# EARLY TORPEDOES AND THEIR CONSERVATION IN THE DEUTSCHES MUSEUM, MUNICH

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## FISH TORPEDOS - LITTLE SUBMARINES

The history of the torpedo of Robert Whitehead and his cooperation with Giovanni Biagio Luppis has been outlined in several publications.[1]

Reflecting the history of the automobile torpedo it may be of some interest to point out some possible connections and links between the ideas of Luppis to the contemporary efforts of the german inventor Wilhelm Bauer. From about the 1850s both inventors had been experimenting with small, unmanned submarine automobile vessels. Bauer had originally the idea to copy and imitate the diving actions of a seal by constructing an "iron seal", that was to be propelled by human power with the purpose to attach charges to enemy ships. Bauer started with a small model of about 700 mm length before his submarine "Brandtaucher" was built under considerable difficulties without sufficient financial support. The Brandtaucher had a length of about 8 m, and a beam of 2 m. It was propelled by the power of two men which was tansferred via a gear system to a propeller.[2] After a severe set back of his "Brandtaucher", which sank with a crew of three during the first diving experiments in the harbour of Kiel in 1850, he was forced to improve his ideas by again using smaller, unmanned test models. These models had also the purpose of representating his concept to possible supporters, mainly in the european navies of that time.

In the year 1852, Bauer demonstrated a clockwork model of a submarine in Trieste. During these trials, Bauer kept in contact with his model for security with a thin line. Here in Trieste, this model may – as a hypothesis- have found the also the interest of Giovanni Luppis. Bauer then moved to England, where he presented his model to Queen Victoria and Prince Albert in 1852, but lost it

1 For example Sueter 1907 and Smokvina 1993, see also general literature.

2 Röhr 1975, Herold 1993.

during the trials as the security line was torn. With the help and support of the Queen, Bauer returned to Munich and built a third model, which has survivend and now is being kept at the Deutsches Museum. (Fig 1,2)[3]

This model allows the comparison with the concept of Luppis (Fig 3,4). Luppis intention was not to develop a submarine, which was intended to return home after the application of a charge to a enemy vessel, but to design a self propelled "one-way" vessel, which was destroyed during the action of delivering the charge.

The outer appearance of both vessels shows the use of a streamline hull shape, generally used in ship design with a likely adaption of the natural form of fishes. This ressemblance between the two designs thus can be expected quite naturally. Further, the fact that both vessels were driven by a clockwork motor working a propeller at the stern, reflects the contemporary state of the art of mechanical propulsion.

Yet, there is one special device, which deserves our interest. From the experience of being trapped in a sunken submarine, Bauer had designed an automatic device to release ballast as soon as the vessel touched ground. It consisted of a lever at the lower part of the model, which, when triggered by grounding, via several links released metal ballast kept in a double row of compartments inside the vessel.[4] (Which also shows, that Bauer originally was not a naval architect, as a loose ballast keel would have been a simpler solution to this problem.)

A quite similar triggering device was used by Luppis at the bow of his model, though with another function. Yet the similarity of using such a rather uncommon lever system points to a possible connection of Bauer and Luppis.

This hypothesis of a link between Bauer and Luppis work is not raised for considerations of priorities, but of possible communication networks between inventors of new devices and weapons of military interest, which always were in the dilemma of either secrecy or the need to propagate their ideas to a possible "consumer" on the other side. This problem repeatedly occurred in the history of the torpedo, like between Whitehead and Schwartzkopff, as will be shown later. With regards to the relation of the concepts of Bauer and Luppis, the submarine that Bauer had intended, would have been unsuccessful in the end without the torpedo which was achieved by Luppis and finally Whitehead; a combination which proved its terrible efficiency in the first world war.

Bauer died in 1875, before one of the main problem of a successful submarine, an efficient propulsion engine, was solved.

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[3] DM Inv. Nr. 74463.

[4] Broelmann, Jobst: Der "eiserne Seehund" - oder das U-Boot im Vertreterkoffer. In: Meisterwerke aus dem Deutschen Museum, Bd. 3. München 2000, S. 8-11.

