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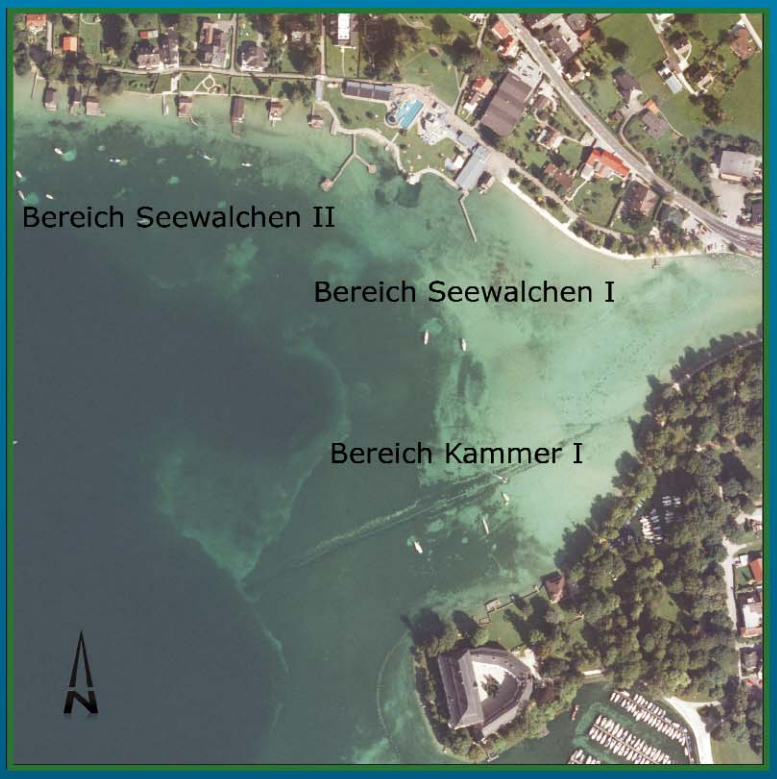

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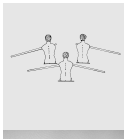

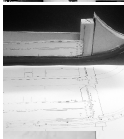







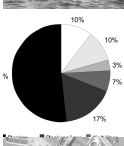

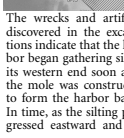

Jutland 1916: The Archaeology of a Modern Naval Battle

The Wreck of the Battle Cruiser HMS INVINCIBLE

Innes McCartney

Abstract *– This paper presents the findings of a survey of HMS INVINCIBLE, sunk at the Battle of Jutland 1916. It is extracted from a currently unpublished report (McCartney 2010) which examined the six known Royal Navy wrecks. All of the wrecks yielded unique insights into the battle. However the very violent destruction of the INVINCIBLE and the story told by its remains on the seabed made an especially revealing case. It is now possible to say exactly how the ship was destroyed and to know which eyewitness testimonies to believe. Like many of the Jutland wrecks, its secrets are beginning to be revealed. As the author has shown in the case of HMS DEFENCE (McCartney 2012), the wrecks of the Battle of Jutland remain one of the most important untapped archaeological resources of the First World War. The wreck of the INVINCIBLE is a notable case.*

Inhalt *– Dieser Beitrag legt die Befunde eines Surveys der 1916 in der Skagerrak-Schlacht gesunkenen HMS INVINCIBLE vor. Er ist ein Auszug aus einem unpublizierten Bericht (McCartney 2010), in dem sechs bekannte Wracks der Royal Navy untersucht werden. Sie alle geben einzigartige Einblicke in die Schlacht. Doch die sehr heftige Zerstörung der INVINCIBLE und die Geschichte, die ihre Reste auf dem Meeresgrund erzählen, waren besonders aufschlussreich. Man kann jetzt genau sagen, wie sie zerstört wurde und welchen Aussagen von Augenzeugen man glauben kann. Wie bei vielen Skagerrak-Wracks beginnen ihre Geheimnisse gelüftet zu werden. Wie der Autor im Falle der HMS DEFENCE gezeigt hat (McCartney 2012), bleiben die Wracks der Skagerrak-Schlacht eine der bedeutendsten ungenutzten Quellen des 1. Weltkrieges. Das Wrack der INVINCIBLE ist ein denkwürdiger Fall.*

Introduction

Fought on May 31st to June 1st 1916 off the west coast of Denmark (Fig. 1), the Battle of Jutland remains the largest gun to gun naval action fought by either Britain or Germany. More of a skirmish than a set piece battle, the German High Seas Fleet „blundered into the stronger British Grand Fleet while chasing what it assumed to be an isolated part of that fleet“ (Gordon 1996, 2). Outnumbered and facing a fleet to fleet encounter it could not hope to win, von Scheer's High Seas Fleet skilfully reversed, melting into the twilight of a North Sea evening, but not before it had sunk HMS INVINCIBLE at the climax of the battle.

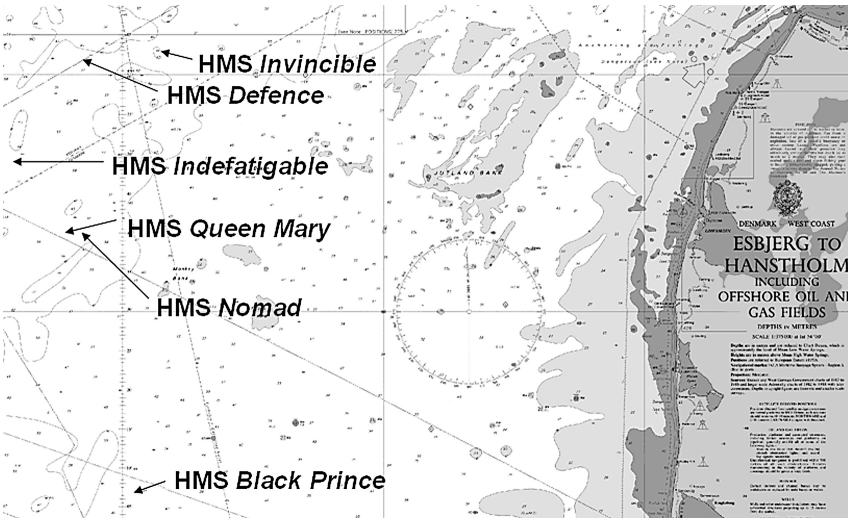

Fig. 1: The area off the west coast of Denmark over which the Battle of Jutland was fought. The inset shows the locations where the six known shipwrecks of the Royal Navy were sunk. The wreck of HMS INVINCIBLE is at the northerly end of the battlefield, having been sunk during the climax of the fleet engagement. The overall battle site is 3772 square miles in size.

