



## The Beginnings of Submarine Warfare

Colonel C. Field R.M.L.I.

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# THE BEGINNINGS OF SUBMARINE WARFARE.

By COLONEL C. FIELD, R.M.L.I.

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" (For near a spacious river's bank we stood)  
A bark emergent rose; with oars well-tim'd,  
Cut the smooth wave, and o'er the surface skimm'd;  
Then sunk again, but still her course pursu'd;  
Clear was the stream, and all beneath we view'd."

—From "*The Scribleriad*."  
By Richard Owen Cambridge  
(1718-1802).

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PRIOR to the recent great war, submarine navigation had never developed beyond an initial stage. But the idea of attacking an enemy's ship from under water can be traced through the Middle Ages right away back to classical times. The forms of attack may be roughly divided into three:—

1. Individual attack by divers without any apparatus.
2. Individual attack by divers provided with some primitive contrivance for the supply of air while under water.
3. Attack by submarine boats.

Before proceeding to consider the little that history has to tell us about these early attempts at under-water warfare, it may be stated at once that, up till quite modern times, some of these forms of attack remained, as far as can be ascertained, little more than projects, and even the few statements that have come down to us of actual submarine attack must be received with the proverbial grain of salt.

We know, from many authentic accounts, that pearl-divers can dive to a considerable depth and remain under water for an astonishing time without the use of any apparatus other than the lungs with which nature has provided them. In the Pacific Islands, where children learn to swim almost before they can walk, it is a common accomplishment to be able to swim for a considerable distance under water. So when we read of the feats of the divers of antiquity I think that we may accept at least a modicum of these accounts as having a basis of fact.

Thus there is no inherent improbability in the story of the effective operations of the divers of Tyre against Alexander the Great when he laid siege to their city in the year B.C. 332. His ships, when anchored off the city, had their cables cut by the enemy's divers and were set adrift, and when he endeavoured to "bottle up" the harbour by a huge stockade or breakwater these expert submarine warriors contrived to destroy it.

One of the most famous of such divers was Scyllis of Scyone, some of whose exploits are recounted by Herodotus. He first appears as a diving expert in the army—or navy—of Xerxes when he set out to conquer Greece. Whether that monarch got any good out of him is doubtful, for it is related that he deserted to the Greeks and brought about the destruction of many Persian vessels. Taking advantage of bad and stormy weather, he and his daughter Cyane—an equally accomplished diver—approached the Persian Fleet, and, diving and swimming under water, the pair contrived to cut the cables of several ships which the gale then drove to destruction. According to Pausanias, this famous exponent of the art of diving, when he deserted from the Persians, swam no less than eighty stadia under water, from Appetæ to Artemisium. As a stadium was equal to 606 feet 9 inches English measure, this would mean something over eight miles! I do not think we need try to swallow this part of the story. Herodotus says that *his* opinion is “that he came to Artemisium in a boat.”

Thucydides takes us even farther back. He tells us that at the celebrated siege of Syracuse, in B.C. 415-413, the stockade which defended the harbour was removed by the Athenian divers. These men cut through the timbers of which it was built close down to the bottom, causing them to float up to the surface, where they were towed out of the way by a party working from a specially protected raft.

The Romans, it is said, actually had a corps of “Urinatores,” or divers, but I have not been able to find any account of their use in submarine attack.

Philon, a Jewish writer born in Alexandria about 20 B.C., seems to have written a treatise on the use of divers in naval warfare. After suggesting the obvious fact that it was easiest for them to carry out their attacks under cover of the darkness, he puts forward the suggestion that they should not only employ the old tactics of cable-cutting, but should use augers to bore holes in the bottoms of the enemy ships.

This sounds a very tough proposition, but, whether or no it was ever carried into effect, we find plenty of references to this form of under-water attack all through the Middle Ages, and even in the 17th century. As late as 1841 it was considered a feasible project by the Chinese, for, according to an officer on board H.M.S. “Nemesis,” then engaged in operations off Canton, “several hundred divers were said to be in training, who were to go down and bore holes in our ships at night; or even, as the Chinese privately reported, to carry down with them some combustible material which would burn under water and destroy our vessels.”