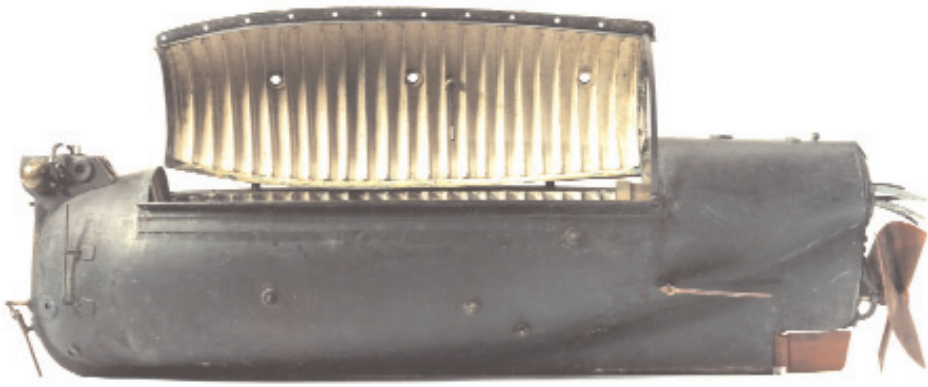

Fig 1 : Wilhelm Bauers functional model of a submarine, the upper watertight service hatch is lifted open

Fig 2 : Closeup of the ballast trigger

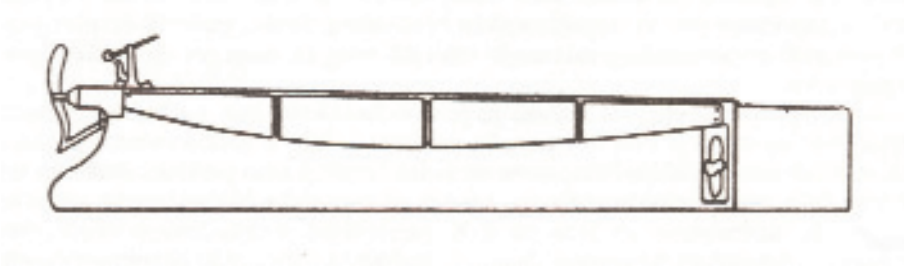

Fig 3 : Model of Luppis (1), on top a 16 inch torpedo, 1870 (3); Sueter 1908, 294.

Fig 4: Torpedo workshops in Eckernförde. Rössler 1984.

## THE WHITEHEAD TORPEDO IM GERMANY

By this time, about 1873 Whitehead had successfully taken up the development of Luppis in buildung such an unmanned, "selfdestroying submarine" and had offered this torpedo to the navies of Great Britain and Germany. The German Navy bought the specimen, which had been demonstrated personally by Whitehead in Wilhelmshaven. (Type Fiume Standard 1872, caliber 35 cm)[5]. Subsequently the commander of the German Navy, von Stosch, ordered 100 torpedoes of an improved type, which was a considerable boost for Whiteheads young factory in Fiume. These torpedoes of the type Fiume Mk I were delivered from 1876 and were classified in the German Navy as C/74 type, their caliber still 35 cm.

The further development of the torpedo and a spezialised carrier for this weapon, the torpedoboat, in Germany is linked with the name of Alfred von Tirpitz, (1849-1930), later German Grand Admiral. His influence on German naval policy began with his study of the potential of the recently invented torpedo and his consequent appointment in 1871 as chief of the torpedo division of the navy ministry.

From 1878 to 1880 he was commander of the special ship "Zieten", which was the first vessel to be equipped with torpedo launch tubes, and from 1881 till 1884 commander of the torpedo training vessel "Blücher". Finally, in the years 1885 till 1886 Tirpitz was in charge of the torpedo affairs of the admiralty and leader of torpedoboat flotillas.

Soon it was realised that the torpedos delivered by Whitehead in their state of early development showed poor results and proved unsatisfactory. Tirpitz during a visit to Fiume in 1877, where he saw the manufacturing of torpedos at its original site, and where he also met Robert Whitehead, negotiated that only half of the amount of torpedoes ordered earlier on had to be bought by the German Navy.[6] This was not a serious problem for Whitehead, as the general demand in other Navies had grown very quick. Tirpitz from now on turned to a national development with own improvements and production of torpedoes.