When the casualties were later assessed, the Royal Navy had come off worse. Of the 25 ships sunk at Jutland, fourteen were British of which the most notable were the battle cruisers, QUEEN MARY, INDEFATIGABLE and INVINCIBLE. Alongside the armoured cruisers BLACK PRINCE and DEFENCE, they all suffered magazine explosions which killed almost the entirety of their crews and accounted for nearly all of the

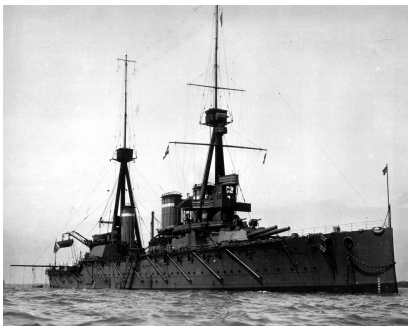

Fig. 2: HMS INVINCIBLE, the world's first battle cruiser. Displacement 17,250 tons, Length 530 ft, 8x12 in guns, 16x4 in guns.

6.000 British sailors who died. German casualties were a comparatively small 2.500.

The author found three of the Royal Navy wrecks over six expeditions between 2000 and 2008. He has researched a unique collection of material relating to them and how they sunk. This includes hours of underwater film and photographs and many first-hand accounts by survivors and witnesses to the loss of each of these ships.

This paper looks at just one of the wrecks; the world's first battle cruiser, HMS INVINCIBLE. The major question asked about the wreck was whether it could contribute a new thread of study to the history of the Battle of Jutland by yielding new information which cannot be found anywhere else but on the wreck.

The detailed diver and ROV survey of this wreck yielded a mass of new information which has contributed much new thinking to the history of the ship's last moments and has demonstrated the value and importance of its archaeological remains.

The loss of HMS INVINCIBLE

HMS INVINCIBLE was the world's first battle cruiser. She was by any measure a famous and revolutionary warship, which along with the battleship; HMS DREADNOUGHT ushered in a transformation of naval technologies. Turbine propulsion and all big gun armament embodied the technological heart of this revolution.

HMS INVINCIBLE could unprecedentedly cruise endlessly at 25 knots, enabling her rapid deployment anywhere in the world. Her all 12-inch gun main armament was able to easily outgun and dispatch any enemy cruisers likely to be encountered in the far reaches of the empire. In 1914 she had been ordered to the South Atlantic and had presided over the destruction of von Spee's squadron off the Falkland Islands. **Fig. 2** depicts the main features of the INVINCIBLE.

During the Battle of Jutland, the INVINCIBLE was the flagship of the Third Battle Cruiser Squadron (3rd BCS), under the banner of Rear Admiral Horace Hood and was attached to the main battle fleet. At the height of the Battle, during the few minutes when the two battle fleets faced each other, the 3rd BCS took position at the head of the the British battle line and was quickly hotly engaged with Admiral Hipper's battle cruisers. Initially things went well for the INVINCIBLE which poured accurate fire on the Hipper's flagship, the battle cruiser, LÜTZOW. But at the range of less than 9.000 yards, „something cataclysmic was liable to happen sooner, rather than later" (Gordon 1996, 450). A break in the mist revealed INVINCIBLE in sharp relief against the background sky, the German battle cruisers ranged-in and straddled her and then almost inevitably, she blew up taking all but six of her complement of 1031 to their deaths (Harper 1927, 117). The battle situation at this time is depicted in **Fig. 3**.

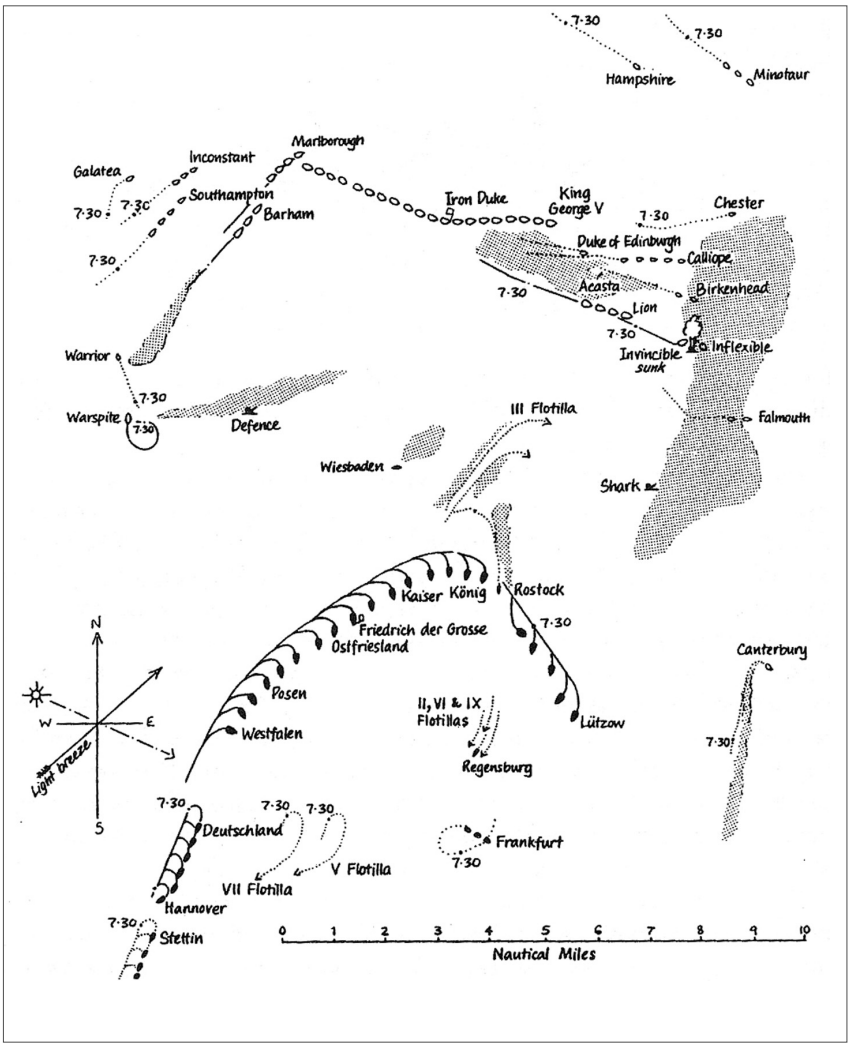

Fig. 3: The battle situation between 18:30 and 18:35. The INVINCIBLE at the front of the BCF has just been sunk and the High Seas Fleet is now turning away. Timings are in CEST.