The latter form of offensive would appear to be almost chimerical—to “set the Thames on fire” might seem to be easier, yet, if we may believe an old historian, a heavy stockade in the Seine was destroyed by similar means in 1203. “An engineer named Gaubert,” he writes, “a native of Mantes, found out how to keep alight, even under water, a kind of firework contained in earthen pots without any covering; and, as he also shared, with certain divers, the accomplishment of being able to cross a fairly wide river, swimming under water, he made use of this secret to set on fire the big stockade which defended

the approach to the Island of Andelys, which the army of Philip Augustus was attacking, and which he took before laying siege to Château Gaillard. For, whilst the enemy were making an assault upon the bridge which this prince had thrown across the Seine, and the whole attention of the besieged was concentrated upon this spot, Gaubert swam under water with his earthen pots full of fireworks, and, having reached the stockade, he set it instantly in a blaze. As the boats were all in readiness to transport the soldiers to the island, it was surprised on this side, and the garrison of the castle was obliged to surrender."

But to return to the use of the auger. In mediæval times this system of submarine attack was considered perfectly practicable. In a code of maxims, or rules, for the carrying out of naval engagements, which was universally known to the sea-warriors of those times, we find the following:—

"Let your divers with augers pierce the ship's sides; in order to hasten her destruction you must hurl great stones at the spot where the water is coming in." Valturius, a celebrated writer on warfare in the 15th century, recommends the same procedure, and in the French Navy, in the reign of Charles V., among the complements of its men-of-war, were "*seamen who know how to swim under water*," and it is stated that these were the men who, being expert in the use of the instruments called "*Perçoyeurs*," had the duty of scuttling an enemy's ship. When we come to consider early efforts in the direction of submarine boats we shall again find references to the use of the auger.

The form of attack remains as a tradition to the present day in the well-known ballad or "*chanty*," "*The Golden Vanity*." There are innumerable versions, but the gist of the story is that, it being necessary to sink an enemy galley—variously described as French, Spanish, or Turkish—the captain of an English ship—generally supposed to be Sir Walter Raleigh—offered a "*store*" of silver and gold and his daughter in marriage to anyone who would carry out the job. The "*little cabin boy*" volunteered for the desperate attempt. A modern version goes on to relate that—

"Then the boy bared his breast and straightway leaped in,  
And he held all in his hand an *Auger* sharp and thin;  
And he swam until he came to the Spanish ga-la-lin,  
As she lay by the lowlands low.

"He bored with the *Auger*, he bored once or twice,  
And some were playing cards, and some were playing dice;  
When the water flowed in it dazzled their eyes,  
And she sank by the lowlands low."

It is interesting to find that, in a very old version called "*Sir Walter Raleigh sailing in the Lowlands*,"<sup>1</sup> it is stated that—

"He had an *Auger* fit for the nonce,  
Which will bore fifteen good holes at once,"

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<sup>1</sup> In this version the ship is called "*The Sweet Trinity*."

while in another probably slightly later version we are told that before the boy went overboard, "they sewed him up tight in a black bull's skin," and that when he took out his *Auger* he "bored thirty holes at twice." One wonders whether in mediæval times divers really were provided with instruments capable of boring more than one hole at a time. Fifteen, the number mentioned in both the last-quoted versions, is of course out of the question. In yet another version the hero died when he got back on board his own ship, and it was *then* that—

"They sewed him up tight in a black bull's hide,  
And they hove him into the sea to go down with the tide."