To take up own experiments and developments, suitable torpedo test facilities with shooting ranges were installed in Wilhelmshaven and Friedrichsort near Kiel, later also in Eckerförde, north of Kiel. The outline of the shootimg range in Eckernförde (Fig 5) shows some similarities with the torpedoinstallations in Fiume.

An independent german production of torpedoes was taken up by Louis Schwartzkopff, who had also visited the works in Fiume.There were rumours that Schwartzkopff had tried to get access to Whiteheads blueprints, but a study of the

[5] Rössler 1984,15

[6] Rössler 1984,18

international accessible Whitehead torpedoes themselves would have been a much simper and more appropriate approach for Schwartzkopff.

The main feature, that distinguished the Schwartzkopff torpedos now from those of Whitehead was the use of phosphor-bronze for the outer shell instead of steel, which was to subject to corrosion and demanded a lot of maintenance work. Apart from this item, the first Schwartzkopff torpedo proved inferior to the actual Whitehead types and the german firm, now Berliner Maschinenbau AG, had to untertake improvements in cooperation with the navy torpedo laboratories in Friedrichsort. As a result of this, new types were delivered to the German navy in 1883/84, of the type C/84.

In 1888 the C/84 type was improved to the C/84A type. Using fuller lines of its body, the displacement and thus weight and charge could be increased. Also alterations of the engine led to a increase in speed beyond 24 knots. (Other specifications are given in table I). This type of torpedo is also kept in the Deutsches Museum.

As the speed and the range of the torpedoes were increased continuously, an increase of the calibre was necessary, with a new calibre of 50 cm (19,7 in) of the G/7 type with a length of 7 m.

Table I [7]

| Type | C/84A | C/03 | G 7 |
|---|---|---|---|
| Year | 1888 | 1903 | about 1910 |
| Calibre | 350 mm | 450 mm | 500 mm |
| Length | 4652,5 mm | 5159mm | 7020 mm |
| Engine power | 25,2 hp | | 72/120 hp |
| Range/speed | | 3000/26 | 9300/27 |
| (meter/knots) | | | 4000/37 |

Around the turn to the 20th century, the arms race between the torpedo and its typical carrier, the torpedo boat, and the means of their defense by big warships had turned in favour of the latter.[8] Innovations such as searchlights, torpedoboat destroyers and rapid fire guns limited the effectiveness of the torpedoboats and the torpedo its elf. This situation coincided with the appearance of a basically reliable submarine, which after the earlier, but unsuccessful attempts of Wilhelm Bauer, had yet not been favoured by Tirpitz. Thus, around 1900, other nations like

France were well ahead and leading in the development of submarines, while the German navy hesitated to accept the submarine as a serious weapon. The initiative came from industrials like Krupp, who, in cooperation with a foreign engineer, built two experimental type submarines, which after trials were sold to Russia. Finally, the German navy had to join, and Krupps yard "Germania" received the order to build the first submarine of the navy, "U 1".[9] This boat was equipped with one 45 cm torpedo tube in the bow and altogether three torpedoes, but from "U 19" the equipment was updated to the 50 cm caliber.

## CONSERVATION OF TORPEDOES IN GERMAN MUSEUMS SINCE ABOUT 1900

The importance of building a fleet and rising a seapower at the beginning of the 20th century was reflected in the internal propaganda of the German Kaiserreich, its influence and education of the public and institutions like a maritime museum in the capital of Berlin. Here, the Museum für Meereskunde, opened in 1906. As emperor Wilhelm II, an enthusiast in naval affairs himself, had ordered all outdated or useless navy material to be collected in this museum, a number of the earlier torpedoe types were on display and made public at this rather early stage. Among these was the first Whitehead torpedo which had been demonstrated in Germany.[10]

Even in Munich, far away from any coast, the naval armament played a mayor role in public institutions.To win the interest of the emperor and funding of the Reich, the founder of the Deutsches Museum in Munich, Oskar von Miller, was quite aware to meet these imperial interests. Thus, he persuaded Kaiser Wilhelm to donate as a present of his Majesty a big elaborate cut away model of one of the latest battleships, named "Rheinland". (While this model was destroyed during World War II, another model of an equal elaborate style can be seen presently in the Vienna Military Museum.) Among the other systematic acquisition of maritime collection pieces like ship models, navigational instruments or weapons, the first mentions of torpeodos in the museums inventory books appear in the year of 1906. These torpedos donated then were obviously outdated for the purposes of the Torpedo Inspection of the Navy.