Witnesses to the sinking

The concentration of so many ships around the point where the INVINCIBLE sank means that, not surprisingly there is no shortage of first hand witness accounts of what happened. However, very few have much detail of the actual moment of the explosion which destroyed the ship, with most focusing a huge plume of smoke and the dreadful sight of the two halves of the ship standing clear of the water afterwards **(Fig. 4)**.

From the German side, Gunner Officer von Hase on the battle cruiser DERFFLINGER wrote:
„the veil of mist in front of us split across like a curtain in a theatre. Clear and sharply silhouetted against the uncovered part of the sky was a powerful battleship with two funnels...and thirty seconds after the first salvo, the second left the guns. I observed two short splashes and two hits...and then for the third time we witnessed the dreadful spectacle that we had already seen in the case of the QUEEN MARY and DEFENCE. As with the other ships there occurred a rapid succession of explosions, masts collapsed, debris was hurled in the air, a gigantic column of black smoke rose towards the sky and from the parting sections of the ship, coal dust spurted in all directions. Flames enveloped the ship, fresh explosions followed and behind this murky shroud our enemy disappeared from sight" (von Hase 1920, 183-184).

Leading Seaman Reginald Bowden on HMS YARMOUTH reported that:
„Suddenly a dark smudge seemed to pass along the leading ship's side, the INVINCIBLE. She disappeared into a huge cloud of smoke and flame. The upper bridge awning was blown high above the smoke and looked like a huge parachute...As soon as the force of the explosion was over the whole thing plunged into the sea…" (Steel – Hart 2003, 230).

Assistant Clerk Hubert Fischer on HMS INDOMITABLE, following the INVINCIBLE and INFLEXIBLE observed:

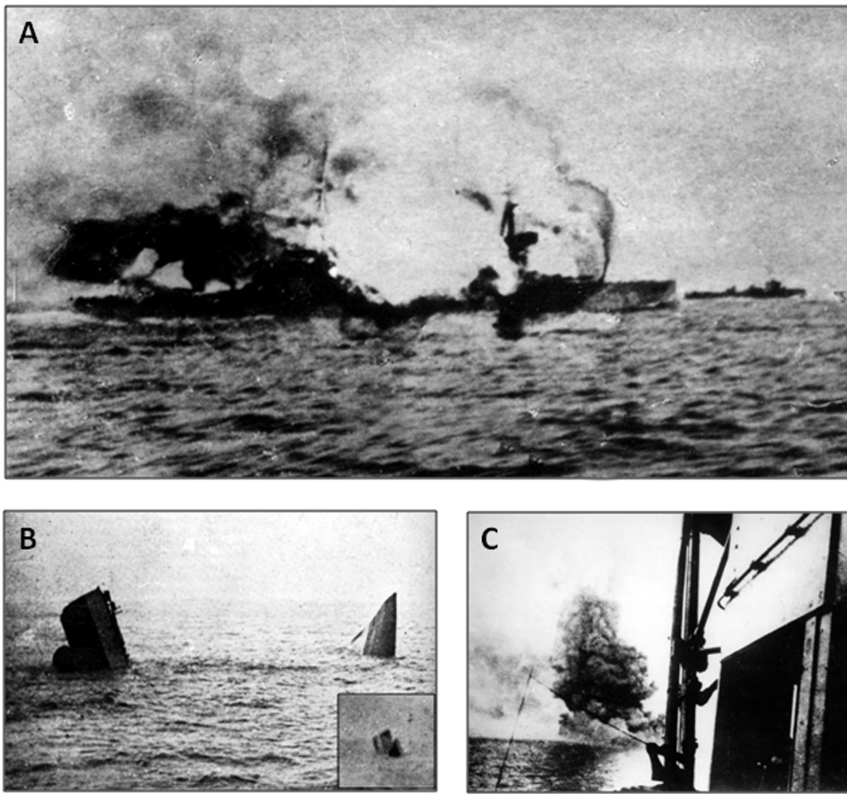

Fig. 4: The destruction of HMS INVINCIBLE. A) The moment of the detonation of the magazines seen from the starboard side. B) The two halves of INVINCIBLE resting on the seabed and (inset) a rarely seen photo of the same seen from another angle; C) The inevitable cloud of smoke which shortly followed as seen from HMS INFLEXIBLE.

„two dull glows amidships. The appearance was that the armour was withstanding the impact of the shells. But a few moments later a great mushroom of smoke rose to the clouds. When it cleared our flagship was in two halves sticking out of the water in opposite directions" (Steel – Hart 2003, 231-232).

Of the six survivors, the marine, Bryan Gasson had the most remarkable of escapes. He was actually inside ‚Q' turret when it was struck by a shell:
„Suddenly our starboard midship turret manned by the Royal Marines was struck between the two 12-inch guns and appeared to me to lift off the top of the turret and another from the same salvo followed. The flashes passed down to both midship magazines...The explosion broke the ship in half. I owe my survival to the fact that I was in a separate compartment at the back of the turret" (Steel – Hart 2003, 231).

The most senior survivor, the Gunnery Officer Hubert Dannreuther (ironically Richard Wagner's godson) was in the foretop above the bridge and saw the roof of ‚Q' turret blown off and hurled over the side of the ship (Tarrant 1986, 109). Then as the INVINCIBLE sank he literally stepped into the sea as it rose up to meet the falling mast (Gordon 1996, 450).

The loss of the INVINCIBLE is the best photographically captured sinking at Jutland. At least four photographs showing the destruction of the ship survive and at least two of its ghostly remains, before they too sunk, also exist (the most illustrative are shown in **Fig. 4**). The most remarkable of these images (A) actually caught the moment at which the INVINCIBLE started to blow up and it is worthy of some analysis. Brown (2003) suggests that there are actually two photos of this event taken 1/8 of a second apart, but for this analysis it is not necessary to analyse whether this is actually the case as one image is sufficient. Marshall (2012) has unconvincingly suggested that the

photograph (he seems unaware of the possibility of two photos existing) is a fake.

