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CONTENTS

	PAGE
EDITORIAL	3
TREASURER'S NOTES	4
MELANCHOLY MISSION	4
HOME STATION CLEARANCE DIVING TEAM	7
JUST ANOTHER JOB	9
50TH CLEARANCE DIVING TEAM	11
MEDITERRANEAN CRUISE	13
OBITUARY	20
PAGES FROM THE AUSTRALIAN DIARY (1)	21
MEDITERRANEAN FLEET CLEARANCE DIVING TEAM NOTES	22
THE SIMPLIFICATION AND SPEEDING UP OF UNDERWATER WELDING AND CUTTING BY ELECTRIC ARC PROCESSES	23
CHATHAM DIVING SCHOOL NOTES	27
HYTHE'S WATER BABIES	27
THE SUBMARINE RESCUE BELL	29
COMMANDER L. K. P. CRABB, O.B.E., G.M., R.N.V.R. (s) (Ret.)	33
NOTES FROM H.M.S. FLATHOLM	34
BREAKING THE WORLD'S DIVING RECORD	35
CLEARANCE DIVING TEAM, PORTLAND	39
A CHILLY OUTING WITH THE UNDERWATER EXPLORERS	41
51ST CLEARANCE DIVING TEAM (H.M.S. BRENCHLEY)	44
PRINCIPLES AND TECHNIQUE OF FREE ASCENT IN SUBMARINE ESCAPE	44
CENTAUR CHRONIC!	50
THE FAR EAST CLEARANCE DIVING TEAM	50

R.N. Diving Magazine

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 Petty Officer R. W. COLLAR }

Vol. 4

June, 1956

No. 2

EDITORIAL

Dear Readers,

Here is our June edition, which is my second and also the last as Editor. I have enjoyed my short spell very much, but it does need a lot of spare time to keep in touch with the ever increasing subscribers, and to keep the high standard achieved by previous editors, Mr. Newman (Treasurer) and Instructor Lt. Lewis (Secretary).

I have been detailed to take over the regulating duties of the Diving School, which in itself is more than a full time job. Fortunately I am able to turn over to Petty Officer Collar (Spiero) who has just returned to the school from H.M.S. *Reclaim*, and he is happy to include the editorship of our magazine along with his other instructional duties.

In March, Keith Chipperfield, A.B. Clearance Diver, lost his life whilst diving at Gibraltar; this tragic incident was felt by all divers and especially his shipmates on H.M.S. *Dingley*. He was our magazine subscriber for the Home Station Clearance Diving Team of this edition. Our deepest sympathy goes out to his bereaved wife and relations.

Also during this quarter came the sad news that Cdr. Crabb, O.B.E., G.M., R.N.V.R. (s) (Ret.) was missing and presumed killed whilst on a diving mission. The circumstances his loss are not known, but became the subject of world-wide speculation; perhaps one day the whole mysterious incident will unfold. To his diving colleagues all over the world he was great as a man and as a diver. Our deepest sympathy is extended to his bereaved family.

I would like to thank all those who subscribed material for this edition, and I invite all readers whether service or civilian to send in their stories of interest and so make the next edition even better.

Cheerio! EDITOR.



TREASURER'S NOTES

Dear Readers,

Yet another change in the Editorial Staff has taken place since our last edition; believe me, it is almost a full time job for me to keep the continuity going. My thanks are extended to Chief Petty Officer Peach for the hard work he did during his term in office as Editor.

The increase in price of this magazine is regretted, but it just had to come. I am sure you are all only too well aware of the ever increasing cost of day-to-day life. At this point I would like to mention that the increase, as well as helping us to cover the cost of production, has enabled us to enlarge the magazine by another eight pages and also include more photographs—which, I am sure you will all agree, makes the magazine more interesting.

Before closing may I remind a few of our subscribers receiving this edition that it has put them in debt; through some over-sight you failed to read the remarks on the bottom of the renewal subscription form enclosed with your last magazine. To those concerned, may I draw your attention to the enclosed renewal subscription form.

Our next edition will be in September, and so to all Dip Chick's good hunting and Cheerio! TREASURER.

MELANCHOLY MISSION

by

LIEUTENANT C. W. CHADWICK, R.N. RETIRED, DEEP DIVING OFFICER

The final destruction of the major surface menace to our world wide shipping was one of the main priorities and events of the concluding phases of World War II and had far-reaching repercussions relating to the conduct and strategy of the war at sea. This Titan of the Third Reich found her final moorings and tomb off Tromso, well within the Arctic Circle, on 12th November, 1944, after being blasted by midget submarine and aircraft in previous attacks in other harbours.



