During the first years of World War II Italian frogmen demonstrated to the world how effective a weapon a frogman could be. Hidden by the water, these frogmen mined the Allies’ ships as they were moored ‘safely’ in their own waters.

Even with quite small numbers, and using relatively small resources, the frogmen were a very powerful force. The English, especially, were quick to copy the equipment and train their own frogmen, and after the war many nations supplemented their armed forces with frogmen units.

The idea of such a weapon arose in World War I, when experiments were carried out using different vessels to carry mines into the Austro-Hungarian naval base in Pola. The weapon was developed during the inter-war years 1915.

While the war was raging on the battlefields of Europe, and submarines were terrorising the ships on the high seas, the Austro-Hungarian fleet and Italian fleet lay mostly well protected in their harbours, surrounded by mine-fields and anti-submarine nets. This passivity was, in the main, due to the ongoing submarine war.

In 1915, after Italy had severed its connections with its German and Austrian allies, and joined the English-French Alliance, Italian naval officers had thought long and hard about how the Austro-Hungarian fleet could be attacked in the harbour.
Targetting Pola
The desire to hit the Austro-Hungarian fleet in Pola was, however, undiminished, and much thought was put into possible solutions. Naval-lieutenant Raffaele Paolucci worked out a plan in 1918 whereby he was to be transported by motorboat to about a sea-mile out of Pola. From here he would swim into the harbour towing a mine. Under one of the battleships he would tie a four meter-long rope to the mine and thereafter sink it by letting the air out of its two floatation tanks. The other end of the rope was to be fixed to the hull of the ship. The mine, which contained about 100 kg of TNT, had an automatic timer, and would explode in about 4 meters of water close to the side of the ship. As soon as the mine was activated Paolucci would swim out of the harbour towards the outer breakwater and wait for the explosion. He would then swim out to sea and, with his back to the enemy, signal to the motorboat to pick him up.

Mignatta
After months of nocturnal swimming near Venice, towing a mock-up of the mine, he abandoned the project. Simultaneously with the efforts of Paolucci, Italian engineer and naval officer Raffaele Rossetti was working on a modified compressed-air torpedo, named Mignatta, which, half-submerged, would carry him and another crew member into Pola. The men, in diving suits, would sit astride the torpedo and steer it into the harbour and thereafter over to one of the battleships. Two mines, each of 170 kg TNT, were fixed to the head of the torpedo. The mines were to be hung in a 4 meter-long rope under one of the battleships. Rossetti had constructed a powerful magnet which should keep the rope fixed to the side of the ship.

Now or never
However, in October 1918, an armistice was in the offing, and it was obvious that it was now or never if the Mignatta was to see action. In the evening of 31 October, 1918, a motortorpedo boat from Venice set sail for Pola. On board were Paolucci and Rossetti and, on the deck, the S2 and a motorboat which would carry the two men and the Mignatta close in to Pola. At 22.13 the S2 was released from the motorboat and sailed in to Pola, which was reached at 02.00 on 1 November, 1918. In the harbour the two men passed three anti-submarine nets by pulling the S2 over them. Once inside the harbour they steered in between two illuminated battleships and directly towards the 21000 ton battleship Viribus Unitis. They fixed one of the mines and then rapidly sailed away – leaving a trail of silvery bubbles. On their course away from the battleship they were discovered, but before being taken prisoner they had managed to arm the second mine, and then left the Mignatta to its own devices. It wandered around in the harbour, and when the compressed-air was exhausted it finally came to rest against one of the ships.

War’s over - well almost
That they were not discovered before was due to the fact that it was a day
Dive History

thought to be no reason to keep the watertight doors closed. Immediately after this first explosion a second explosion was heard. It was the second mine, still attached to the Mignatta, that exploded directly against the side of the 7000 ton freighter Wien, and sent her to the bottom. Ten days after Viribus Unitis had been sunk Germany accepted the Armistice conditions, and World War I was brought to a close.

