

# Turtle Ship



# **Turtle Ship**

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## From Editorial Board

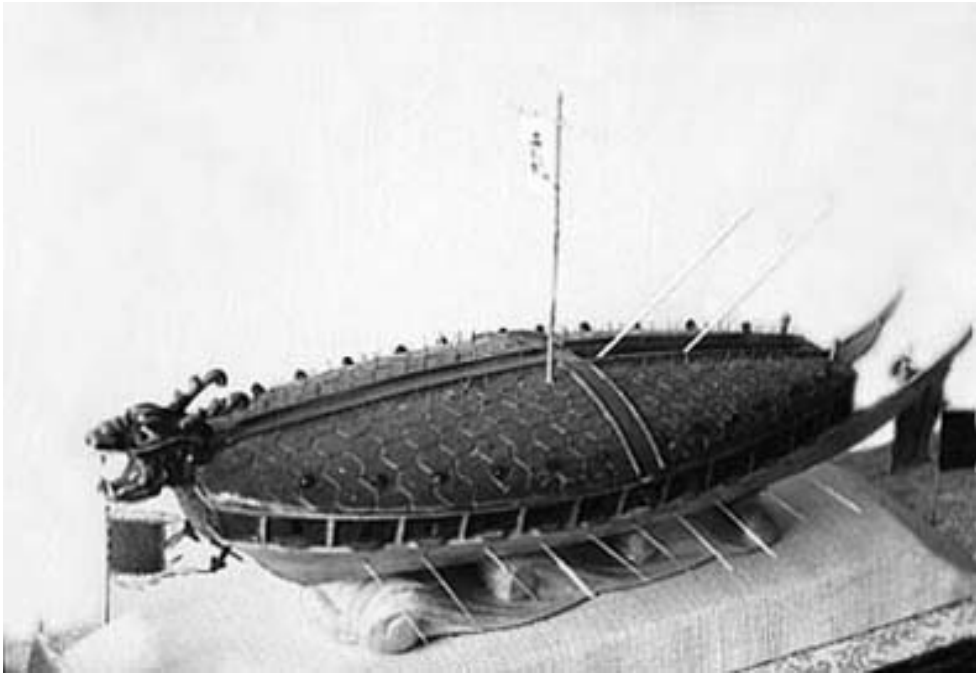
The late 16<sup>th</sup> century witnessed the Imjin Patriotic War in Korea which was touched off with the invasion of Japanese samurais.

Throughout the war, the Korean navy held the command of the South Sea of Korea and made a notable contribution to final victory by scuttling the Japanese aggressive plan to force a naval breakthrough into the West Sea of Korea by way of the South Sea of Korea for a pincer attack with the ground forces advancing northward to overrun Korea in one go.

The Korean navy always defeated the numerically superior enemy in the fierce naval battles. The credit goes to Admiral Ri Sun Sin (1545-1598) and the patriotic seamen and people as well as to such efficient vessels as turtle ships.

The turtle ship was the world's first iron-clad vessel invented by the Korean ancestors. It was a unique, powerful warship, which was strong, fast and convenient for manoeuvring.

With a view to promoting a deep understanding of the turtle ship, a world invention, and Korea's medieval cultural traditions, the editorial board compiles this book on the historical records about the turtle ship, its technical specifications and combat capability.



Turtle ship (model)

## 1. Emergence of a Turtle Ship and Its Age

An ancient Korean ballad *Song of Turtle* runs:

*Raise your head, turtle, turtle  
If not, I'll eat you roasted*

The song implies the age-old relationship of the turtle with human life in Korea.

A turtle is meek, lives long, and has a strong powerful protective shell.

The Korean ancestors were fond of the turtle, as is evidenced by the many historical relics of portraying turtles.

For centuries, Korea suffered frequent foreign invasions and put up tough resistance against them. Sea-bound on three sides, it was particularly vulnerable to naval invasions and this prompted an urgent need for vessels with powerful offensive and defence capabilities.

In Korea, the book “Sungsonjikjirok” was compiled in 1416 and another, “Kyonggukdaejon” in 1469, which were collections of regulations

on marine technology, shipbuilding, management of vessels and seamanship. The evolution of regulations on shipbuilding techniques shows that ship designs and technical inspection were available as far back as that time. It was not until 1774 that “Lloyd’s Register of Shipping”, which is said to be the world’s first collection of shipbuilding regulations, was published in England. Koreans, favoured with long-standing technical and cultural traditions, made a fresh progress in shipbuilding and weaponry manufacture in the 15<sup>th</sup> century. The navy and the shipbuilding sector endeavored to establish a new command system, improve the qualitative composition of ships and build many new types of powerful warship.

The turtle ship, which demonstrated its might during the Imjin Patriotic War (1592-1598), was an original type of warship as an advanced version of preceding marine technology and naval tactics.

As a historical record of its advantages, the following passage finds a place in Volume 120 of “Supplementary Documents for Reference”: “The war vessels of our country are very large and superior. They say scores of Japanese vessels proved no rival for a single ship of ours. Ri Sun Sin manufactured turtle ships, with which he always won battles simply because of the ships’ advantages.”

The turtle ship made its debut in naval action on May 29, 1592, the starting year of the Imjin Patriotic War.

It was earlier, however, at the dawn of the 15<sup>th</sup> century, that a warship called turtle ship had been invented.

The first historical record on the turtle ship is written in the “True Records of Thaejong,” which says that in February of the 13<sup>th</sup> year of Thaejong reign (1415), the King saw turtle ships encountering “Japanese vessels” in a naval rehearsal.

The Records also mention the recommendation on defense measures which was submitted to the King by *Jwadaeon* Thaksin in July of the 15<sup>th</sup> year of Thaejong reign (1413): the sixth of the measures was the tactics of turtle ship, and it was suggested that this vessel, impregnable to attack by a lot of enemy vessels, should be made more solid and sophisticated as a good means of war victory.

The turtle ship, the world’s first armoured ship, was the comprehensive application of Korea’s age-old achievements in science and military technology. Korea’s advanced metallurgy and metal-working, the invention of powder weapons, the switchover from ramming and boarding to cannon

fire and the steady development of shipbuilding techniques became the military and technological foundations for the advent of the turtle ship.

In February 1413, the turtle ship was subjected, in the presence of the King, to a capability test in a simulated battle against a Japanese man-of-war. The February of this year marks the birth of the turtle ship just as a ship's shakedown cruise marks the date of the completion of its construction in modern shipbuilding industry.

The emergence of this warship scuttled the Japanese strategy of ground-naval pincer attack and helped defend the home waters of Korea during the seven years of Imjin Patriotic War; it led to ultimate victory in the war, displaying the mettle of Koreans. And its world's first armour and effective shape and structure went a good way to advancing the world's marine engineering.

Every creation is an inevitable product of its historical age.

The construction of the turtle ship was based on the exigencies of its days.

The Japanese pirates did not give up their aggressive designs, despite their bitter defeats by the Korean people.

They pretended to be engaged in commercial trade, but suddenly went over to invasions against Korea.

In the complex internal situation of Korea the Japanese marauders aboard 50 vessels intruded into Toduum Point of Piin Prefecture, Chungchong Province on May 5, 1419, and into Yonphyong Point in Haeju, Hwanghae Province on May 11, resorting to brigandish acts.

After these incidents the Korean government decided to stage an expedition to Tsushima, the base of pirates.

The feudal lords in Tsushima were raking in huge profits by making a monopoly of privileges in trade with Korea, while supporting the pirates in return for kickbacks from them. Tsushima served as the logistic base of Japanese pirates.

In May 1419 the Korean government organized an expeditionary fleet and appointed Ri Jong Mu supervisor of three provinces—Kyongsang, Jolla and Chungchong (supervisor was a military commander controlling over three provinces) and assembled 227 war vessels from the three provinces at Kyonnaerang off Koje Island. The government demanded the governor of Tsushima to hand over the chief of the pirates to it but received no reply, to its great fury.

On June 19, the Korean navy sailed over to Tsushima, burnt 124 Japanese vessels, seized 34 and killed or captured a large number of pirates by surprise and siege. After wresting surrender from the enemy, the expeditionary force returned to Koje Island on July 3. This incident is called Tsushima Expedition in Korean history.

Reeling under this mortal blow, the pirates could make no more adventures against Korea for nearly a century.

But their predatory nature was sizzling as ever. They resumed their adventures in the 16<sup>th</sup> century when Korea's situation was rough-and-tumble and the country was weakened under corrupt rule.

After the Tsushima Expedition, the governor and merchants of Tsushima requested the Korean government for permission to conduct bilateral trade and to engage in commercial activities while residing in certain places of Korea. In 1443, Korea allowed them access for trade to the ports of Pusan, Yom (in Ulsan County) and Naengi (in Jinhae City) and fixed the number of Japanese resident families at 60. (Kyehae Agreement)

Later, the number of settled families at the three ports grew steadily, reaching 10 000 by the end of the 15<sup>th</sup> century.