Pride of the Reich—October, 1945

The final attack administered the *coup de grace* and was delivered by a force of heavy bombers under the command of Wing Commander D. B. Tait, D.S.O., D.F.C., and remains for all time an epic of precision-bombing under adverse conditions.

Moored within a ring of anti-submarine and anti-torpedo nets, with main and anti-aircraft armament alerted and in action, the *Tirpitz* succumbed to the Royal Air Force onslaught and capsized, taking with her the major part of her crew.

In August of 1945 it was my privilege to command a diving survey of the ship with a party of twelve divers selected from the three Depots.

Having drafted my party to Rosyth, the recruitment of a suitable vessel for the job became the next priority, remembering that the majority of H.M. Ships were still occupied upon all-embracing duties connected with operations with Japan. Eventually a Landing Craft Quarters was allocated for the task, having suitable accommodation for additional personnel and a wide steaming range. We immediately nicknamed her the 'Mobile Filing Cabinet' and the Coxswain the duty tram driver, owing to her peculiar steering mechanism.

With a scratch crew we set upon the task of storing, provisioning and making ready for our long voyage.

The Manager, Constructive Department, and Superintending Naval Store Officer, Rosyth, were the epitome of help in relation to stores and by the end of August we were ready.

We sailed from Methil on 31st August and had a tempestuous voyage en route to Tromso, eventually anchoring off Tranoy to pick up a pilot on 4th September. On arrival at Tromso, Constructor Captain Bessant R.C.N.C. came aboard and we steamed to the vicinity of the wreck for a preliminary survey, a macabre prospect. There was a vast potential from the point of view of material and we commandeered a sixty-five by twenty pontoon, of concrete construction, to act as a mobile diving platform and to house the pumps and diving equipment.

The diving team worked with a will and great energy and had the pontoon ship-shape and Bristol fashion for diving and for burning by 6th September.

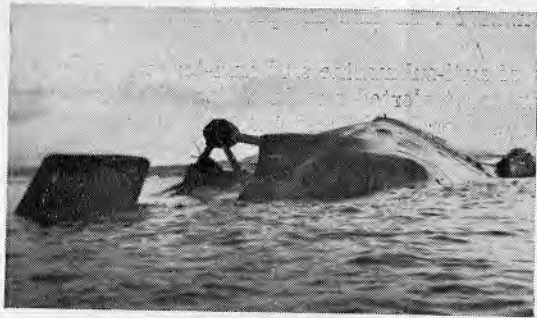
Thus commenced the prelude to some hundreds of dives in between 50 and 70 ft, among indescribable wreckage. Assisting us in the prosecution of the work was a scale model of the hull of the *Tirpitz*, upon which we clarified the reports at the end of each day. Prior to commencing underwater work we had etched broad lines on the capsized hull to coincide, station, by station with the ship's drawings.

The effect of the R.A.F. block-busters on a giant vessel of the *Tirpitz* calibre had to be seen to be believed. The armour belt in its entirety had been blasted clear of its anchorage and the general disruption was incredible.

In most of the submerged compartments dead bodies were encountered, but they were left undisturbed in their last resting place as a mark of respect.

The work progressed day by day in the ever-decreasing light, enlivened by periodic runs ashore, where our host was Captain Bryan King,

R.A.S.C., in charge of Water Transport from Narvik to the far North.



Stern of Wreck—German KFK 6611 alongside

Awaiting repatriation after the conclusion of hostilities in the northern area were over a hundred thousand German troops.

A small working party of these, and with Corvettin Kapitan Gunther Kraus with a German tender KFK 6611, were of the greatest assistance during the whole survey, acting as linesmen, pump

hands and general workmen in the multifarious duties which became apparent each day.

The weather continued to deteriorate in late September and early October and heavy snowfalls were frequent.

On 5th October, when the major proportion of the underwater work had been completed, a Force Eight gale with blizzard conditions made life a trifle depressing. The whole diving pontoon, with our diving, burning gear and apparatus, stove in on the wreck, and capsized during the night, leaving us in a parlous plight, apart from the obvious ramifications of such losses. When the gale abated, we borrowed German diving equipment to dive for remnants of our diving gear.

