous, the master of a junk finds it a joyful and luck chance that enables him to cross the bows of a foreign vessel. Time and again have the foreign steamers plying on the great rivers and seas of China cut down unfortunate junks which were endeavoring to accomplish this strange feat. Disaster teaches no lesson, apparently, for the practice is still continued.

As an account, no matter how brief, of our naval architecture which did not at least mention the Great Eastern would be considered incomplete, so it will be only just to glance at what Chinese history has to say of a similar ship-building work accomplished in China. As the Chinese historian, however, does not make the same nice distinction between fact and fancy that is considered necessary with us, due allowance must be made in accepting the statement.

It was nearly a hundred years before Columbus, in his tiny craft, was venturing away from the sight of land that Ching-ho, a mighty warrior from an interior province, received orders from his emperor to build him some ships and in them carry a large army to foreign lands, partly to overawe the small portion of the world outside of China, and partly to take prisoner the fugitive but rightful ruler of the Chinese. Ching-ho, without loss of time, built sixty-two ships, each four hundred and forty feet long and one hundred and eighty feet broad.

This is certainly a better story than we can tell, for though the Great Eastern was one-half longer than these junks, she was only one-half as broad, added to which is the fact that Ching-ho built sixty-two vessels instead of only one.

The Louisville Exposition.

The Louisville *Courier*, August 9, referring to the Exposition, laments over the fact that there has been so much delay in getting their exhibits in place and the show in running order, but adds:

The great engines which are to furnish the power to drive all the machinery are one by one getting down to work. In a few days the extensive display of the textile machinery will have power applied, and the never-ending wonder of changing the fleecy staples into yarns will begin.

Last night the electric railway was in operation, and the locomotive with two cars attached made the tour of the park. To-day it will be running constantly, and visitors will see what is the latest achievement of science. It is an event of extraordinary interest. It is the practical demonstration of the power of electricity applied as a motor. Without fire or smoke, with no visible agent to propel it, moved by an unseen and even as yet an almost unknown influence, it follows the path marked out with all the celerity and certainty demanded by the most cautious and practical.

The *Courier* passes flattering encomiums on the loan collection of paintings in the Art Gallery of the Exposition, and suggests that there has never been such a gathering before in America.

The Jarvis Furnace in the Sandwich Islands.

Messrs. Charles Brewer & Co., Honolulu, Sandwich Islands, have taken the agency of the Jarvis patent furnace for that section of the world. They have just taken a contract to reset over a large number of boilers with the Jarvis furnace to burn wet sugar cane trash for the Waulukulu Plantation, on the island of Monia. This is the second order from this plantation. The wet weather during the grinding season prevents the drying of the sugar cane trash after it comes from the grinding mill.

Wood is very scarce, and coal from England costs about \$20 a ton. By setting boilers over with the Jarvis furnace this wet fuel can be utilized and the cost of making sugar reduced materially.

Topographical Uses of the Balloon.

The recent balloon trip of Crespigny and Simmons across the English Channel has given occasion for the latter to send to the *Pall Mall Gazette* some facts of the voyage, with a suggestion of the usefulness of the balloon in making topographical surveys. In his account Mr. Simmons says that "not only the land lay below us like a map, but the bottom of the sea is clearly seen in every direction. Every channel and shoal is easily marked, and forms a fibrous network. By the aid of instantaneous photographs there would be no limit to the increase of our knowledge of the sea through balloons, as charts of greater exactness than any yet existing could be made of the bottom of the sea, at least of shoals shallow enough to offer danger to sailing crafts."

Sparrows as Foo.

The English sparrow, where he has become habituated, is usually regarded as a nuisance to be abated or a pest to be extirpated. Indeed, one State, Massachusetts, has enacted a statute against these small birds, to encourage their thinning out, if not their extermination. Whatever may be the value of the sparrow alive, there is but one opinion about him when dead. The sparrow—or plenty of him—makes delicious pies. In Germany and in England the sparrow is a game bird, and is sought after as food. He is so tame that his capture requires very little skill, and after grain gathering in August he swarms on the stubble so that one charge of fine shot would bring down a number of birds.