The Japanese grew arrogant enough to ignore the supervision of the Korean government. Finally, in April 1510, they started an invasion in collusion with the pirates from the three ports. This incident is described as a "Japanese riot at the three ports" in history. The riot was quelled in 15 days, and Korea cut off all relations with Tsushima. This retaliation drove to a tight corner the governor and merchants of Tsushima who had been earning enormous profits through trade with Korea, as well as the homeless Japanese residents in the three ports.

They now solicited the Korean government for normalization of diplomatic relations, trade and their residence in the three ports. Korea replied by demanding the stern punishment of the leading rioters. In 1512, an envoy of the Japanese shogunate came over for apology, carrying the hacked-off heads of the prime movers. The Korean government brought him to task for the incident and made him pledge to prevent its recurrence. It placed a ban on Japanese settlements at the three ports and fixed the number of Japanese trading vessels and the varieties and amounts of goods to be traded. (Imsin Agreement)

Every year the governor of Tsushima and other Japanese lords had the effrontery to persist in requests for Korea's permission to increase their



trading vessels. Chagrined at repeated rebuffs, they again resorted to force of arms.

On April 12, 1544, at the instigation of Tsushima governor, 20 Japanese vessels attacked Saryang Islet off Kosong, Kyongsang Province, but were repulsed by the tough resistance of the soldiers and civilians on the islet.

The Korean government took punitive steps to downgrade the status of Japanese residents in Korea and place a ban on all trading vessels except those from the Japanese shogunate.

Later the governor of Tsushima apologized for the intrusion and entreated for the lifting of the ban. In 1547, Korea gave a green light for trade, yet on far smaller scale than before. (Jongmi Agreement)

The pirates' sorties subsided until 1555, the Year of Ulmyo that witnessed a larger invasion called Ulmyo Japanese Invasion in history. From mid-May to late June, the pirates made inroads into the islets and offshore waters in the South Sea of Korea, committing slaughter, arson and looting before they were routed by the determined resistance of Korean soldiers and civilians, leaving lots of corpses behind.

This situation prompted an urgent need for Korea's steps to strengthen its navy and construct powerful men-of-war.

Meanwhile, the Japanese samurai rulers had ended the wars of 100 years and unified their country; now they launched full preparations for invasion of Korea with an ambition of dominating Korea and Ming China and solidifying their footing.

To provide against the brewing danger, the Korean navy and people under the command of Admiral Ri Sun Sin set to work on building formidable war vessels with offensive and defence capabilities, in order to destroy the invasion force at sea. They improved the turtle ship in the light of a contemporary sea battle, relying on the ancestors' shipbuilding techniques and experiences and fresh achievements in science and technology.

In 1592, the turtle ship re-emerged, fully geared to demonstrate its might.

## 2. Details of a Turtle Ship

### 1) Varieties

The turtle ship was divided largely into two types. In 1591 Ri Sun Sin was appointed naval commander in charge of left half of the waters off Jolla Province, and he ordered the speedy construction of turtle ships at the Jwasuyong naval base of Jolla Province. This vintage is called Jwasuyong turtle ship. It demonstrated its overwhelming might against the Japanese in the early stage of the Imjin Patriotic War.

As for the Jwasuyong turtle ship, the head of dragon (a tube for giving off flames) was placed in the bow and below it, another protruding monster head was embossed; the deck was straight-lined in the corners and enclosed by a hexagonal, mosaic iron-clad shield, which was dotted by sharp-pointed spikes and swords as a deterrent against the enemy's boarding.

It had a single bank of eight oars each to port and starboard and was equipped with a lot of cannons ensuring intensive firepower.

In 1593, Ri Sun Sin was promoted to naval commander of the three provinces—Chungchong, Jolla and Kyongsang. He took immediate steps to improve the turtle ship at the Thongjeyong (naval base) by drawing on combat experiences.

The improved version, the Thongjeyong turtle ship, was a sum-total of medieval shipbuilding technology, an unchallengeable man-of-war in view of its technical features and combat capabilities. In fact, it is the typical vintage of turtle ship.

It had ten oars each to port and starboard, as well as two folding masts with square sails that give an additional driving force. The outer shell had a cross-shaped gangway in the middle of spikes and swords that were set densely enough for the enemy not to be accessible to the ship, and a passage leading down into the interior. The deck was oval-shaped in the corners and the vessel had many more portholes for cannon fire—12 respectively on either side of the deck, and 22 each to port and starboard.

During the Imjin Patriotic War, the turtle ships always stood in the van of the fleet as an impregnable seagoing fortress. Its construction continued after the end of the war.

Relevant historical records are available. In 1622, the king instructed to resume the construction of turtle ships and train the naval force actively.\*<sup>1</sup>

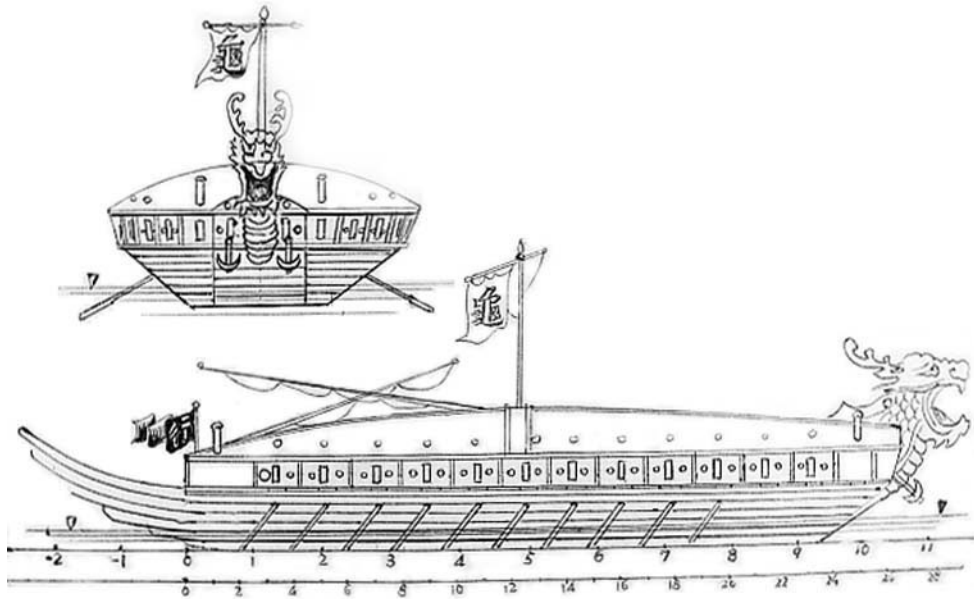
In 1791, Choe Tong Ak, naval commander in charge of left half of the waters off Kyongsang Province, proposed changing the three of his ten attic galleys (with an attic inside the hull) into turtle ships, citing the fact that the former was not so fast as the latter and that there were few of the latter in his charge, and he carried his suggestion into practice.\*<sup>2</sup> In 1809, the building of turtle ships was resumed relying on “Complete Works of Ri Sun Sin”.

\*<sup>1</sup> “Diaries of King Kwanghaegun”, Vol. 179, July of the 14<sup>th</sup> year of his reign

\*<sup>2</sup> “True Records of King Jongjo”, Vol. 33, November of the 15<sup>th</sup> year of his reign

By that time, the turtle ship was 21.74 metres long in the hull and 12.16 metres long in the tail section, and mounted some 70 cannons. This shows that since the end of the Imjin Patriotic War, the turtle ship changed little except alteration in arrangement of cannons.

In the 18<sup>th</sup> century, Korea had 14 turtle ships in all—one in Kyonggi Province, another in Chungchong Province, nine in Kyongsang Province and the other three in Jolla Province. But these, like other war vessels, were not used to good effect for defence build-up because of the slight concern for defence on the part of the feudal rulers who were obsessed by sycophancy to big powers and an indolent and depraved lifestyle.



Front and side views of turtle ship

## 2) Shape

### Closed Shape

As is true with all creations, the turtle ship was the product of the ingenuity and diligence of the people and technicians.

The source of relevant information is represented by “True Records of Ri Dynasty,” “Complete Works of Ri Sun Sin” and other historical records from the ages subsequent to the Imjin Patriotic War. The standout is “Complete Works of Ri Sun Sin” (printed in 1795) which contains the following passage of how the classic saw the light of day. “In the 200th anniversary of the Imjin Patriotic War, King Jongjo titled the book ‘Complete Works of Ri Sun Sin’ as its compilation by Yun Haeng Im was drawing to a close, and then ordered Ryu Tuk Gong to supervise its printing.”

Every object has planes of straight or curved lines and a cubic of space.

In shape, the turtle ship is curved because it was patterned on a turtle, the curved animal.

As the book “Kusonsong” in “Complete Works of Ri Sun Sin” has it, the curved, slouchy vessel looked like a turtle being exposed to the sun.

The pictorial figures of the original record show the Thongjeyong turtle ship all curved-lined in the deck corners, in the central cross section and in the tail section.

It was not until the latter half of the 20<sup>th</sup> century that the straight-line shape of vessel came into vogue in the world. The turtle ship is generally curved in shape, as evidence of the Koreans’ emphasis, but has a straight keel, a handy way of building.