New weaponry
The attack at Pola was a success – the Italian fleet had obtained insight into a new weapon. The weaknesses of the weapon were that the crew were visible above the surface of the water, and that the compressed-air torpedo sent out a stream of air-bubbles. These deficiencies would have to be corrected so that an attack could be carried out with the torpedo and crew completely submerged, and without air-bubbles giving evidence of the attack.

The interwar years
In the interwar years another alliance was formed, an alliance in which Italy was not allied with England. Italy felt itself squeezed between the English fleet in Alexandria and the French fleet in Toulon. That England could rapidly reinforce their Mediterranean fleet with units from their Atlantic fleet didn’t make the Italian frustrations any the less. Italy needed a weapon that could reduce the scope of a possible blockade.

The First Frogmen
It was two Italian divers and naval officers, Teseo Tesei and Elios Toschi, inspired by Rossetti’s Mignatta, who would begin the development of the weapon that the world would come to know as “Frogmen”. However, before this weapon could be brought into service, diving suits, breathing apparatus and ‘torpedoes’ had to be developed.

Further developments
Teschi and Tesei served as engineers for the submarines at the naval base at La Spezia. The development and construction of an improved Mignatta started in 1935, and in January two prototypes were tested. Later in the year the new weapon was demonstrated, under the strictest secrecy, for the Admiralty in a dock at the La Spezia basin.

The Maiale
The weapon mostly resembled a torpedo but was in fact a miniature submarine designated SLC (Siluro a Lenta Corsa) with the nickname Maiale (the pig). The torpedo was 7.3 m long, including the explosive head, the diameter was 0.53 m, and two frogmen could sit astride it. The compressed-air motor had been replaced by a 1.1 HP electric motor. The power of the motor was later increased to 1.6 HP. In 1935 the explosive weighed 220 kg, but was later increased to 250 kg and thereafter to two amounts of explosive, each of 150 kg. The capacity of the batteries allowed a voyage of 5 seamiles at 2.3 knots or 4 seamiles at 4.5 knots. The torpedo had diving tanks which permitted the crew to increase or decrease the buoyancy. A separate compartment contained compressed-air tools to cut through a submarine net. A screen in front of the leading frogman protected the crew against the water flow. Behind the screen were the steering controls and the luminous navigation equipment. The maximum diving depth was 40 meters.

The crew wore waterproof Belloni suits (Vestito Belloni) constructed by Captain Belloni. The Belloni suit actually consisted of two suits, an inner suit of thin elastic rubber, and an outer suit of heavy canvas.
Rebreathers

The breathing equipment that was required in order to sail completely submerged, was initially a modified Davis jacket – an ascent jacket designed for submarine crews. The equipment had a closed-circuit system with manual control of the oxygen, and a potassium carbonate to absorb the carbon-dioxide.

Captain Belloni mounted a helmet with two windows onto the equipment and modified it with bigger chalk containers and a bigger oxygen supply, thereby obtaining a greater operational time. Later, a Pirelli daughter-company produced an oxygen apparatus ‘model 49’ for the unit. Dosing of the oxygen was now continuous, so that the frogmen did not have to keep filling oxygen into the breathing-bags. Model 49 was replaced in 1936 by Model 49/bis. This apparatus was employed towards the end of the Second World War after which it was replaced by ‘model 50’ from Pirelli. This apparatus had one large window. Its operational time was more than four hours.

At the same time, fast motor-boats (called MTM) were developed which could be steered towards enemy ships. The boat carried a 300 kg explosive charge which detonated on contact with the objective. At an appropriate distance from the target the rudder was to be fixed and the crewman to abandon the boat, which would then continue at a high speed towards the target.

The training of the crew started with great enthusiasm, but not everyone was convinced of the effectivity of the new weapon – what could two men accomplish against a battleship?