The photograph was taken from the starboard side of the ship and depicts her entire length. There is a major conflagration engulfing the central part of the ship with smoke and flame drifting aft. Startlingly, there is also a jet of flame emitting from the area of ‚A' turret barbette, including a piece of debris in the air in line with the bridge. The photograph was most likely taken from a passing destroyer, but it is similar to the view von Hase would have had from his station on the DERFLINGER. Such was the rapidity of events that it is remarkable that this photograph was taken at such an important time in what was happening to the ship, because a few seconds later, photograph (B), taken from the INFLEXIBLE, the next ship in line, simply shows the pall of smoke which obscured much of what followed.

The two halves of the wreck remained upright for many hours. The cruiser GALATEA witnessed the stern section finally sink the following day at 14:35. The bow section remained clear of the water, but had sunk by the time a British submarine, tasked with demolishing it arrived in the area on 3rd June (Tarrant 1986, 113).

The image of the INVINCIBLE exploding was published in Fawcett – Hooper (1921) but may well have been in the public domain as soon as the war ended, or even before this time. This was because the Admiralty censor, Rear Admiral Sir Douglas Brownrigg initially allowed the details of the battle to be published with little restriction. Strong protests from Admiral Jellicoe (commander of the British Grand Fleet) led to a tightening of censorship in the weeks that followed, but in Brownrigg's own words: „we made a bloomer" (Brownrigg 1920, 54-55). Brownrigg specifically mentions this in relation to the mishandling of flash protection and cordite becoming public knowledge, but there is no reason to assume that photographs too may well have slipped out. This is important because the presence of these images could have affected the way later accounts by eyewitnesses actually recalled what happened to INVINCIBLE, and therefore because of this, only a limited number of eyewitness reports which actually include additional detail have been considered.

Nevertheless the photographs, in particular allow for a scenario for the destruction of the INVINCIBLE to be developed. The deadly salvo struck the area around ‚P' and ‚Q' turrets, as witnessed by the survivor accounts. It detonated the magazine and possibly even the shell room below **(Fig. 11)**. Brown (2003) has suggested that the instant detonation of the remaining 50 tons of cordite in this magazine would have created a pressure wave of around 1.000 psi. This would have caused INVINCIBLE to burst open. However as shown below, there is unburned cordite within ‚Q' turret, suggesting only a partial detonation of the stock of cordite. This was clearly still enough to cause the ship to break in half.

The wreck of HMS INVINCIBLE

When Captain J. Harper was assigned to compile the first official record of the battle (Harper 1927), he sent the minesweeper OAKLEY into the North Sea to locate the wreck of the INVINCIBLE. This was done in order to reconcile the Grand Fleet's track charts (Gordon 1996, 539). This means that the INVINCIBLE was the first Jutland wreck to be located. At present it isn't known how the identification of the wreck was made, but it is possible that divers visited the wreck as early as 1919.

In 1991 the 75th Anniversary Expedition also visited the site and used divers and a ROV to examine what was there. The description of the wreck was that it was in two parts, as seen in the photographs of the sinking. The bow was upside down and the stern upright with ‚X' turret still in position (Moor 1991, 53).

Using the SatNav positional data from the 1991 expedition, the author located the wreck of the INVINCIBLE on 24th July 2000 and has returned to the site on five other expeditions, the most informative being the documentary filming expedition of 2003. During these expeditions, much of the wreck has been surveyed and the stern section is now understood in detail and the actual circumstances of the sinking have become much better known.

The wreck site of the INVINCIBLE is not clearly defined by the two sections of the wreck. There is much dispersed debris lying in the path of the ship and off to both sides. While the site is not as dispersed as the INDEFATIGABLE or QUEEN MARY, it cannot be satisfactorily surveyed by diving and ROV alone because it is simply too large and, in places, too confused to safely draw together all the data gathered this way into an accurate map of what is present. Nevertheless the data, especially of the stern area has been compiled into a site plan for this paper, but without higher quality geophysics than that so far carried out **(Figs. 8-9)**, the results are illustrative and the distances and bearings of the pieces of wreckage cannot be guaranteed to be wholly accurate.

The first dive conducted on the site was carried out on the first large piece of wreckage which was located by bottom sounder. This remarkably turned out to be a 12-inch gun turret, inverted on the seabed with some scattered wreckage around it, but no shipwreck in sight. Later that day the main body of the wreck was located to the west of the single turret. Initially it was proposed that the turret may be ‚A' turret, blown out of the ship in the jet of flame in ‚A' turret barbette seen in image (A) of **Fig. 4**.