Following the didactical concept, according to which the function of every engine or museums artefact had to be explained to an ordinary visitor as a layman, the museums curator planned to prepare a cutaway from the torpedos, but the torpedo experts argued that essential parts woud be destroyed by cutting it

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7 Rössler 1984

8 Techel 52

9 Broelmann, Jobst: U 1 – die unsichtbare Waffe. In: Circa 1903. Artefakte in der Gründungszeit des Deutschen Museums. Ulf Hashagen ; Oskar Blumtritt; Helmuth Trischler (Hrsg.) Abhandlungen und Berichte/ Deutsches Museum: Neue Folge; 19; München 2003

lengthwise and suggested to use only some smaller openings in the outer skin of the torpedo, as they are still to be seen today. The mounting of the C/84A torpedo on top of a launching tube due to the restrictions of space in the museum represented a rather untypical view, though. (Fig 6)

After the first world war, Oskar von Miller seized the opportunity to save the veteran "U 1" for his museum and from the fate of being scrapped, according to the general orders of the Allies. In a rather tedious action, this 44 m submarine was brought to Munich and reconstructed in the museums basement. Again using the cut-up demonstration technique, it shows the torpedo installations in the bow section.

While the Meereskundemuseum in Berlin was destroyed and dissolved after the second world war, the torpedos in the Deutsches Museum have been kept. Finally, following the reunion of western and eastern parts of Germany in the 1990s, another institution worth mentioning für their torpedo collection is the Army museum in Dresden.

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[10] Most of this inventory was destroyed during World War II. In 2003 a new maritime department will be opened in the Deutsches Technikmuseum in Berlin, which claims to be the legal successor of the earlier Meereskundemuseum.

[11] DM Archive, Picture 856, 31392.

[12] DM Archive , Picture 50

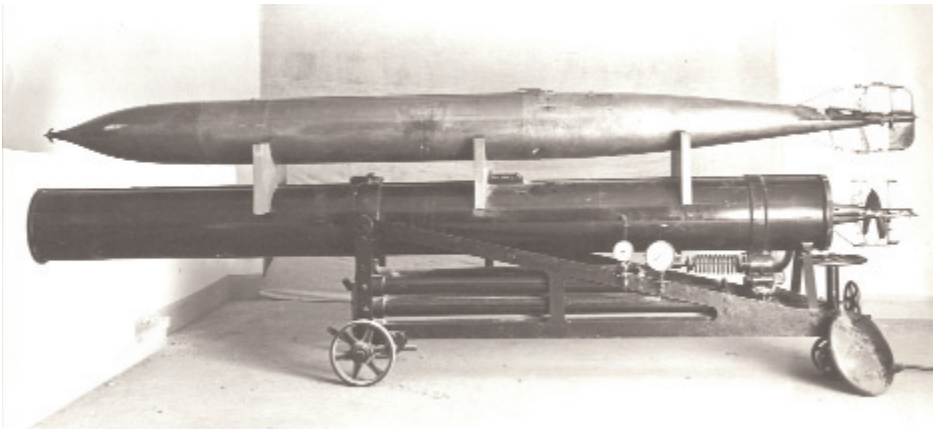

Fig 5: Torpedo C/84A, on top of a lancing tube (built by Whitehead, date unknown) with Torpedo C 77.[11]