The turtle ship was covered by a shell of iron plates and designed in such a way as to be open to outside view and closed to inward sight—perfect conditions for fields of vision and fire.

The turtle ship of closed shape, the first of its kind in medieval naval history, is the predecessor of the modern submarine in shape; it was an advanced vessel 35 metres at the longest, 11.8 metres at the widest, 3.5 metres high at the gunwale and 5.2 metres highest.

The Spanish ship *Victoria*, which made a round-the-world voyage over 100 years after the emergence of the turtle ship, was only 23 metres long.

### Simplified Shape

In shipbuilding, the simplified shape means a shape clear of curved lines and planes in the framework and planking of the hull.

Increasing the outer flatness of the hull and using straight-lined materials for the framework are a way to reduce manpower, materials and the time needed for the building of low-speed vessels. In case of the turtle ship, a hull being made up of 120 mm-thick planks, it is very difficult to make the planking and structure highly curved in lines and planes. In the hull, the surface of the bow and stern, the bottom and the keels are straight-lined to the plane.

Ensuring the minimum draught of a vessel with a certain displacement requires the flatness of its bottom.

The simplified shape of a turtle ship was of great strategic importance. In the battles on the South Sea of Korea and West Sea of Korea the minimum draught was of strategic significance, in view of the water-level differences between high and low tides.

In low tides, the simplified shape will enable a warship to perform its mission, but the non-simplified shape will run aground to lose combat efficiency.

The simplified shape of the turtle ship was the source of its phenomenal performance during the Imjin Patriotic War. The simplified shape had a keel to beam ratio of 3:1 and a corresponding ratio of deck of 2.16:1 which provided for a high speed and an effective condition to protect wooden board with the iron shield.

### 3) Hull

#### Iron-clad Shell

The turtle has a long lifespan, 300 years at maximum. The advantages of its protective shell and lifespan were adopted by Korean ancestors for the construction of vessels, turtle ships in particular. The Koreans coated the turtle ship with iron shell, hoping it be an unsinkable man-of-war like a long-lived turtle..

History of war is the history of offence and defence.

The outcome of war depends on the combination of offence and defence. The tank with armour 10 mm thick made its debut in the First World War and demonstrated its formidable assault power.

The shield of the turtle is a powerful defensive means and a symbol of military fortification.

The Koreans' modeling of the turtle shell in warship was a factor of naval victories based on proper combination of offensive and defensive.

A passage from the book "Great Strategy for Conquering Korea" published in Japan during the Imjin Patriotic War runs: "The enemy vessels were all covered with iron and our gunfire could not destroy them."

The turtle ship belonged to the period of transition from the wooden to the iron vessel.

As its wooden structure and sides were covered by iron shields, it was invulnerable to the enemy's arrows, muskets and cannon, and it could emerge victorious from the medieval battles of boarding and cannon fire. Otherwise, it would not have been able to overpower the numerically far superior Japanese navy in the many encounters. It was the world's first armoured vessel impervious to the flaming waves and raging cannon fire.

In Europe, cannon came into use as the major armament of a galleon by the 16<sup>th</sup> century. It was not until 1782 that the allied fleet of Spain and France was covered by iron plates against enemy gunfire. This signaled the starting-point of European armoured-vessel history. Russia built an iron-clad war vessel in 1834 and called it the earliest armoured ship.

### Head of Dragon

In Korea, the dragon was considered an imaginative animal symbolizing wisdom and courage from olden times and depicted in diverse forms and patterns in architectural buildings, Buddhist temples and mural paintings. The turtle was also portrayed often in combination with the dragon.

The Kangso Three Tombs situated in Sammyo-ri, Kangso County, South Phyongan Province, the mural tombs of Koguryo from the mid-7<sup>th</sup> century, have a still vivid mural of four guardians of the north, south, east and west—*Chongryong*, *Paekho*, *Jujak* and *Hyonmu*. *Hyonmu* with a well-balanced body and a delicate turtle-shell pattern gives an impression of living turtle but its head is similar to a dragon's. True to this national tradition, the turtle ship from the 16<sup>th</sup> century had the head of dragon fitted in the bow.



The head of dragon was used for awe-inspiring and frightening the enemy and for spreading smokescreen, the naval tactics used for the first time in the world. The relevant passage from “Complete Works of Ri Sun Sin” runs: “The head of dragon fitted in the bow is 1.28 metres long and 0.9 metre wide. It opened its mouth and belched fog-like clouds of smoke

of burnt sulphur and nitre, leaving the enemy helplessly embarrassed. Its upper side had two loopholes for gun fire and its underside two doors, which had a loophole on either side.”

The mouth of the head of dragon was opened only in battle.

## Protruding Rudder

The turtle ship had two rudders attached as a means of controlling its swinging from side to side and ensuring its safe, higher speed.

In world naval history, the advent of powder weapons led to the introduction of cannon-fire tactics, in which case speed rather than veering counted most. This necessitated a leaner, longer shape of vessel.

But there is a limit to the length of vessel, for when a long ship rides the crest of the wave or the trough of the sea, its hull might be broken by the moment of force acting on either side of the central vertical plane. Now it becomes clear that the above two problems were fully considered by the inventors of the turtle ship with long, protruding rudders. The rudders worked as a sail on stern.

## 4) Fittings and Building Techniques

### Fittings

The fittings of the turtle ship consist of anchors, helm, oars, sails and mooring outfit.

It had an anchor each to port and starboard. The chains of anchor were 75 metres in total length and 19 millimetres in diameter, and the two anchors weighed 462 kilograms in all. The chains of anchor were operated by a hand windlass.

In the medieval vessels, the helm was mounted mostly in the stern. It was the same with the turtle ship, whose helm weighed 378 kilograms.

The turtle ship had ten oars each to port and starboard, as well as two sails.

A relevant passage is found in the book “On the Defence of Sea” by Hua Yu of Ming China. It runs: “The turtle ship of Korea has sails that can be erected or lowered, and it can sail freely even in the onrushing wind or in low tide.”

The pole mast with sail was lowered in battle and erected when sailing.

There were two wooden mooring poles each to port and starboard, in the bow and stern.



## Building Techniques

As stated above, the turtle ship was a fine creation both in terms of technology and military art. Its merits of reliability, seaworthiness, offensive and defence capability are closely linked to its building techniques.

The methods of its construction are fundamentally different from those of an ordinary wooden vessel.

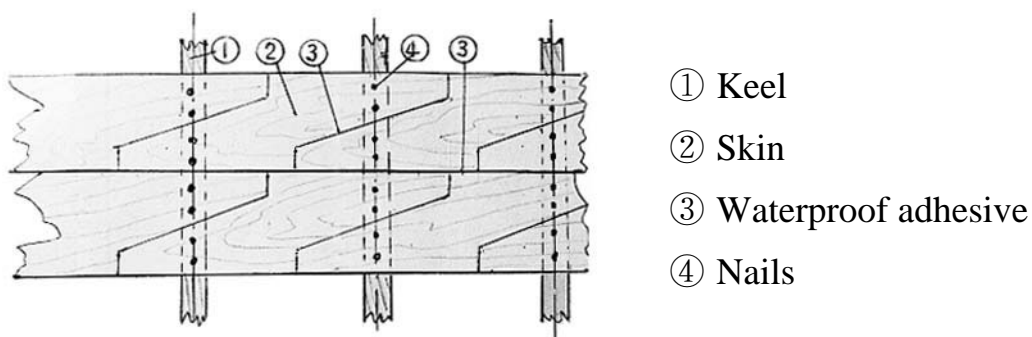
Different are the methods of joining its thick planks together and those of joining planks with the materials for the framework from those in other vessels and its caulking materials are of a new kind.

The inventive method of planking means that of piecing together the planks 894 to 1 192 millimetres long with both iron and wooden nails driven through drilled holes; it is entirely different from the previous practice of boiling the planks, curving them and joining them with iron nails.

The planks used for the turtle ship are 11.92 centimetres thick. The boards of that thickness are impracticable to be boiled and curved for hull assembly. It would be very difficult to attain a curve of a specified length, width and height, as well as the smallest seams.

No matter how much curved the skins of hull, each of its several sections—if it is so divided—has a nearly straight plane. In this sense, hacking the long planks into many shorter ones and joining them together like a mosaic was an ingenious conception.

The figure shows an assembly of hull planks by applying the inventive method of planking.



The present ingrained practice of using planks with a thickness of 40 millimetres in wooden-vessel construction is accountable to the need of their curving. The vessel shape has a curved plane of a certain length, breadth and

height, which can hardly ever be attained without steaming the planks. This necessitates a limit on the thickness of skins. Any wish for a larger thickness to make the hull more solid is restrained by the difficulty of curving. Omission of this curving allowed a thickness of up to 120 millimetres for the turtle ship. This was an entirely new method that immensely facilitated shipbuilding as it dispensed with the limits on the thickness of planking and with their curving.

The quality of wood for vessel construction, ancient or modern, must meet the following technical requirements:

First, the wood must be free from any internal and external flaws such as decay.

Second, the wood must be easy of sawing, cutting and planing. This is particularly important for the above-mentioned, new planking method that requires drilling many big holes for nailing.