This turret was relocated in 2003 for filming purposes and the ROV

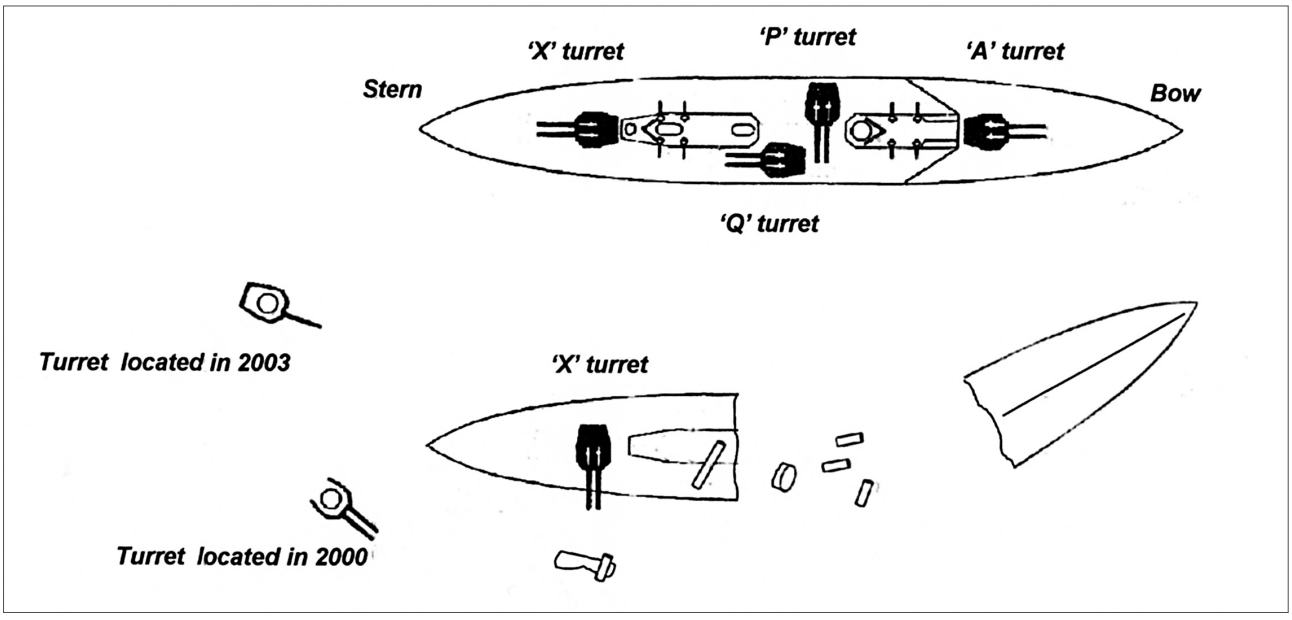

Fig. 5: Plans of the INVINCIBLE as built (top) and as a wreck today (below). The two centre turrets are named 'P' (for port) and ‚Q'. Three of INVINCIBLE'S turrets have now been located. The inverted nature of the bow section means that the presence, or otherwise of 'A' turret under the bow section cannot be ascertained.

was then used to explore the seabed around the turret and trace the path back to the main part of the wreck. During this process another turret was located using the ROV's echo sounder. It was also inverted and behind the wreck. The presence of two turrets, distributed as shown in Fig. 5, and the presence of the empty armoured turret sleeve of ‚Q' turret (Fig. 6), located in the debris field between the two halves of the wreck means that they are almost certainly ‚P' and ‚Q' turrets, which parted from the ship during the explosion and sinking process.

The stern section and part of the debris field of the wreck has been surveyed either by ROV, diver operated video, or both. The wreck lies at a maximum depth of 54 m and the visibility on the site in calm conditions can be in excess of 15 m. Fig. 6 depicts the key items located and is arranged to show location around the central plan of the wreck. Some items are highlighted in red for ease of identification:

A. To meet the 25 knot requirement of her design, INVINCIBLE was fitted with 31 Yarrow water tube boilers. The remains of the boiler room forward of the centre turrets and under the two forward funnels is scattered throughout the debris field between the two halves of the wreck. The image depicts the water container at the top of one of the Yarrow boilers. Also see image (B) of Fig. 10 for an example of one of these boilers under construction (Patricia McCartney);
B. One of two water traps fitted to the Yarrow boiler system, as seen in the debris field. This can also be clearly seen in image (B) of Fig. 10 (Innes McCartney);
C. The armoured turret barbette sleeve in the debris field on the starboard side of the wreck. It is most likely that this once held ‚Q' turret. The position of this sleeve, roughly where one would expect to find it, means it fell to the seabed exactly when the ship snapped in half and was not blown out of the wreck earlier in the explosion and sinking process (Innes McCartney);
D. The roller bearings in ‚Q' turret barbette sleeve, upon which the turret would have rotated (Innes McCartney);
E. Lying across the deck of the stern section, near the break is the remains of the after spotting mast. The entrance door at its base is shown in the image (Innes McCartney);
F. A large piece of hull plating was found lying off the starboard side of the stern section and located by ROV echo sounder. Lying across it was another 10 metre section of the stern mast (Innes McCartney/Ideal World Productions);
G. The muzzles of the two 12-inch guns of ‚X' turret pointing to starboard in the direction in which they were firing when the ship sunk (Innes McCartney);
H. The interior of ‚Q' turret contains several unexploded 12-inch rounds. Around these are pieces of coal which were situated in a bunker next to the barbette (see Fig. 11). The thin brown spaghetti-like sticks are unburned pieces of cordite which strongly indicate that an entire magazine detonation (as suggested by Brown, 2003) did not occur (Innes McCartney);
I. The ruptured base of a 12-inch cordite container, which has burst open along its line of rivets. While it is possible this damage was caused by being flung around in a exploding turret; it is far more likely that it was one of the sources of ignition, bursting open as the cordite flared out of it (Innes McCartney);
J. The aft counterbalance section of ‚P' turret upside down. Circled is the partially opened escape hatch in its underside (Innes McCartney/Ideal World Productions);