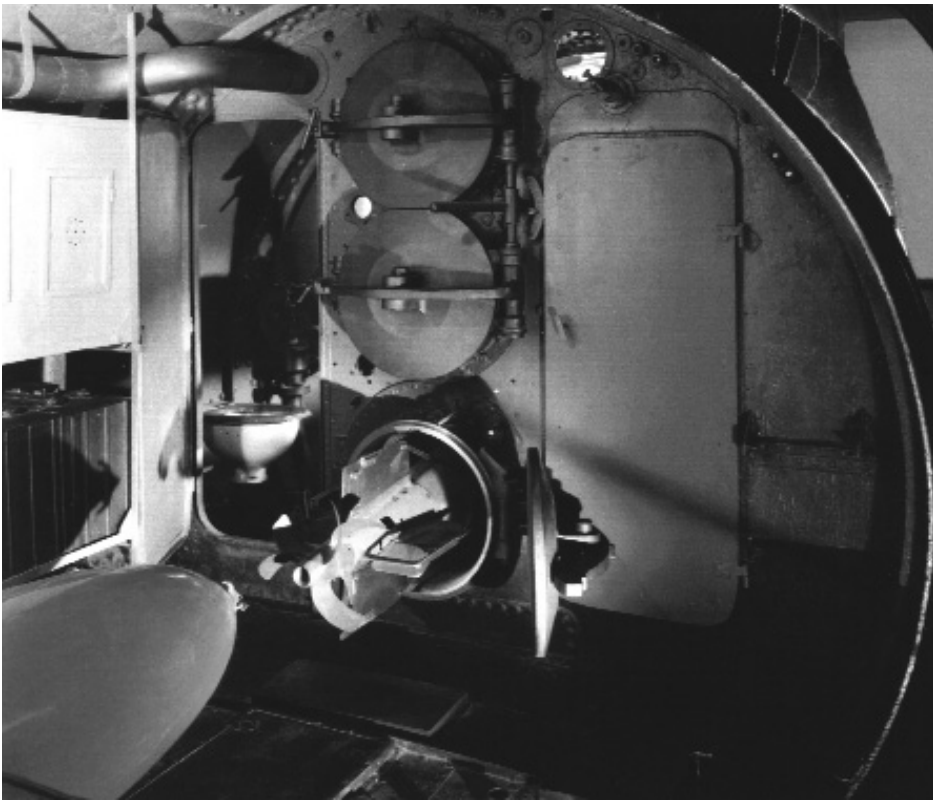

Fig 6: Torpedotubes in the submarine “U 1” , 1906. One tube was used for lancing, the other two were kept for the storage of torpedos of the C03 type.[12]

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***Sažetak***

***RANI PRIMJERCI TORPEDA I NJIHOVO KONZERVIRANJE U NJEMAČKOM MUZEJU U MÜNCHENU***

***Jobst Broelmann***

*Referat u glavnim crtama daje prikaz postanka torpeda i osvrt na pozadinu razvitka " torpeda--ribe"* – fish torpedo*, posebice u odnosu na rane koncepte podmornice poput onih koje je razvio Wilhelm Bauer i njegov* Brandtaucher *u Njemačkoj. Upućuje na sličnosti u konceptu samopropulzivnih malih vozila bez posade poput "obalnog spasitelja"* – coast saviour *Giovannija Luppisa i daje pojedinosti njihovih kontrolnih sustava.*

*U okviru brzog uvođenja torpeda od strane svjetskih ratnih mornarica i njihovo opskrbljivanje u Whiteheadovim tvornicama u Rijeci, prikazan je neovisan uspon razvoja njemačkog torpeda u kompanijama* Schwartzkopff and Pintsch*, s pojedinostima o izgradnji.*

*Drugi dio referata bavi se zaštitom torpeda i pripremom za prikazivanje i obuku u njemačkim pomorskim zbirkama poput one u Njemačkom muzeju – Deutsches Museum koji je osnovan 1903., a koji drži primjerke poput Whiteheadova tipa torpeda Mk III (C 77) iz 1879., kao i druge strojeve koje je izgradio Whitehead.*

***Abstract***

***EARLY TORPEDOES AND THEIR CONSERVATION IN THE DEUTSCHES MUSEUM, MUNICH***

***Jobst Broelmann***

*The paper outlines the origin of the torpedo and reflects the background of the development of the "fish torpedo", especially in reference to early submarine concepts like those developed by Wilhelm Bauer and his "Brandtaucher" in Germany. It points out the similarities in the design of self propelled unmanned small vehicles like the "coast savior" of Giovanni Luppis and details of their control systems.*

*Within the fast introduction of the torpedoes by the Navies of the world and their supply by the Whitehead Factory in Rijeka, the rise of an independent german torpedo development by the companies of Schwartzkopff and Pintsch is sketched and some details of their construction are given.*

*The second part of the paper deals with the preservation of torpedoes for demonstration and training in the german maritime collections like the Deutsches Museum, founded about 1903, which holds specimen like the Whitehead type torpedo Mk III (C 77), dated 1879, and furthermore other engines built by Whitehead.*