Cable-cutting tactics were, however, not lost sight of. At the siege of Bonifacio by the Spaniards in 1420 the heavy boom, protected by five anchored ships with which they had closed the harbour mouth, was broken by the ships of a relieving squadron, which engaged the five defending vessels. "At length," to quote an old writer, "a skilful diver, armed with a helmet on his head and a scimitar slung to his side, threw himself into the sea, and, swimming under water to the enemy's ships, cut their cables; which, being thus loosed, fell foul of one another with great destruction."

We will pass now to the earliest accounts of special diving dresses and similar apparatus for enabling divers to stay longer under water than was possible when they had to depend only on the staying power of their lungs.

To the exploits of certain divers at the siege of Tyre by Alexander the Great we have already referred. According to Aristotle, some kind of air-supplying apparatus was also used upon this occasion, which he likens to "the trunk of an elephant." Pliny, too, has a story of some of a very similar nature, while centuries later the celebrated Friar Bacon, who seems to have been something between a wizard and an early scientist, wrote that apparatus *could* be made to enable people to walk under water, and asserts that "such instruments *were* made in ancient days, and also in our own times."

When Acre was besieged by the Crusaders a submarine apparatus of this kind was the means of getting a diver into the city with a message from the outside world, if we are to credit the account of Bohaddin, an Arabian historian, who lived about 1150. We find very queer pictures of what purport to be diving dresses in manuscripts of the Middle Ages and in one of the earliest printed books—Valturius' "Art of War." Referring to the quaint wood-cuts in the latter work, a modern French authority has written:—

"The warriors of the sea were always distinguished for their intrepidity and boldness, and it is easy to believe that from them emanated the systems of maritime warfare that in the 15th century gave birth to a series of extraordinary inventions in nautical weapons."

The earliest picture of a diving dress that I have been able to find occurs in a 14th century MS. in the Imperial Museum at Vienna. The helmet, or head-piece, is supposed to be of metal and is apparently provided with glazed eye-holes. The rest of the figure being painted

*black* is taken to mean that the dress was made of leather. In order that no one should make any mistake as to which part of the picture the artist intended for water and which for terra firma, he has introduced various fishes and quadrupeds. The black colouring, to denote leather, is also used in a drawing of a couple of under-water warriors which is—or was—at Castle Ambras, in the Tyrol. Curiously enough in none of these three figures is there anything indicating a tube communicating with the surface, though one of the latter is equipped with a gourd or flask which may be supposed to contain air.

Valturius has a couple of wood-cuts of divers, one armed with a mace and shield and dressed in an ordinary warrior's helmet, and a costume probably intended to represent leather. The other has no apparatus except a flask, presumably containing air. He also gives a picture of what is stated to be a diver's helmet. In the background of this picture appears the figure of a man armed with a battle-axe and wearing a similar kind of head-dress. He is an active fellow, for he has caught a fish with his hand, although—strange to say—his helmet has no holes for the eyes.

Neither has the helmet in the fore-ground. What is the explanation of this remarkable omission? If a guess may be hazarded, the answer is that Valturius was copying from and endeavouring to improve on the drawing in the manuscript of the previous century that has been already referred to. For in that MS. there is another drawing of a *swimming jacket* provided with a tube for its inflation which is practically the facsimile of Valturius' diving helmet. Place the two side by side and one cannot but come to this conclusion. The only difference is in the straps and buckles. In the original drawing the oval part of the jacket was to be applied to the breast, the rectangular part to the back, and the two strapped together. When inflated, by blowing into the leather tube, the jacket would enable the wearer to float, but he could dive under water if he allowed the air to escape. It is the same idea as that depicted in an ancient Assyrian carving at Nimrud; but more elaborated. Now it is suggested that Valturius, having determined to annex the picture for his book as an illustration of a diving helmet, eliminated the buckles on the oval portion and put a couple of them on the straps of the lower part to give the idea that they were for the purpose of fastening it to the rest of the diving dress. But, strange to say, he hesitated to make the necessary and obvious addition of eye-pieces.