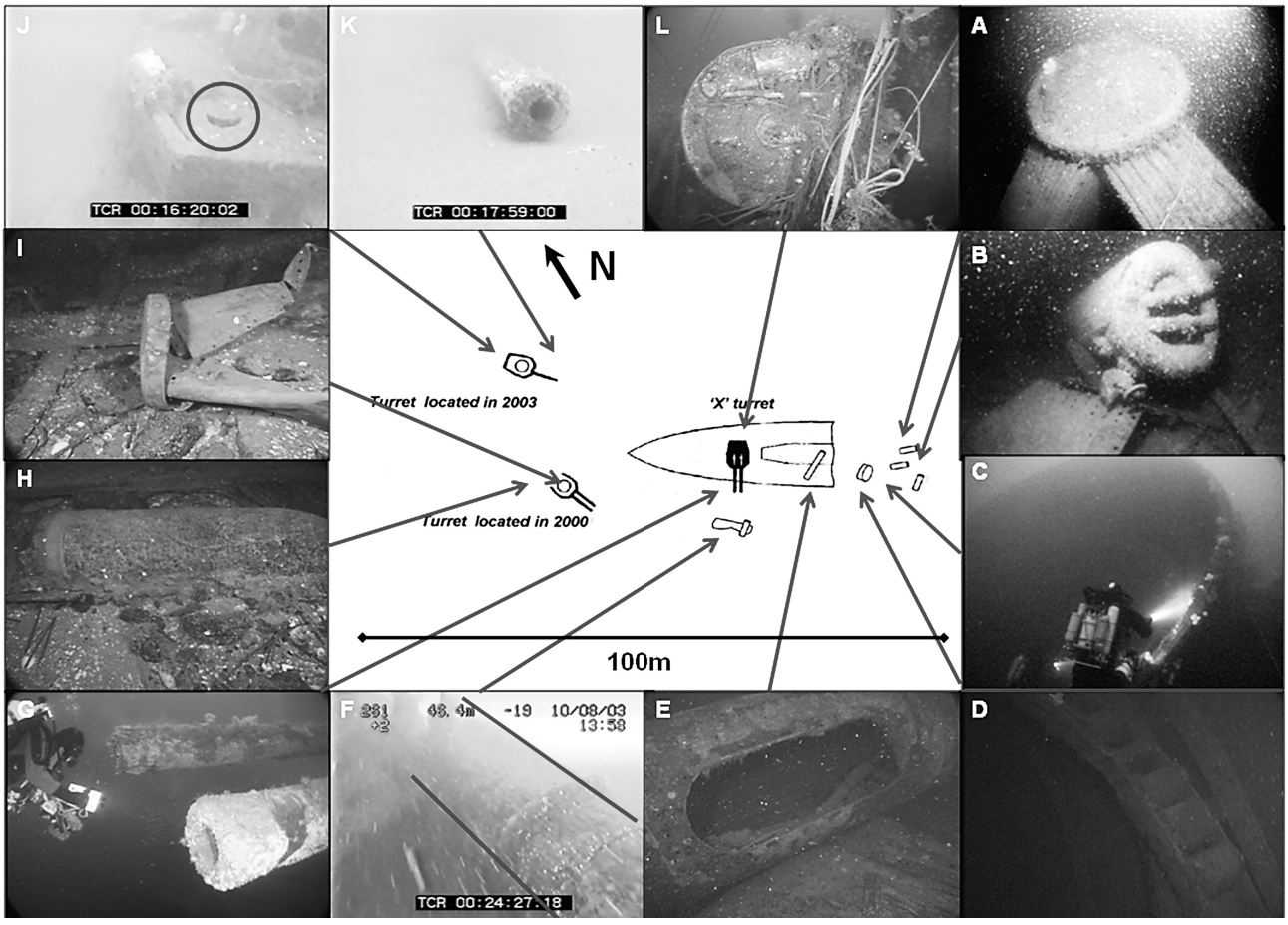

Fig. 6: Results of surveyed areas of the wreck of HMS INVINCIBLE related to wreck diagram.

K. Unlike ‚Q' turret, the remains of ‚P' turret hold only one of its two 12-inch guns. However the sleeve of this turret seems to be attached to it. This makes the turrets easy to differentiate (Innes McCartney/Ideal World Productions);

L. The bronze breech of the port side gun of ‚X' turret. This turret is missing its roof and its sides have collapsed inwards. Brown (2003) claims that the roof was blasted off by the explosion amidships passing a pressure wave through the ship and lifting it off. It is equally plausible that if slid off whilst the stern section was vertical after the ship broke in half (Innes McCartney).

The stern section of the wreck is dominated by the ghostly remains of ‚X' turret which continues to be the major draw for the few hardy divers who visit the wreck. Yet there is much it can reveal about the state of the shipwreck today. Image (A) in **Fig. 7** is particularly revealing. Shot by the author with a fisheye lens on a day of excellent visibility in 2001, the entire turret can be seen in one shot. What is immediately recognisable is that the guns themselves have slumped downward at the muzzle end, and actually point toward the seabed. In time they will inevitably become detached.

However this image also reveals the extremely degraded nature of the rest of the stern section. The deck can be seen in the lower portion of the image and is it surprisingly low. In fact it has collapsed down from the level of line (a) to line (b), a distance estimated at around three metres. What this means is that the stern section has collapsed on itself and is less than half as high as it would have been when the ship first sunk. ‚X' turret has so far withstood this process because its strong armoured barbette sleeve has held it together, although it is possible that the inner portion of the sleeve has collapsed down into the shell room below. However, ‚X' turret too is now falling apart. Line (c) points to the break between the curved pieces of armour plate which make up the barbette, and it shows they are parting and beginning to collapse too. Therefore it is anticipated that this turret will be gone in only a matter of years.

The 1991 expedition reported that the stern section was in a much better condition than what was seen in 2000-2003. Of particular note was the description in the 1991 report that: „it is possible to look into the starboard stern portholes into the seaman's toilets" (Moor 1991, 53). However when the author filmed this area in 2001, it had completely changed. The toilets have all collapsed into the bottom of the wreck (see image (B) of **Fig. 7**) and the hull plating which held the portholes has simply corroded away. This seemingly rapid change in the condition of the wreck in a decade shows that the wreck is in a process of rapid and probably increasing deterioration.