Third, the wood should be knotless and even-grained. Wood is anisotropic material unlike iron, an isotropic material. Wood is made up of cellular tissues enclosed in thick membranes. The properties of timber are determined by different structures of membranes. Its hardness is varied by differences in the layout of cells.

It was out of regard for these criteria that Korean ancestors mostly favoured spindle trees, fir trees, elms and black walnuts for vessel construction.

Adhesives are indispensable for caulking joints and waterproof.

The major caulking materials for the turtle ship were lime, mainly composed of calcium carbonate. In Korea rich in limestone, lime had been widely available in different sectors since the ancient times, for instance, for stopping over the seams of ancient-tomb stone walls and for the reinforcement of graves. Over thousands of years, the lime reinforcement of graves became cemented for solid waterproofing.

Lime is divided into quicklime and slaked lime.

Quicklime is produced by pyrolyzing hydroxide, carbonate and other compounds of calcium.

Slaked lime is produced by hydrating lumpy or powdered quicklime.

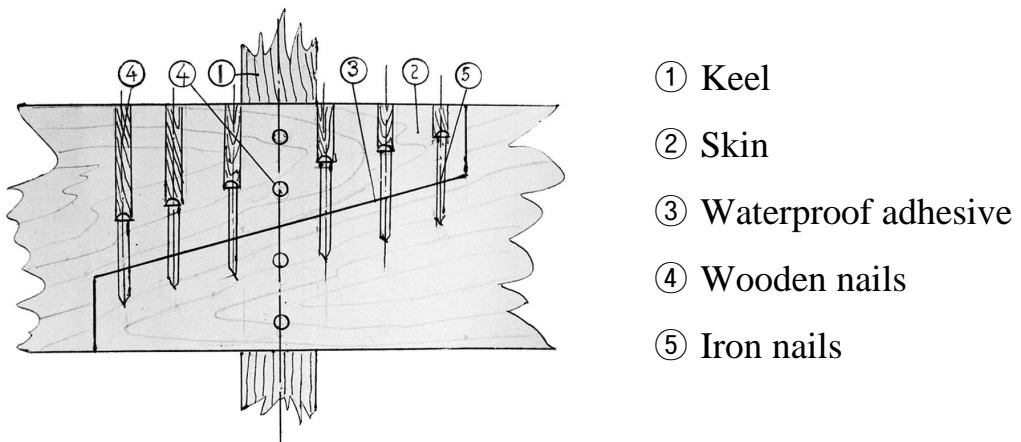
The turtle ship was caulked by getting the kneaded slaked lime absorbed on the surface of planking.

The adhesion of lime to wood was an invention of turtle ship builders, and it became the starting-point of later developments over hundreds of years toward cement coating for preservation against decay.

Another feature of turtle ship building was plank-joining by iron nails and the prevention of decay of iron nails by wooden nails. Its planks had a great thickness and a breadth of at least 300 millimetres, and they could be pieced together only by iron nails with a diameter of at least 10 millimetres, but never by wooden nails.

The iron nail, however, will go to decay by seawater, which will cause the breaking away of seams under crushing pressure. In order to forestall this vulnerability by blocking the contact of iron nails with seawater, wooden nails were added in the turtle ship.

The figure shows the arrangement of wooden and iron nails



There was also a carbonating process, that is, the process of scorching the surface of planks.

The hardening of slaked lime is marked by carbonating. The scorching of planks by smoke and the caulking by lime were the result of Koreans' age-old inquiry and experience. Slaked lime, in moisture, reacts to carbon dioxide in the atmosphere to beget calcium carbonate. But this reaction is very slow, because carbon dioxide makes up an infinitesimal 0.03 percent of the atmosphere.

Therefore, for speedy hardening of slaked lime, the Koreans adopted carbonating, the singeing of planks.

A relevant passage is furnished by the Japanese book "History of Navy in Korean Waters," which reads: "The turtle ship was very solid also

because of its unique building techniques related to planking. The thick planks, each 894 to 1 192 millimetres long, were holed before being nailed together, and their seams were caulked in such a way as to appear as watertight as the surface of earthenware.”

### 5) Internal Arrangement and Capability

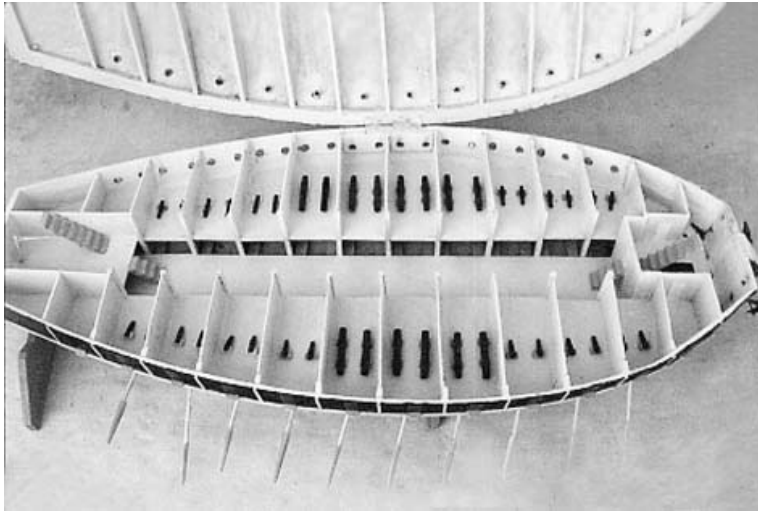
“Complete Works of Ri Sun Sin” contains the following record on the internal arrangement of the turtle ship:

“There were guard railings along the deck to port and starboard and a beam was fixed across the bow on the railings, looking like a harness on the neck of a draught ox. Boards were placed under the railings, on top of which was spread another layer of boards that supported a second line of railings. The height from the lower to the upper railings was 1.28 metres. ...

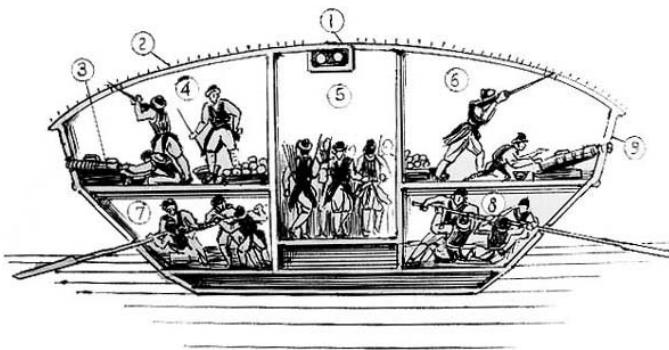
“On the lower deck were 12 cabins and bunks each to port and starboard; two of them for the storage of hardware, three for cannon, bows and arrows, spears and swords and the other 19 for the seamen’s quarters. On the upper deck, there was a cabin for the captain to the left, and another for the officers to the right. The seamen were in the lower-deck cabins for rest and in the upper-deck ones for battle.

“On the upper deck, there were 22 loopholes and 12 doors to port and starboard. The head of dragon had two loopholes on the upper side and two doors on the lower side, with a loophole on either side of each door. “The lower deck as well had 12 loopholes to port and starboard, as well as flags with an inscription ‘Turtle Ship’ raised.”

The figures show the internal layout of the turtle ship as described by the original record.



Cross section of turtle ship



Vertical section of turtle ship

- ① Iron-clad deck
- ② Spikes
- ③ Gun
- ④ Compartment for gun
- ⑤ Gangway
- ⑥ Compartment for gun
- ⑦ Cabin
- ⑧ Cabin
- ⑨ Shied

Its internal arrangement was geared to seaworthiness and action.

The interior of a seagoing galley should be laid out in such a proper way as to hold all supplies and hardware in its limited space.

The interior of the turtle ship had two decks with two openings in between. Its compartments were connected as in a long trench for ready

movement in battles and prompt conveying of orders. There were separate cabins for the captain, officers and seamen.

The arrangement of 72 loopholes for cannon and musket fire to port and starboard was geared to attaining maximum firepower— successive fire from muskets, bows and cannon—in consideration of the time needed to charge each cannon with powder.

This feature was quite suited to medieval naval warfare, rarely to be seen in foreign galleys in the Middle Ages.

The interior of the turtle ship was designed in such a way as to boost its capability. It epitomized the assiduous and disciplined lifestyle of the Koreans.

The capability of a vessel boils down to its restoring force, seaworthiness and veering power.

The restoring force means the property of a tumbler, that is, the ability to regain balance from a careening position. The secret of this ability is that the center of its mass is on its bottom. This property is one of the major capabilities of a man-of-war, as well as a merchant vessel. It was true particularly of the turtle ship that emphasized rapid manoeuvrability and ramming in battles.

The maximum restoring force requires that the center of a vessel's weight be as close as possible to its bottom. The center of weight of the turtle ship was only at 1.4 to 1.5 metres from its bottom or lower deck was stowed with weaponry and ammunition and the seamen's quarters. This figure changed little in battle when the seamen were on the upper deck, because the hold was still occupied by oarsmen, hardware, arrows, powder and service supplies.