Writers of somewhat later years probably copied their diving suits from Valturius' wood-cuts, but supplied the deficiency by adding eye-holes. They probably said, as did the Chinaman when asked why "eyes" were always painted on the bows of a junk, "Suppose no have eye, how can see?" Such pictures appear in a work by Ludwig von Eybe zum Hartenstein, published early in the 16th century, in a work on gunnery by one Diego Ufano, published in 1613, and in "*Metaphysica, Physica atque technica Historica*," by Robert Flud, published in 1617. In the picture of a diver crossing a river in the last mentioned, the air tube leads directly from the diver's mouth,

but from the position of the figure we cannot tell whether the author intended that he should be able to see or not.

It seems quite possible that such diving dresses never really existed before the 17th century, except in the imagination of various authors and artists. For, prior to Luttrell's account of an experiment with a diving helmet invented by the Duke of Schomberg, there appears to be no definite record of such an event. Wearing this apparatus, a man, he says, walked some way along the bottom of the Thames on September 7th, 1692. Moreover, the celebrated Leonardo Da Vinci, from whose fertile brain proceeded many inventions and suggestions for mechanical apparatus, of which he left a great number of drawings, seems to have made only one suggestion to facilitate the work of divers, the apparatus proposed being merely a hollow bamboo, the lower end of which could be fastened tightly to the mouth, while the upper was supported by a circular float. Had such diving dresses as those referred to by Valturius had an actual existence, Da Vinci was not a man likely to be in ignorance of the fact, and would hardly have put forward such a primitive invention as his bamboo tube.

Having dealt with early diving and diving dresses, we come now to the inception of the submarine boat. The way in which Alexander the Great was hampered by the divers of Tyre has already been referred to, but he himself is also said to have employed divers for warlike purposes. Moreover, if we may give any credence to legends which were, in mediæval times, prevalent in Europe, and are even to-day recounted in the villages of India, he not only took an interest in submarine matters, but he himself descended to the bottom of the sea in a closed vessel variously described as a Glass Barrel, a Glass Globe, and a Glass Box or Cage. There are innumerable mediæval MSS. giving what purport to be true histories of Alexander, and his descent into the depths of the sea forms the subject of many quaint illuminated pictures. In India, to the present day, he is always referred to as the "Two-Horned Alexander," and, curiously enough, in some of the monkish MSS. of the Middle Ages, though he is not personally adorned in this way, his charger is.

One of the earliest accounts of his submarine adventure is to be found in an Ethiopian version entitled "The History of Alexander. Belonging to the Holy Saviour of the World." According to this, "he went into a cage of glass which was covered with asses' skins, and which had an opening which was closed with chains and rings, and he took with him such food as was needful—and took two of his friends with him." He told his friends that he expected to be away for 100 days. "At the end of 70 nights," goes on the chronicle, "God commanded the Angel who had charge over the sea, saying, 'Everything that the Two-Horned shall command thee, hearken thereunto, and take and deliver him from all evil, and keep every evil thing away from him and everything which can terrify him in the billows of the sea.'"

The angel seems to have arrived in the nick of time, as "the ark in which the Two-Horned was sailing" was beginning to be broken up by the sea.

The angel, having secured Alexander's safety, went on to ask him whether he would not like to see the wonders of the deep, and on his reply, "Yea, my lord and messenger of God Almighty," proceeded to call up what was apparently our old friend the sea serpent, or rather a succession of him. Even the first monster beat all modern records. He was a regular procession, since Alexander sat watching him pass for two days before he saw "the tail and hinder parts." "What do you think of that?" said the angel, and, Alexander having expressed appropriate amazement, he proceeded to summon Sea Serpent Number 2. This one was "black as a cloud"—and passed quite close. It took Alexander two days and two nights to see the end of *him*. However, the angel said that he would go one better even than this, and brought up another monster. "Pass thou by the Two-Horned quickly," ordered the angel, "like a flash of lightning." Even at this speed he took three days and three nights to pass the patient Alexander, who, one would imagine, must have been bored to death by this time, and presently, after some further conversation, he must have been greatly relieved when the angel said, "'Lift up thine head that thou mayest see a wonderful thing,' and he lifted up his head and behold he was nigh to his troops who were in a ship."