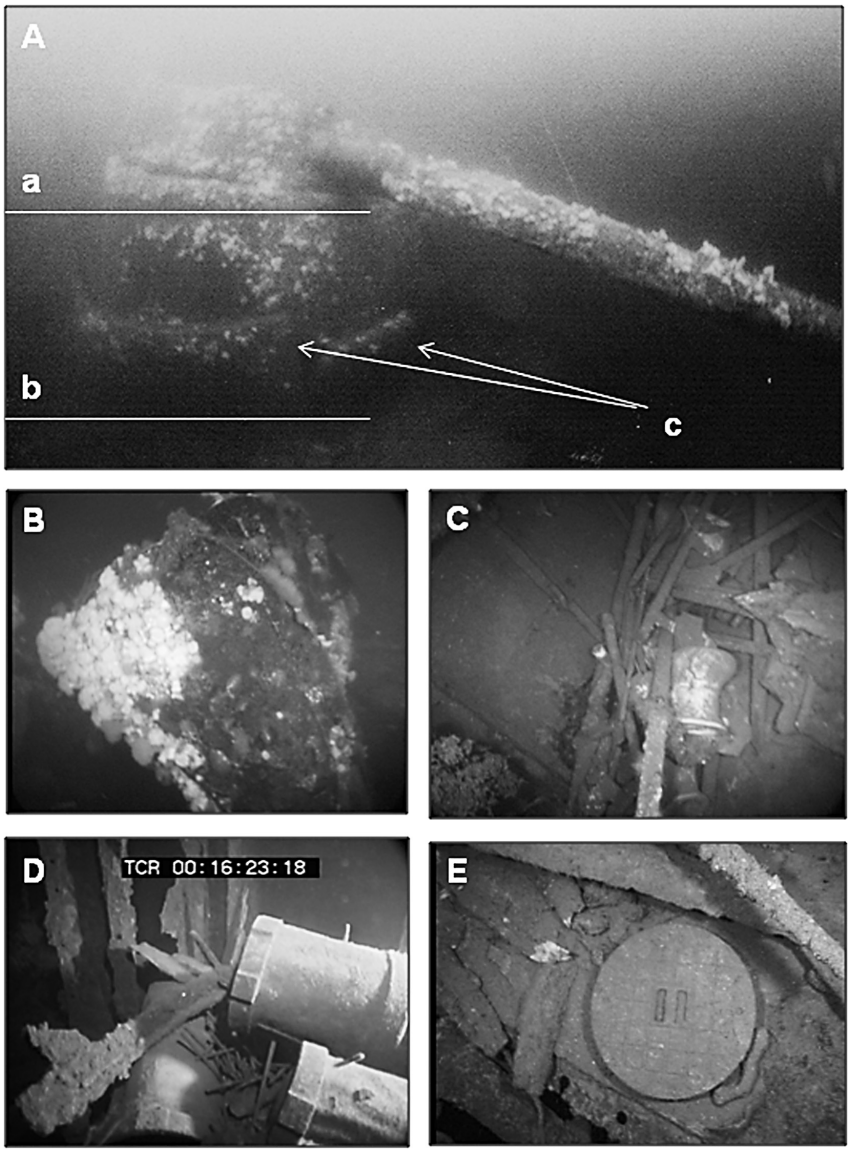

Fig. 7: Images from the stern section of the INVINCIBLE. A) ‚X' turret in its entirety, showing the slumped guns and surrounding deck. The distance by which the deck has collapsed in highlighted by the distance between lines a) and b). Lines c) point to the collapsing armoured sleeve. B) INVINCIBLE'S extreme stern C) One of the heads in the extreme stern of the wreck. D) Unexploded cordite cases in ‚X' barbette. This area is now very collapsed. E) A coaling hatch lying on the stern section.

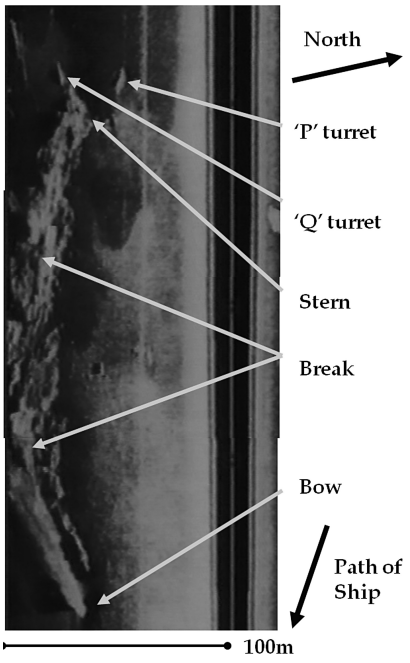

Fig. 8: The side can trace of the INVINCIBLE taken in 2003 showing the entire wreck from the north side with many key features visible.

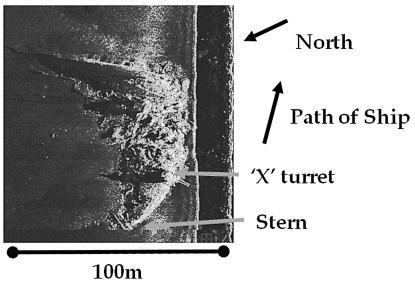

Fig. 9: Side scan trace of the INVINCIBLE taken in 2001, clearly showing ‚X' turret with its guns and the scattered debris which characterises the break between the bow and stern sections.

This means that although ‚X' turret is the best preserved of the ‚big gun' turrets (and their associated barbettes and magazines) at Jutland, it isn't possible to forensically analyse the theory promulgated by Lambert (1998) that the turrets were overstocked with cordite and the flash protection systems had been overridden. The collapsed nature of the cordite store can be seen in image (D) of **Fig. 7**.

On two visits to the wreck site some side scan sonar images have been obtained, with interesting results. These are depicted in **Figs. 8-9**. The trace taken in 2003 shows the whole wreck from the north side and interestingly seems to show the location of ‚P' and ‚Q' turrets, behind the path of the ship. It also depicts the degraded nature of much of the wreck and the more intact portion of the bow section. The author has viewed video footage of the bows taken by another diving group and it depicts that it is totally upside down but that the keel is heavily corroded in places. This is supported by the side scan trace.

The trace taken in 2001 was from the south side and it neatly captured the guns of ‚X' turret. More importantly it shows the debris field between the two halves as it is; full of broken pieces of wreckage. The orientation of the wreck looks curved. This was because the ship was turning at the time this trace was captured. We experienced a total power failure shortly afterwards and were not able to repeat the run.

Conclusion

The stern section with its outlying turrets is now well understood. One of the most important outcomes of the study of the stern

section has been the understanding of the collapsed nature of this seemingly intact portion of the wreck. Image (A) of Fig. 10 shows (with the red line) the degree to which the deck has settled. The depth to which the armoured sleeve of ‚X' descended into the ship is also shown and it would seem logical that the entire turret is now being held in place by this sleeve. It too is corroding. Compared to the description of the stern from 1991, the findings from 2001 show a rapid deterioration of the wreck in recent years.

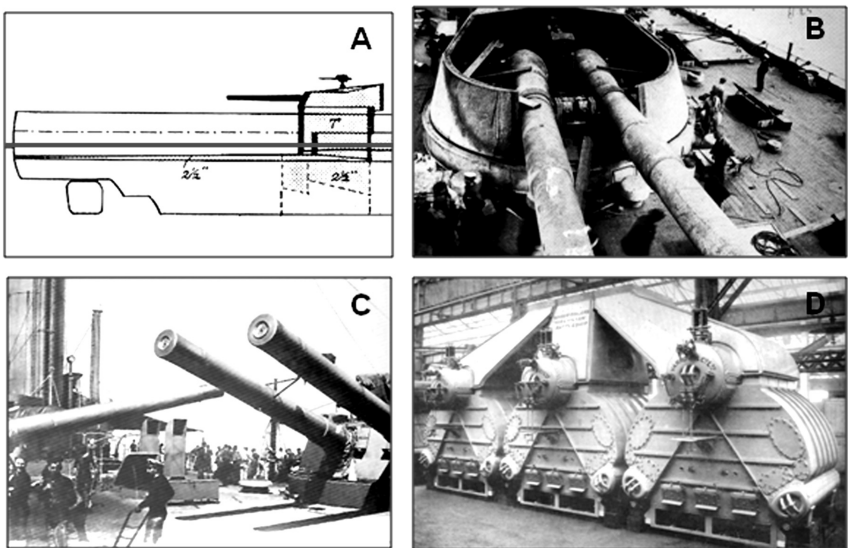

Fig. 10: A selection of images illustrating features akin to those on the wreck of the INVINCIBLE. A) Elevation drawing of the stern section of the ship. The red line marks how far the deck has collapsed. B) The Lions' ‚Q' turret after Jutland, with its roof removed looks very similar to ‚X' turret on INVINCIBLE today. C) ‚P' and ‚Q' turrets turned inwards, showing the height of the deck in relation to the guns and the proximity of these two turrets to the centre of the ship. D) Three Yarrow boilers as fitted to INVINCIBLE. These are common sights on all dreadnought era wrecks, including INVINCIBLE.