According to a calculation, the weight-centre of an empty turtle ship was of 2.7 metres from its bottom, a relatively small figure compared with its height of 5.2 metres.

In addition, the turtle ship of the simplified shape was seagoing even in low tide, with no risk of striking a reef. It also had little tendency to roll or rock, because the outer boards of the gunwale cause high resistance to rolling and the shape of the stern reduced the extent of rocking. This advantage made a notable contribution to accurate cannon fire.

Further, the outer boards of the stern shaped like a bird-tail gave a boost to the vessel's stability in the given direction of sailing.

Seaworthiness means a set of necessary features for navigation, including speed.

The turtle ship had a considerably greater speed than other galleys in its days. Its unique shape enabled it to plow through the shallow sea and maintain a fast rate.

Moreover, it had ten oars each to port and starboard and a total 80 men controlling them, i.e. four men for each of the oars; this allowed for a certain speed even with lowered sails. The oars were the main propeller, the sails playing a supporting role. Throughout the history of sailing from the ancient times, the oars are the simplest and the most stable and reliable propeller.

The turtle ship had a normal speed of 4.27 knots and was capable of about 7 knots in action, or 1.5 to 1.7 times the normal figure. This was an extremely high speed in the 16<sup>th</sup> century world.

The “Encyclopaedia of Shipping” published in Russia records, in the passages about the speed of European galleys of the 18-19<sup>th</sup> century, that a galley, 35 to 40 metres in length and with 50 to 60 oars, could sail at 5 knots at maximum.

The veering power of a vessel is of great importance for navigation, particularly for battles. It is defined by the veering radius of a vessel. It was represented in galleys by steering outfit, mast and sails, and the shipside propeller—oars.

This was also true of the turtle ship, which, moreover, as a galley closed by iron shield, offered less space exposed to the wind than other types of vessels in sailing and veering. Also, its mast and sail, lowerable as it was, gave little resistance to veering. Therefore, swift and smooth veering was far from a top concern for the turtle ship, unlike other galleys. The ship also offered the sailors perfect, all-round fields of vision and fire.

As stated, this formidable man-of-war was favoured with an effective internal layout and, therefore, with an advanced level of capability.

### 3. Armament and Tactics of a Turtle Ship

#### 1) Armament

##### Weapons

The weapon emerged in the course of endeavours to conquer nature dating from the dawn of human history, and gradually developed into a means of war effort. By the Middle Ages, it underwent rapid advancement with the invention of gunpowder.

The medieval naval wars were fought by ramming and boarding the enemy vessel, wielding spears, swords and shooting arrows. These tactics gave way to cannon-fire warfare after the invention of gunpowder.

The turtle ship mounted various types of cannon.

The powder weapons on board it were the result of an independent research dating back to the period of Three Kingdoms of Korea (Koguryo, Paekje and Silla—Tr.). The invention of gunpowder had a direct bearing on the development of powder weapons.

The research on powder and its use in Korea started in the period of Three Kingdoms before it was perfected in the light of fresh experiences by Choe Mu Son of Koryo in the 14<sup>th</sup> century.

In October 1373, Choe obtained nitre and mixed it with sulphur, finally making powder. In October 1377, he petitioned the Koryo feudal government to set up an agency called *Hwathongdogam* for the manufacture of powder weapons, where he helped produce various types of cannon, shells and flaming arrows in large numbers.

Powder weapons were first placed aboard vessels in 1380 towards the close of Koryo Dynasty, 33 years before the emergence of turtle ships.

A relevant mention is made by Volume 114 (Biography of Rase) of the classic “History of Koryo” that records: “In August 1380, 100 gun-armed warships led by Sim Tok Bu and Choe Mu Son burnt and destroyed 500 Japanese vessels which had intruded into the waters off Jinpho.”

This battle off Jinpho was the first ever cannon-fire naval action in world history; it was the starting point of mobile gunfire tactics and naval bombardment.

According to historical records of European sea battles, cannon fire was first applied in 1571 in the Battle of Lepanto Strait, an engagement between



the allied Venetian, Genoese and Spanish forces and the Ottoman fleet. The mobile gunfire tactics was exploited for the first time in 1790 in the Battle off Kerch where Ushakov of Russia vanquished the Ottoman fleet.

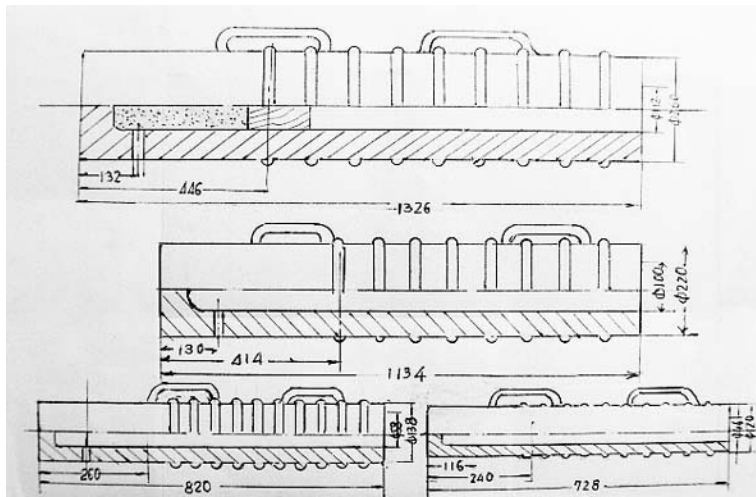
The guns of the turtle ship were an advanced version of those employed in the battle off Jinhpo.

Its armament consisted of various types of guns called *Chonja*, *Jija*, *Hyonja*, *Hwangja*, *Sosungja*, *Taesungja*, *Jillyo*, *Taebalhwa*, *Taewangu* and *Jungwangu*; cannon balls called *Jangphyon*, *Cholthanhwan*, *Taejanggun*, and *Janggun* as well as flintlock firearms.

An evidence is found in “Complete Works of Ri Sun Sin”, which mentions: “The turtle ships fired different types of cannon such as *Chonja*, *Jija*, *Hyonja* and *Hwangja*, and other vessels gave a volley of fire from *Jija*, *Hyonja*, *Jillyo* and *Taebalhwa*.”

*Chonja* was the largest gun of medieval Korea, a muzzleloader into which a long streamlined ball (*Taejanggun*) or a round lead-coated, cast-iron shot was loaded and from which it was fired at a low angle.

The names of cannon, *Chon*, *ji*, *Hyon* and *Hwang*, denote their numbers, derived from the first four of the 1 000 Chinese characters. Their respective structures and measures are shown in the figure.



Structure of guns

top—*Chonja*, middle—*Jija*, below—*Hyonja* (left),  
*Hwangja* (right)

Their typical shot was *Jangphyon*, a wooden ball shaped like the present-day rocket 3.6 metres in length and 0.077 metre in diameter and with three iron-plate wings 1.2 metres long, and an iron-tipped head 0.909 metre long. It was hurled over a range of 545.4 metres from the hold of the second and third banks.

*Jillyo* was a gun dating from the Koryo Dynasty, a cannon with a round, lidded wooden barrel. The barrel was stuffed with a powder-box and ignition box surrounded by nitre, and the powder-box was topped by dried wormwood over a layer of small iron shots.

A spark first caught the ignition box, which effused gas, making the barrel recoil a short distance. Then the flame passed over to the powder-box, and the expanding internal pressure blew the lid open and then became reduced, but the combustion of powder continued. The flaming ball was hurled and struck the target, exploding and giving off iron shots.

*Wangu* was a muzzle-loader from which *Jinchoroe*, a ball with the action of a time-bomb, or a round stone ball was hurled at high angle. The turtle ship was also equipped with smoking facilities.

## Shield

A shield has a long history from the remote past and is still available in immensely developed and varied versions.

The ancestors employed two kinds of shield, hand shield (for personal protection) and fixed shield (for group defence). To the category of the latter belonged the shield of the turtle ship, i.e. its iron-clad shell, of which a detailed account is made in the foregoing section about its hull.

The early use of iron was an event of special note in naval history. Moreover, the iron shell was installed on the turtle ship by an original method.

In the medieval times, it was impossible to form an armoured hull of iron plates at least 50 millimetres thick welded together. Instead, armoured plates of great thickness were joined together exactly like a mosaic.

The shield of the turtle ship consisted of a deck shield, shields to port and starboard, and another covering the bow, which were proof to arrows or bullets. The flaming arrows and cannon balls hurled from the enemy vessel intent on “torching tactics” could in no way penetrate the shields.

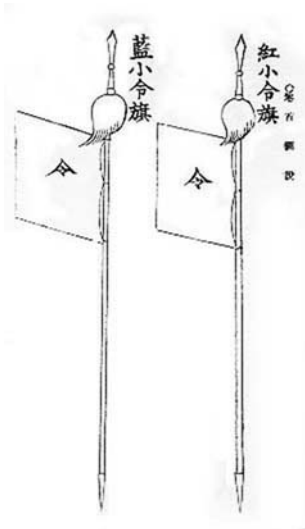
## Signal System

The signal system in medieval sea battles was represented by flags waved for visual sight among the vessels.