There are also one or two Greek versions of the story, one of which says that Alexander's real reason for exploring the depths of the sea was to get pearls—a more business-like theory, which may have had a foundation in fact.

A typical mediæval version runs somewhat as follows:—

Alexander ordered his "cunning men" to make him a box of "great sheets of green glittering glass" bound with "great girths of iron," and to "bind great chains to it." It was then taken to sea in a boat, and Alexander, getting inside, "quickly shut the wicket, and his princes painted it with pitch so that no water might come in at the joints, and in a moment he entered the deep with a heavy plunge. There he saw fish whose figures he had never dreamed of, with forms diverse and horrible, and creeping things and four-footed things crawling on the sea bottom, and feeding on strange fruits of coral and sea-weeds and trees growing on the sand and sea-ooze. Great monsters came sailing up to the sides of the cage and looked in and turned away affrighted, and other sights he saw such that he would never tell to any man till the day of his death, for they were so horrible that tongue could not tell or man hear them told and Alexander fell down on the floor of his vessel of glass and lay there for a time without life." The enterprising monarch was nearly coming to grief altogether, for one of his friends in the boat inadvertently let go the chain. Overcome with horror at his carelessness he threw himself overboard that he might die with his master. However, as luck would have it, the heavy chain fell on and smashed the glass box, and, miraculously escaping both the heavy chain and the broken glass, Alexander shot up to the surface and was rescued.

If we except a story that Lucullus sent a messenger from a besieged port in a distended goat-skin,<sup>1</sup> in which the blockading fleet mistook him for a fish, the earliest mention of an actual submarine boat occurs in an old German poem entitled "Salman and Morolf," dating from about 1190. It is, of course, a romance only, but the idea is there definitely enough. The story deals with the adventures of one Morolf, a conjuror, who had incurred the wrath of King Solomon. A price being put upon his head he escapes from that sovereign's fleet in a leathern boat caulked with pitch, which enabled him to disappear beneath the waves. As the boat was supplied with a long air-tube, he contrived to lie snugly at the bottom of the sea for a whole fortnight, by which time, presumably, the pursuit had blown over. It is a pity that the picture of this early conception of a submarine, which formerly adorned the MS., has been cut out and lost. It would have been interesting to have seen the 12th century idea of a "U"-boat.

The next reference to a submarine boat that I have been able to find occurs, not in a romance, but in Olaus Magnus' account of Scandinavia, written about 1555.<sup>2</sup> This writer, who, by the way, was Bishop of Upsala, declares that he had seen two such boats himself. This is what he says: "There are pirates in Gruntland (presumably Greenland) who make use of skiffs and boats constructed of leather for the purpose of going wherever they wish, either above or *below water*, and by their means they pierce and make great holes in passing merchant vessels. In the year 1505 I saw two of these leathern boats or skiffs in the Cathedral Church of Asloe, in the Western porch. They were dedicated to St. Haluard, and are said to have been taken by King Hakon while passing with his warships along the coast of Gruntland, when the pirates, by their wickedness, tried to sink his vessels." The Bishop probably wrote in good faith, but I strongly suspect that the boats he saw were kyacks, such as are used by the Esquimaux. The wood-cut<sup>3</sup> which he presents as an illustration, goes far to prove this theory. The boats are distinctly of kyack shape, there is no indication of submergence, and for concealment—very partial concealment at that—the redoubtable pirates rely, apparently, on a "camouflage" composed of what looks like bunches of reeds. These "bunches" *may* be intended for shields, but though placed as shields usually were in mediæval times, I have never seen a shield of their shape or appearance in any other drawing, illumination, or wood-cut.