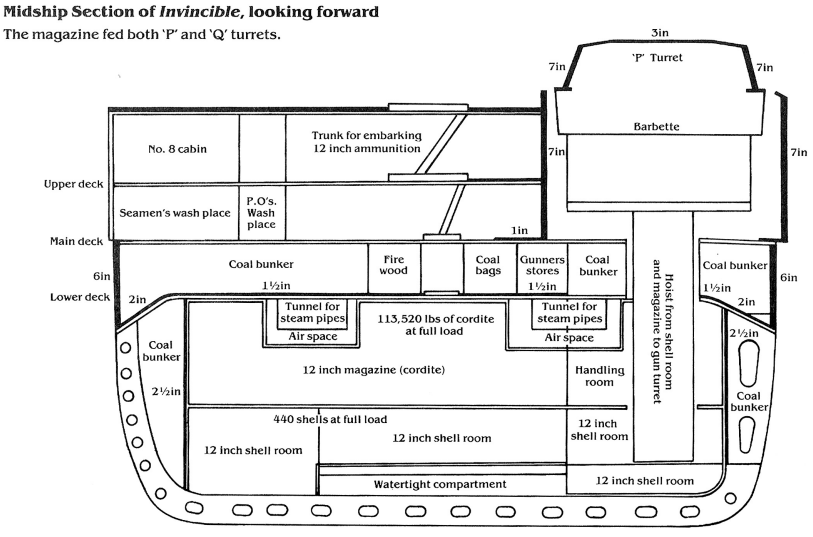

Fig. 11: The single centre magazine on the INVINCIBLE which stored 50 tons of cordite and fed both ‚P' and ‚Q' turrets. The detonation of this magazine destroyed the ship and bodily lifted both turrets clear of the ship as it ran on until it finally broke in half.

Undoubtedly the discovery of ‚P' and ‚Q' turrets by the author in 2001 and 2003 has been the most important outcome. It has enabled the development of the story of how the INVINCIBLE was destroyed to be finally completed. The photographic evidence and the testimonies of survivors mean that it is certain that the detonation which sunk the ship occurred in its mid section in the area of ‚P' and ‚Q' turrets. The magazine which fed these turrets was joined (see Fig. 11) and contained at least 50 tons of volatile British cordite, some of which when exposed to flash, simply blew up.

Interestingly the presence of ‚Q' turret barbette sleeve in the debris field between the two halves of the wreck means that it was present within the ship when it snapped in half. The fact that the two turrets are astern of the path of the ship means that they had to have been ejected by the force of the explosion, before the ship finally broke. ‚Q' certainly was launched out of its sleeve by the force of the blast, which D.K. Brown (2003), assuming a full detonation, calculated to have possibly created as much as 1,000 psi of pressure. ‚P' turret probably fell out still in its sleeve, although this has to be confirmed.

The remains the two turrets are different. Although ‚P' turret is missing a gun, it is generally in much better condition than ‚Q' turret. For instance it still has part of its armour walls and its counterbalance (Fig. 6), whereas ‚Q' turret has only the turret area surrounding the guns. Interestingly, the missing gun of ‚P' turret is the starboard gun (when the turret faces forward) and this would have been the one nearest to ‚Q' turret at the time of the explosion. It is therefore possible to conclude that as Dannreuther reported (see above), it was most likely ‚Q' turret which was hit, and initially its roof blew off. Then the flash ignited the magazine under the turret, forcing it upwards and over the side, probably taking ‚P' turret's missing gun with it (or at least blowing it off). Almost instantaneously, ‚P' turret too was blown out of the ship, probably with its barbette sleeve. The INVINCIBLE staggered on under its own momentum for another 70 m before finally snapping in half and settling on the seabed. Bryan Gasson's survival from inside ‚Q' turret was certainly miraculous.

Without the chance find of ‚Q' turret in 2000, the idea that the area of the wreck site could be defined by its obvious extant remains (as is the case with HMS DEFENCE) may well have become the accepted view. However, although the site is now better understood with the help of ROV survey and geophysics, it is likely that other portions of the wreck will be discovered in the future. Although not as dispersed as the sites of the QUEEN MARY and the INDEFATIGABLE, this site should be treated as only partially documented. It is likely that more would be revealed by a full survey of the bow area and a mapping of the site using high quality side scan sonar and multibeam. Future research projects will be utilising this technology.

The INVINCIBLE is now partially understood. Planned future expeditions will focus on developing more accurate site plans using geophysics and recording more of the debris field between the two halves of the wreck.

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Credits of figures

Fig. 1: Admiralty Chart No 1404 – Esbjerg to Hanstholm, adapted by the author; Fig. 2: Imperial War Museum Q39273; Fig. 3: Tarrant 1995, 134); Fig. 4 A: Imperial War Museum SP2468; Fig. 4 B; Imperial War Museum SP2470; Fig. 4 B (inset): Liddle 1985, 116; Fig. 4 C: Imperial War Museum SP2469; Fig. 5: Innes McCartney, adapted from Jane's 1990, 44; Fig. 6: sources referenced in the text; Fig. 7: photos: (D) Innes McCartney/ Ideal World Productions, all others Innes McCartney; Fig. 8: Innes McCartney/Ideal World Productions; Fig. 9: Ingmar Lundgren; Fig. 10 A: Parkes 1966, 493; Fig. 10 B: Gordon 1996, after p. 308; Fig. 10 C: Tarrant 1986, after p. 64; Fig. 10 D: Kennedy 1912, p. 32; Fig. 11: Tarrant 1986, p. 108.

Address

Innes McCartney
Bournemouth University
School of Applied Sciences
Christchurch House, Talbot Campus
Fern Barrow
Poole, Dorset BH12 5BB
UK
imccartney@bournemouth.ac.uk