The flag-signal system of the turtle ship was compact and rigid. In use were five types of flags—one for conveying the admiral’s order, another for discipline, two for issuing orders, still another for signaling a charge, and five for direction of the ship’s movement.

The admiral’s flag was inscribed, on the front side, with a letter meaning “Order” and a front view of a leopard in half size, and on the back side, with a letter meaning “Admiral” and a back half view of a leopard.

The flags for discipline had written on it a message that every soldier should be punished to death when he does not obey the orders.



As for the two flags for issuing orders, there were red and blue flags.

The charge-signaling flag, inscribed with white letter meaning “charge” against the black background, was hoisted in the stern when the need arose.

Red and blue flags for orders



Signal flags



Charge-signaling flag

The five flags for directions of movement had five imaginary animals—*Hwangryong* (yellow dragon), *Chongryong* (blue dragon), *Paekho* (white tiger), *Jujak* (phoenix) and *Hyonmu* (tortoise)—painted on the background of five colours: the yellow flag with *Hwangryong* signified the middle direction, the red flag with *Jujak* forward movement, the blue flag with *Chongryong* veering to the left, the white flag with *Paekho* veering to the right, and the black flag with *Hyonmu* backward movement. This signal system proved effective for the conduct of battles on orders from the flagship.

## 2) Tactics

### Cannon Fire

The turtle ship, with intensive firepower of guns, was always at the forefront of an onslaught, overpowering the enemy vessels. Its mainstay was cannon fire.

In those days, the guns were stuffed with powder and loaded with balls before they were fired by setting fire to powder. This resulted in slow shot and short-range fire. To overcome this defect, the turtle ship mounted a greater number of guns.

As was already stated in the section about its internal arrangement, it had a total of 72 portholes for gunfire on the both sides, bow and stern, a step designed for salvos of fire in consideration of the time needed for loading each gun. Its battery also comprised diverse calibers, which facilitated gunfire both in assault and pursuit.

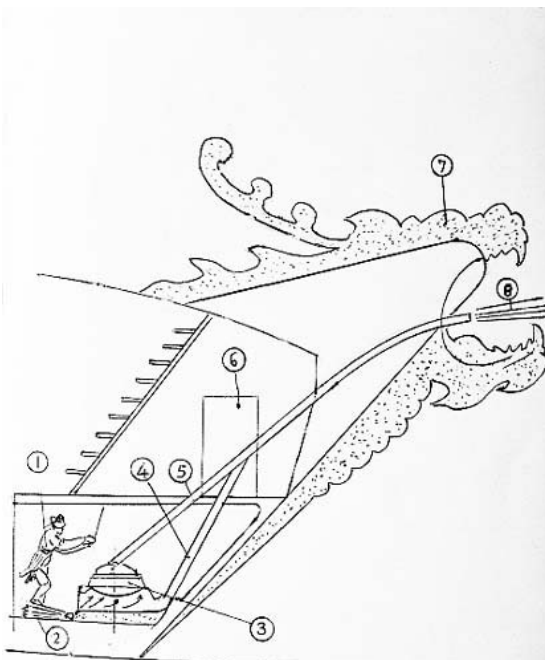
As “Complete Works of Ri Sun Sin” puts it, “the enemy trying to board were thrust by swords and spikes (dotting the iron-clad shield—Tr.), and those in their encircling movement were deterred by volleys of fire from all directions of the ship.” The classic, in the section about the battle off Roryang on November 19, 1598, mentions: “The turtle ship was first ordered to move through the enemy fleet, firing all types of cannon. The showers of balls thundered, shaking the heaven and earth. Countless were the enemy casualties and the enemy fleeing, dragging the wounded.”

This great firepower assured a vanguard role of the turtle ship during the Imjin Patriotic War, in which the Korean navy sealed all battles, major and minor, with victory.

## Smokescreen

The second aspect of assault tactics of the turtle ship was its first ever employment of smokescreen in the world.

As already mentioned, the mouth of the head of dragon mounted in the bow spouted flaming substances and thick smoke, blinding the enemy and making them puzzled as to the exact location of the ship. The smoke was that of burnt sulphur and nitre.



- ① Seaman
- ② Foot bellows
- ③ Cauldron
- ④ Smoke stack
- ⑤ Smoke pipe
- ⑥ Airtight box
- ⑦ Head of dragon
- ⑧ Smoke

### Principle of smokescreen facilities

Nitre is powder which gives off black smoke in combustion. It is a mixture of kalium nitrate (or acetic acid), sulfur and powdered charcoal, that is, black powder in which kalium nitrate acts as the oxidizer, charcoal as the combustable and sulfur as the ignition stimulator. It burns quickly but is far less powerful than smokeless powder or explosive invented in 1890.

Nitre was invented by Korean ancestors, but no evidence of the exact date is available, presumably before 661 when *Kwangyo*, a sort of powder

weapon, was in use. An ancient medical classic of Korea mentions the use in medicine of nitre, the principal ingredient of powder.

In this sense, Choe Mu Son's brainchild in the reign of Koryo was a re-invention of powder. The smoke of burning powder blurred the vision of the enemy and its acrid smell severely affected their breathing.

The Korean ancestors, deserving the credit for invention and improvement of powder, used for smokescreen the smoke of burnt nitre and sulphur. This method was first used by the turtle ship.

There is a record of ancient Romans hurling combustibles (pine resin) onto the enemy vessel and torching it, but no mention is available about any examples of employing smokescreen as the means of assault in those days.

According to the official record of the world's naval history, smokescreen was first applied by the Russian navy in November 1914, later by the British in March 1915 and by the Germans in April 1916.

## Ramming

The tactics of the turtle ship also included ramming.

The turtle ship was from the period of transition from boarding war to gunfire war, and so embraced the tactics of both wars. But it abandoned boarding, and only rammed and damaged the enemy vessel before destroying it by gunfire. The enemy had no way of boarding the ship, dotted with swords and spikes.

As stated earlier, the ship was favoured with a solid structure, which prevented any damage in ramming.

Relevant passages are found in "Complete Works of Ri Sun Sin", which follow.

"After encountering the enemy fleet, the turtle ship was dispatched as an advance guard after its shield was shrouded by purple eulalias to conceal the swords and spikes dotting it. The enemy, when trying to crawl aboard, were wounded by the sharp spikes and were deterred in approaching by salvos of fire bursting from the ship. This proved decisive for victory in major and minor battles.

"The turtle ship first rammed the underside of the bank of galleon and then destroyed it by hurling cannon balls through the mouth of the head of dragon.

“The turtle ship with the charge commander on board rammed again its underside and sank it with gunfire.” (Japanese vessels were multi-banked)

The tactics of ramming traced its origin back to the Koryo Dynasty.

As the Japanese book "Shoyugi" had it, “the Koryo warship was designed to pierce the enemy vessel with an iron horn projecting from its front side,” and “The Koryo man-of-war was deployed for the unique tactics of rapidly approaching the side of an enemy vessel, ramming it below the waterline for eventual sinking and then giving battle.”

The ramming tactics had been available to some extent in ancient Greece and Rome.

In conclusion, the turtle ship was the most reliable, formidable battleship in its days as it employed a set of tactics—gunfire, smokescreen and ramming.

## 4. Imjin Patriotic War and Turtle Ships

### 1) Imjin Patriotic War and Korean Navy

The Imjin Patriotic War was a war of Korea’s resistance to Japanese invasion from 1592 to 1598. It is so called because it was started in the year of *Imjin*, and it is also called Imjin Japanese Expedition.

The Korean people turned out and put up tough resistance to the invading Japanese samurais, demonstrating their resourcefulness and courage and defending national dignity.

By that time, Toyotomi Hideyoshi had put an end to 100-year-long feudal civil wars and effected unification of the country. Now he went further and harbored a wild ambition of dominating Korea and Ming China. He sought, by staging wars of aggression, to put more territory and people under his control and also to defuse the critical socio-class crisis at home.

After years of full-scale preparations, the Japanese invaded Korea by surprise on April 13, 1592 with 158 700 ground troops and tens of thousands of sailors.

The Koreans rose to cope with this national crisis, determined to defend national sovereignty.

The war went largely in three stages. The first stage was from April 1592 when the invaders landed in Pusan to June 1593 when the Korean people and soldiers threw the marauders back from deep in the territory and

drove them into the narrow region of Kyongsang Province on the south coast.

The Japanese strategy envisaged overrunning Korea with a pincer attack of ground and naval forces: the former would be the main thrusting force, and the latter would overpower the Korean navy in the South Sea of Korea and make a detour through the West Sea of Korea to back up and finally converge with the advancing infantry.

Pusan and Tongnae were the first areas to be attacked, and the local people and soldiers offered stiff resistance, inflicting considerable losses. But finally, the numerically superior Japanese forced a landing there and occupied Ryangsan, from which they thrust northward in three directions.

The government of the Ri Dynasty concentrated its forces on the middle direction, hoping to roll back the enemy from the Sobaek Range area, the border of the three provinces of Chungchong, Jolla and Kyongsang. But its defence tactics miscarried because of the ineptitude of commanders including Sin Rip, and the defence line was ripped through.