Diving bells were invented about this period, if, indeed, they had not a much earlier existence among the ancients. But these were not intended, or indeed suitable, for offensive submarine attack. But Sir Francis Bacon, in his "Novum Organum," after describing a diving bell, adds: "I have heard also of a sort of machine or *boat* capable

<sup>1</sup> Can there be any connection between this story and the "black bull's skin" in the ballad of "The Golden Vanity"?

<sup>2</sup> "Historia de Gentibus septentrionalibus."

<sup>3</sup> "De nauibus insidiosis" is its title.

of carrying men under water for some distance." To what particular invention he refers is unknown, but there were two or three projects for submarines before 1620, the date of the first edition of this work, not counting the "insidious ships" of the Gruntland prototypes of our modern Huns. The Venetians are said to have used a submarine vessel to raise a galleon which had sunk in the Roads of Malamocco in 1559. Whether this "vessel" was a boat or merely some kind of diving bell or caisson is uncertain. In 1578 William Bourne, who had served in the Navy as a gunner under Sir William Monson, published a book called *Inuentions or Deuises—Very necessary for all Generalles and Capitaines, or Leaders of Men as wel by Sea as by Land.* In this little work we find set out at some length an Elizabethan seaman's conception of a submarine boat. "It is possible," he says, "to make a shippe or boate that may goe vnder the water vnto the bottome, and so to come vp againe at your pleasure. Any magnitude of body that is in the water, if that the quantity in bignesse, having alwaies but one weight, may be made bigger or lesser, then it shall swimme when you would, and sinke when you list." The description of the suggested submarine which follows is extremely verbose and somewhat involved, but it may be shortly described as being a small boat or "Bark," as he terms it, divided into three horizontal compartments or decks. The lowest one contained a good deal of ballast to reduce the flotation. The centre one had, apparently, water-tight bulkheads fore and aft. Between these bulkheads, the sides of the vessel were pierced with a number of holes for admitting the water. At the surface these were closed by a movable inner side which was held close up to the side proper by "A prouision of skrewes or other engines."

When the boat was to submerge these bulkheads were withdrawn towards the centre of the vessel, the water poured in, the displacement was altered, and she sank. There were waterproof leather connections, probably like the sides of a bellows or of a concertina, between the ship's side and the movable bulkheads, so that the water could not penetrate into the body of the vessel. To come to the surface, the procedure was to be reversed and the water expelled. There was a hollow mast for the provision of air when under water, and the inventor wisely suggests that "you must sound the deepness of the water and foresee that the water will not rise higher than the top of the mast." Access was obtained to the interior of the boat by "a hatch or skotel," which was to have "leather round about it, that you may bring it together as a purse mouth, and so with a small skrewe you may wind it so close together . . . that there shall no water come in." No system of propulsion is suggested, nor any means of egress for divers when at the bottom. So it is rather difficult to imagine what William Bourne intended his boat to perform. In 1596 we find a Scotsman, Napier of Merchistoun, claiming to have invented a submarine boat, but he gives us no description in support of his claim. He merely makes the statement that he had made four "Secret Inuentions; profitabil and necessary in their dayes for defence of the Iland and withstanding of strangers, enemies of God's truth and religion, besides

devices of *sailing under water*, with divers other devices and stratagems for the burning of the enemies, (which) by the Grace of God, and work of expert craftsmen, I *hope to perform*." A vain hope, if not a vain imagining.

But now at last we come to an actual submarine, really built, and which seems to have been able to travel under water for a short distance. The inventor of this early under-water craft was a Dutchman, Corneilius Van Drebbel, of Alkmaar, who is said also to have devised an "engine of perpetual motion," and so have had something to do with the invention of thermometers, microscopes, and telescopes. He is reported to have constructed two submarines, one larger than the other, about the year 1620, which were launched on the Thames. They were built of wood, strengthened inside with iron bands, and covered externally with tightly-stretched hides soaked in grease.