Opinions regarding the weapons were so strongly diverse that it was necessary to terminate the project, and the torpedoes, equipment and boats at the naval-base in La Spezia were hidden well away from curious eyes.
In 1938 commander Paolo Aloisi was promoted to head of the First Light Flotilla, which consisted of very fast boats. The Ministry also asked Aloisi to take over the torpedos as well as the MTM-boats. Aloisi quickly saw the possibilities in these weapons, and under his leadership both Maiale and the MTM-boats underwent several improvements.

In July 1939 the political situation in Europe was such that it was obvious that a war was imminent. As a consequence of this, the Naval authorities asked Aloisi to accelerate the development of the weapons and begin the training of the crews. The earlier pilots were transferred to the First Light Flotilla together with the new trainees. The carefully selected crew undertook a hard physical training as well as a thorough mental training.

The elite
Only the absolutely most suitable were accepted. Those that were found not to be suitable were returned to their previous unit with a diving certificate.

Free-swimming frogmen were also trained, these being designed Gamma-men. Their equipment was modified in several ways in order to make it easier for them to move under their own power. The suits were tight-fitting, and they had fins on their feet. The oxygen equipment had a smaller oxygen-cylinder with consequently a shorter operation time. The underwater operation time for the Gamma-men was about 40 minutes. The Gamma-men were trained to cover a distance of 6 – 7 km at a speed of more than 1.5 km per hour. The oxygen equipment was only to be used when they were close to the objective. As camouflage the Gamma-men had a net with seaweed over their heads. It was intended that the Gamma-men should be brought close to the objective by submarine or fast motorboat, or that they should operate from a neutral coast.

Minelaying
Two types of mine were developed, which the Gamma-men could carry around their necks or in a belt. ‘Leech’ was a mine with 2 kg of explosive. The mine was held under the ship by means of an inflated rubber bladder which held the mine against the bottom of the ship. When the mine had been placed the Gamma-man activated a detonator which detonated the mine after a given interval.

The other type of mine, the ‘Limpet’, contained 4.5 kg of explosive, and was fixed to the keel by means of a clamp. The detonation of this mine was arranged so that it would sink the vessel out in the open sea. The point at which the mine would explode was controlled by a propeller on the mine. The propeller first began to turn when the speed of the ship was above 4 knots. After a given number of revolutions, which corresponded to a given sailed distance, the mine exploded. The ship was thus sunk where salvaging of the...
and its cargo was impossible or more complicated than in harbour, and the suspicion of a frogman attack probably did not arise.

It was originally intended that the torpedoes should be launched from amphibious aircraft, but it was the submarines that were given the job. Several submarines had airtight containers fixed to their decks, each of which could hold a torpedo. The containers were intended to protect the torpedoes from damage from depth-bombs and from damage if the submarines were forced down into deeper water.

In containers on a sub
The submarine crew could either open the containers while the submarine lay awash at the surface, or they could exit from the submarine while it lay on the bottom and thereafter open the containers, pull the torpedoes out and start the operation. Both forms of launch were trained.

Attempts were made with short-wave radios with which the crew could find their way back to the submarine after the operation had been carried out. The trials were not successful and were thereafter dropped. It was realised that it would not be possible to bring the torpedoes and crew back with the submarine. The crew had to find a neutral coast and drop the torpedoes there. That the crew didn’t have to worry about getting back to the submarine would give them greater motivation for the operation.

The first practice attacks were carried out at the beginning of 1940. The objective was the cruiser Quarto which was anchored in the bay outside La Spezia. Three Maiales took part in the exercise, two of them broke down and couldn’t complete the exercise, but the third managed to place a dummy mine under Quarto.

A two-year break in the work on the weapons and in the training of the crew meant that the weapons were not fully developed when Italy declared war on England on 10 June 1940. The first attack with Maiale should have taken place on the night between the 25 and 26 August 1940 against the English warships in og Alexandria – but things turned out quite differently from what the Italians had hoped.

To be continued in our next issue.