The Japanese overran the capital of Seoul and pushed deep into the territory.

The corrupt and inept feudal rulers, instead of organizing defence by drawing on the high-running patriotic zeal of the people, fled the capital even before it fell and hurried northward.

On the strength of their surprise and military superiority, the Japanese made rapid inroads, taking Pyongyang in the west in mid-June and striking North Hamgyong Province in the east in July.

Japan's quick victories over wide areas in the early stage of war were accountable to insufficient defensive measures on the part of the depraved Korean rulers and to the hopeless inefficiency of the government troops as a result of the extreme slackness of the military system.

However, the Japanese drive left many pockets of the locals' resistance behind, and finally they were surrounded by them as they pushed deeper. They also made a strategic error by dispersing their forces, which gradually threatened their unit-to-unit coordination and overstretched their supply routes.

With the passage of time, the tide of war turned against the invaders, and the resistance grew fiercer both on land and at sea.

The Korean navy under Admiral Ri Sun Sin won the first signal victory in the battle off Okpho in early May 1592, and gained further victories. In



their first sortie, the Koreans sank 44 Japanese vessels and inflicted heavy casualties.

In their second sortie from late May to early June, they launched turtle ships in raging assaults in the major battles off Sachon and Tangpho, sinking and destroying 32 Japanese vessels and killing and wounding thousands of soldiers including a dozen unit commanders. In their third sortie in early July, they wound up the Battle off Hansan Island, widely known as “Great Victory off Hansan Island” as well as the battle off Angolpho, in which 101 Japanese warships were sunk or destroyed and 9 000 men drowned.

These daring ventures scuttled the Japanese strategy of “ground-naval pincer attack”, gave the Koreans full command of the sea and posed a grave threat to the rear of Japanese infantry. Thus the tide turned in favour of Korea.

Meanwhile, on land the civilians and the dispersed soldiers got together in the units of volunteers and dealt a series of severe blows to the enemy across the country. This patriotic struggle, together with brilliant naval victories, made a notable contribution to breaking the offensive power of the Japanese.

In step with the counterattacks on land, the combined fleet of three provinces—Kyongsang, Jolla and Chungchong—under the command of Ri Sun Sin destroyed over 100 Japanese men-of-war in the battle off Pusan on September 1. This dash led to consolidating the earlier major victory off Hansan Island and tearing to pieces the Japanese plan for pincer attack.

By the turn of 1593, the Korean army went over to counteroffensive on all sectors of the front. On February 6, 1593, the fleet of the Jwasuyong base of Jolla Province commanded by Ri Sun Sin cleared the port and converged with the fleet of Kyongsang Province in the waters off Hansan Island and, on February 8, with the fleet of the Usuyong base of Jolla Province, before debouching into the waters off Onchon Island and storming the enemy unit in Ungchon by an amphibious operation. This feat was rare to be found in the history of sea battles in the Middle Ages and was later to influence the development of military art at sea.

Sustaining a crippling blow, the Japanese were driven to bay in the narrow coastal basin of Kyongsang Province: they had to take a breathing space hoping for a renewed expansion of aggression. In July the war was in stalemate.

The second stage of war lasted from the battle in defence of the Jinju Fortress in June 1593 to the eve of resumed Japanese aggression in January 1597.

The Japanese took the Jinju Fortress after a siege that cost them heavy losses. The wretched aggressors finally sued for peace, in order to wrest time for recovering their losses and making renewed preparations for invasion.

Some rulers of the Korean government, however, pinned their great hope on the “peace talks” and behaved with utter lack of decision, only making the Japanese more arrogant and willful.

The Korean people, always wary of Japanese designs, made patriotic initiatives and endeavours to boost the country’s defence power, developing powerful new weapons and building or repairing the fortresses. During the armistice, the Korean forces grew considerably in strength and armament, securing material guarantees for repulsing re-invasion and winning ultimate victory.

The third stage of the war was between the resumption of Japanese full-scale invasion in January 1597 and the naval battle of Roryang in November 1598 in which the Korean navy struck a fatal blow to the Japanese.

After speedy preparations under the cover of “peace talks” the samurais launched re-invasion in 1597, hurling a force of 145 000.

By then, Ri Sun Sin had been dismissed from his post of naval commander of the three provinces by the underhand plots of some bureaucrats who were obsessed with factional strife. He was replaced by Won Kyun, who was incompetent and underestimated the Japanese and finally lost the bulk of his fleet in the naval battle off Chilchon Island in July.

The tables were turned, however, by major victories in the ground battle in Jiksan and the naval engagement off Myongryang (Uldol).

In the Jiksan battle in early September, the Korean army struck a deadly blow at the advance party of the enemy, breaking the spearhead of the Japanese ground forces and paving the way to overall counteroffensive.

Ri Sun Sin, who was re-appointed as naval commander in August, foiled an assault of 330 Japanese men-of-war with his dwarfed fleet of 12 vessels in the battle off Myongryang in September, destroying over 30 vessels and 4 000 men. This daring feat again thwarted the Japanese strategy of ground-naval pincer attack and earned the Korean fleet renewed command of the South Sea of Korea.

The Japanese beat a full retreat, and the Koreans launched overall counteroffensive, winning a number of battle including the siege of the Tosan Fortress in Ulsan. The Korean navy staged containing operations.

In September 1598, the Korean army made general offensive in three directions—eastern, central and western. Its strength had grown to 95 000 but that of the Japanese, cornered on the south coast, was 80 000. The Japanese in the Sin Fortress of Sachon and the Tosan Fortress of Ulsan were unable to hold out any longer and they escaped by sea on November 17 and 18.

The enemy were totally routed from Kyongsang Province. Those in Waedari, Sunchon, Jolla Province, however, could not flee in the face of the Korean navy's strong blockade, and they asked for help from their unit in the waters off Kyongsang Province. To rescue this unit, which was under the command of Konishi, some 500 Japanese vessels pressed toward Roryang on November 19, 1598.

The Korean fleet commanded by Ri Sun Sin sank and destroyed 200 galleys and killed nearly 20 000 men. As the battle was drawing to a close, Ri was killed by the bullet of the enemy. This battle of Roryang dealt a crushing blow to the main force of the Japanese navy and Konishi-and Shimaz-led army units.

The triumph signified the brilliant conclusion of the Imjin Patriotic War.

To conclude, the war was an extremely fierce showdown in all stages, it was a testing ground to distinguish between patriotism and treason, and during it Korean people full displayed their patriotism, self-sacrifice and resourcefulness.

The Koreans emerged victorious from the seven-year-long hostilities, first of all because the patriotic-minded people and soldiers, the principal agency of war effort, fought with self-sacrificing courage to defend national sovereignty and dignity.

The Japanese surprise and numerical superiority brought about the early critical stage of war, but its tide was finally reversed by Korea's nationwide resistance. The civilians organized volunteers' units to harass the invaders, and raised grain crops to ensure supplies for the combatants, thus making great contribution to war victory.

Another factor of victory in the war was that the Korean army overcame the early military superiority of the Japanese and gradually overpowered them in the way of military technology as well.

After the start of war, the army grew rapidly in strength across the country, with the massive joining of patriotic-minded civilians in volunteers' units and government troops. The people's patriotic zeal and creative wisdom led to the development of musket, twin-barreled flintlock, *Pigyokjinchonroe*, *Hwajon*, iron ball, different types of cannons and vessels, the turtle ship as the world's first iron-clad galley in particular. The Koreans thus became superior to the Japanese in terms of strength and armament.

An important contribution to war victory also came from brilliant military commanders such as Ri Sun Sin, Kwak Jae U and Kim Ung So.

Korea's triumph in the Imjin Patriotic War is of immense historic significance in that it led to the defence of national sovereignty, dignity and honour and that it scuttled the Japanese designs of conquering Ming China as well as Korea, going a long way to Asian security and peace. The war recorded a brilliant page in Korea's medieval history of resistance to foreign aggression.

The following table lists major victories at sea scored by the Korean fleet spearheaded by turtle ships, under the command of patriotic Admiral Ri Sun Sin.

No	Date	Battle	Enemy vessels sunk
1	May 1592	Battles off Okpho, Happho and Jokjinpho	44
2	May 29	Engagement off Sachon	12, 1 captured
3	June 2	Encounter off Tangpho	21
4	June 5	Action off Tanghangpho	26
5	June 7	Battle off Ryulpho	8
6	July 8	Battle off Hansan Island	59
7	July 10	Battle off Angolpho	42
8	August 25-27	Battles off Jangrimpho, Tadaepho and Sophyongpho and Jolyong Island	24
9	September 1	Battle off Pusan Port	Over 100
10	March 1594	Battle off Jinhae-Tanghangpho	31
11	September-October	Battle off Jangmunpho-Yongdungpho	2

12	September 16, 1597	Battle off Myongryang	Over 30
13	February-March 1598	Battle off Kogum Island	16
14	July- August	Battles off Jori Island and Kogum Island	Over 50
15	November 19, 1598	Battle off Roryang	200
Sum-total			Over 660

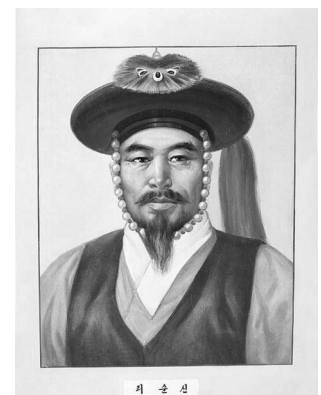
## 2) Admiral Ri Sun Sin

Admiral Ri Sun Sin was a great inventor of the world, as well as a brilliant admiral. In those medieval days, he led the construction of war galleys of advanced technical standards and helped complete turtle ships, the world's first iron-clad galleys based on a sum-total of centuries-old technical achievements.