The larger one pulled twelve oars which passed through holes in her sides, and were made water-tight by leather sleeves attached both to the oars and the vessel's side. According to one account the balance between flotation and submersion was so fine that she could be kept below water by the oars alone, presumably used in the same way as the diving fins of a modern submarine. But another writer asserts that she was sunk by admitting water into tanks, and raised by dropping ballast. Possibly both systems were employed in concert. The same author states further that she was equipped with our old friend the auger, working in a stuffing box, and with torpedoes carried at the end of long poles. According to the "Chronicle of Alkmaar," published 1645, Van Drebbel "built a ship which one could row and navigate under water from Westminster to Greenwich, the distance of two Dutch miles; even five or six miles, or as far as one pleased. In this boat a person could see, under the surface of the water and without candle-light, as much as he needed to read in the Bible or any other book." Drebbel also invented what he called a "certain Quintessence," or chemical liquor, by which he was enabled to renew the air in his boat when it had become vitiated. It is even said that King James I., cautious as he was of his Royal Person, ventured on a submarine trip in Van Drebbel's under-water boat, and was so pleased with the invention that he had a replica built for presentation to the Czar of Muscovy.

It seems probable either that these two boats of Drebbel's, or other similar ones, were used against the French at La Rochelle in the Expedition of 1626. For instructions were given on January 26th of that year for Sir William Heydon, the Lieutenant of the Ordnance, to make "dyvers water mines, water petards, forged cases to be shot with fireworks, and *boates to goe under water*." I cannot help thinking that Drebbel must have been responsible for these. Then, on June 29th, comes an order from the Duke of Buckingham, who was to command the expedition, for these articles consisting of "360 fforged iron cases, with fireworks, 50 water mines, 290 water petards, and *two boates to conduct them under water*." We have no description of the boats or their subsequent use at La Rochelle, but we have the following account of the "Floating Petards": "The composition of

these petards was of latten (an alloy of 60 parts copper, 30 zinc, and 10 lead), filled with powder, laid upon certain pieces of timber, crosse which there was a spring, which touching any vessel would flie off and give fire to the petards." These embryo torpedoes were a dead failure. One succeeded in striking an enemy ship, but its explosion did nothing more than "cast water into the ship." Of the rest some were captured by the French guard boats before they reached their objectives, while one of them blew up prematurely as it was being dropped into the water from an English boat, killing a Captain Allen and seven of his men.

If the development of the submarine had stopped—as this brief account must do—with Van Drebbel's boats and the futile attack on La Rochelle, it would have been well for humanity. The perfected submarine has proved itself of comparatively little value in actual and recognized warfare. As an instrument for the murder of defenceless seafarers in unarmed or inadequately protected merchant ships it has, in the hands of the Huns, disgraced civilization by a series of crimes unparalleled in the history of the world. But against war-vessels equipped and prepared to deal with the submarine menace, it has been a failure. What successes it has gained against men-of-war have nearly always been under exceptional circumstances. At the beginning of the war the knowledge of its presence had some moral effect in keeping a certain number of surface ships in harbour, but latterly it was the submarine that feared to operate where warships were about and on the look-out for it. These, with the assistance of airships and aeroplanes, rendered the existence of an enemy submarine a most precarious one. The Peace Conference is said to have banned the construction of submarine craft or their use in war. If it is able to enforce its decree it will be all for the good of humanity, since such vessels are of no value to peaceful commerce.

The quaint craft illustrated is supposed by some writers to have been intended for submarine navigation, but it will be observed that no claim for submersibility is advanced in the description which is subjoined. Indeed, if we may credit a contemporary Dutch writer, it is very doubtful if the vessel was ever afloat. Its launch, he says, was arranged for July 6th, 1654, but at the last minute De Son announced that she would not be ready in time, as he was waiting for some piece of the ironwork. "Apparently," says the writer, "he never was able to find it; at any rate no more was ever heard of him." The date of this boat is somewhat later than the period covered by this article, but it is interesting as being the earliest picture now known of a possible submarine vessel.