He rendered unparalleled services for the development of the Korean navy and the victory of the Imjin Patriotic War.

He was born the third son of Ri Jong in Seoul in 1545. From childhood, he was clever and industrious, absorbed in book learning and practicing martial arts at the same time. His elder brothers, admiring his fervent inquiry and believing in his great promise, advised him to apply his mind to Confucianist studies. But he was not content with reading Confucianist Scriptures only; he also turned his attention to delving into military science and practicing martial arts. Finally, in 1576, when he was 31, he passed the government-sponsored military service examination.

By that time, the land and other feudal systems of the early Ri Dynasty had disintegrated, and the centralized feudal system was going bust. The rulers had become a phalanx of inept and rotten snobs; they were dissolved in depravity and corruption, bent on exploitation and oppression of the people and factional strife, and obsessed by sycophancy to big powers.



Ri was burning with hatred, more than anyone else, for the factional strife that was ruining the country, and was closely concerned with measures for national defence. He gave a wide berth to the officials steeped in power struggle and knew so few of the dignitaries; he was appointed to a low-ranking post despite his top marks in the government examination, but he stood clear of currying favour with higher-ups.

Once Defence Minister Kim Kwi Yong approached Ri and told him to marry his daughter, but Ri rebuffed his proposal, declaring: “Why should I, already in officialdom, depend on an influential family?”

When he was in service as Manho (a military official post) of naval force of Palpho, the provincial naval commander Song Pak ordered him to cut off a paulownia tree in the courtyard of his office for the making of *komungo*. Ri refused to obey, saying, “The wealth of the country cannot be put to personal use.” This put up the back of the commander, but he broke down in the face of Ri’s upright and stout character.

In 1586 when Ri was 41, he was assigned to Manho of Josanbo to protect the Tuman River from the incursions of the Nuzhen tribe and he was doubling as an officer in charge of the soldiers’ farming for their own food supplies. His unit was so small, and he asked the provincial military magistrate for reinforcement more than once, but the latter always gave him a deaf ear.

In the autumn of that year, the Nuzhen tribe surprised Josanbo, breaking through weak defence and going on a plundering and harassing spree. Ri rose against tough odds, commanded the soldiers in the van and routed the marauders, employing subtle tactics. The provincial military magistrate, however, green with jealousy, conveyed the government a false information of Ri’s “defeat”. Ri was removed from his post to become a rank-and-file soldier. But his unusual sense of patriotism was not to be ignored for long.

Later, he was promoted to assistant military magistrate of Jolla Province before going through a succession of appointments as magistrate of Jongup (1589), then of Jin Island and of Karipho. In 1591, he was placed in command of the navy controlling over the left half of waters off Jolla Province.

With a keen insight into the prevailing situation, he anticipated an expedition of Japanese samurais and channeled all efforts into beefing up the navy. He took measures to reinforce his fleet, secure food supplies and

build up armament. Of particular benefit to this task was the construction of turtle ships, the world's first iron-clad galley. Thus, before the outbreak of war, the Korean navy got fully prepared for countering any invasion.

When the Imjin Patriotic War broke out, the feudal rulers took to their heels, instead of resisting the Japanese. But Ri Sun Sin stood firm, determined to wipe out the invaders at the cost of his life. His patriotic commitment finds expression in his poem that runs:

*At moonlit night on Hansan Island  
I'm seated alone in the seaside pavilion  
With a long sword slung across my hip.  
My heart laden with bottomless cares,  
Suddenly a singing voice comes from nowhere,  
Tearing my whole guts with racking grief.*

All the sweeping victories of the Korean fleet under his command rolled back the Japanese design of "ground-naval pincer attack" and made a notable contribution to turning the tide in favour of Korea in the early stage of the war.

Upset by its overwhelming power, the Japanese committed a huge force to Jolla Province from the close of 1592, hoping to strike at the rear of the Korean fleet and carry out their pincer-attack plan. This prompted Ri to dislocate the Jwasuyong base at Ryosu Port to Tuulpho of Hansan Island in July 1593. At this time, he was placed in the naval command of the three provinces.

During the ensuing armistice years, he adopted containing tactics, at the same time doing his utmost to boost the fleet's combat preparedness as the invaders had not yet been totally routed. In January 1597, when the Japanese resumed aggression, the Korean government fell hook, line and sinker into their feint and the sinister scheme of Won Kyun, naval commander controlling over the right half of waters off Kyongsang Province who was racked with jealousy of Ri's meritorious services. It ordered Ri to sail toward Tsushima and attack the advancing Japanese.

Ri refused to move, perceiving the recklessness of this campaign. He was instantly dismissed, arrested and sentenced to death on false charges of conspiracy with the enemy.

But public opinion was firmly on the side of him, and its mounting pressures led to his release. He was sent as rank-and-file soldier under the command of provincial military magistrate Kwon Ryul.

After replacing Ri as naval commander for the three provinces, Won Kyun was hoodwinked by a Japanese feint and thus sustained a crushing defeat in the waters off Chilchon Island in July 1597; he himself was killed, and the Korean fleet was nearly annihilated.

In this virtual lack of naval defence, the Japanese fleet swept through the South Sea of Korea on its way into the West Sea of Korea, and the Japanese army took Namwon and was striking northward.

The Korean government, dismayed by its naval defeat, had no option but to restore Ri to naval commander in August. Ri found only 12 vessels and 200 men left, but it never deterred him. The government urged him to fight on land for the time being, in consideration of the navy's stranded situation. But he dug his heel in and wrote to the King, saying:

“The enemy has had no guts to attack the two provinces of Jolla and Chungchong since the year of Imjin (1592), mainly because our navy has been blocking their passage. Still, I have a force of 12 battleships, with which I can hope for victory if I fight with all my strength till my death. If, at this juncture, we gave up the navy, this would be a huge relief to the enemy, and they would finally force through Chungchong Province and get on the Han River. I'm apprehensive over this prospect. My force is so small, but I, though a humble hand, am still alive, and the enemy will not dare look down on our fleet.”

Ri grappled with tough odds and buckled down to combat preparedness. He moved his naval base to Jin Island of Jolla Province and concentrated on strengthening the fleet.

The Japanese dispatched 330 vessels to destroy the Korean fleet at one stroke.

On September 16, 1597, Ri engaged them with his 12 galleys in the Strait of Myongryang (Uldol), sinking over 30 vessels and killing over 4 000 men. After this brilliant feat, he stepped up the build-up of his fleet. In February 1598 he again moved his headquarters at Pohwa Island to Kogum Island (in Wando County, Jolla Province), and subsequently gained a string of victories over the invading Japanese fleet.

In March, he destroyed 16 enemy vessels which had intruded into Kogum Island, in July the fleet which attacked Jori Island (in Posong



County, South Jolla Province), and in August over 50 vessels at Kogum Island.

In May 1598, Toyotomi Hideyoshi sued for “peace”, unable to continue with the hopeless war, but was rebuffed by Korea. His heart broke, and he died in August. Finally, broken down under the wheel of tough resistance, the Japanese attempted a full retreat by sea by sending 500 vessels.

Ri countered by blocking their passage, determined to let not a single enemy return alive.

Driven into a tight corner, Konishi, commander of the Japanese advance guard, sent him bribes, begging for a passage of escape. Ri flew into rage and rejected his pleas. “I need no more of enemy’s things,” roared he. “We already have had mountains of swords and firearms of so many killed enemy since the year of Imjin. The Koreans only want the heads of the Japanese as their treasure, not this trash—swords and arms.”

On the morning of November 19, 1598, he ordered the entire fleet for action and ventured out into the waters off Roryang (in Namhae County, South Kyongsang Province), in a major, brilliant engagement that finally sealed the Imjin Patriotic War. He commanded the fleet at the risk of his life through the fierce battle, and towards its close, he suffered a mortal wound by an enemy bullet. He passed his admiral’s flag to Ri Wan, his aide and nephew, and said to him, before breathing his last; “The battle is at its height, so keep it secret that I’m dead. Command in my place.”

True to his behest, Ri Wan waved the admiral’s flag, stimulating the fleet to final dash. The Korean fleet wrapped up the campaign, and the seven-year-long war came to an end.

To this very day, hundreds of years later, Ri Sun Sin’s patriotic services in delivering Korea from national crisis go down in history, enshrined deep in the hearts of Koreans.