By 7th October, blizzard conditions continuing, work proceeded with in the wreck, using burning gear to cut up sections of the hull plating for examination in the United Kingdom.

Amid ice and snow the captured German *Schiebenhof* arrived to assist to complete operations and she proved a worthy aid in the absence of the sunken diving pontoon. We finally finished our work to the satisfaction of the Director of Naval Construction on 16th October and sailed for the United Kingdom via Rurvik, Trondheim, Haugesund and Copervik, where we slipped the pilot and surged on into the North Sea, bound for Montrose and Aberdeen.

Weather conditions on the homeward voyage were extremely poor and it was with gratitude we pulled in alongside the fish quay at Aberdeen to disembark stores on 22nd October.

I shall ever remember the joy of plunging into a hot slipper bath on the station at Aberdeen prior to the train departure!—the first proper bath for many weeks. Thus, in brief, came the conclusion of the survey of the pride of the Third Reich, which never survived to further the aims of her builders.

The Commander-in-Chief, Portsmouth, was pleased to commend our work in a citation dated November, 1945, and in 1953, David Woodward, of the B.B.S., wrote a memorable work,—just 'The *Tirpitz*,' and it is a worthy addition to any library.

Copyright. 15th May, 1956.

HOME STATION CLEARANCE DIVING TEAM (H.M.S. DINGLEY)

Now that Harry is a shore-bound native in the 'School,' I have taken over the pleasant job of keeping the Diving World in general in touch with what the hard-working H.S.C.D.T. have been getting up to since our last article went to press.

'The Terrible Trio' (Harry, Jock Scott, and Nick Carter) left us in November and were replaced by Messrs. Bailey, Maynard and Le-Cornu. (Any more reliefs?) The new members have now settled down well into the usually crazy routine of the team.

As promised, we refitted at Portland, but our grape-vine let us down rather badly about the team setting up residence in H.M.S. *Vernon*. Packing our kit, we bade a fond farewell to the box we call home and trundled up the short, sharp hill to H.M.S. *Osprey*. After being issued with bedding and a Nissen hut we nailed up the dartboard and settled down to wait for Christmas leave. Whilst in that 'Ping-Happy Domain' we caused much gnashing of teeth amongst the Regulating Staff, but they soon got used to us being around!

As the 'Fighting D.' was too cluttered up with Dockyard maties, cups of tea and various passengers (they like to be called the crew!) to be used for diving, we procured (I don't know how) an M.F.V. and a motor-boat. Thus we carried on earning the elusive shekels in not too warm weather. The M.F.V. was used a couple of times for diving, but after nearly hauling the anchor through the bows we relegated it to store carrier and tea-wetting caboose (much to the joy of the civvy crew!). The Dockyard NAAFI staff (bless her!) got so used to seeing us in the canteen at stand-easy times, etc., that she nearly charged us rent.

The Portland C.D. Team were much too busy with their own murky work to have much time for their industrious brethren; but one day, I think, will remain in their memories. As a break from diving and as part of a general keep-fit scare, the Captain decided that we should walk round Portland (only about 10 miles . . . via Portland Bill !!!). Much to the chagrin of the Portland C.D.T., they were roped in as well.

And so to Christmas leave, which I believe was enjoyed by all, judging by the faces first morning back in *Osprey*.

One consolation after leave was that we could look forward to some warmer weather in Gibraltar. After some more dips in the rather cold depths of Portland Harbour we began dusting our clobber and wrapping it up in cotton-wool all ready to be crated-up for passage to Gib. Somewhat reluctantly saying farewell to all our haunts in Portland and Weymouth, we transported ourselves by various routes to Pompey to join H.M.S. *Tyne* as first-class passengers. The upper-deck staff of that 'Floating Barracks' welcomed us with open arms, thinking they had recruited some more slaves . . . How wrong they were !!! We found ourselves a hold and there we stayed. Our crib school improved greatly during the trip and at least one member of the team learnt the game from scratch!

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On arrival at Gibraltar we set to getting our gear across to the Coaling Island, our H.Q. during our stay on the 'Rock'. (To see the amount of gear we had managed to crate up one would have thought that the whole C.D. branch had come for a two-year stay!) After one false alarm which meant humping our kit across the water and back again, we managed to creep into H.M.S. *Rooke* by the back door. Life in the R.A.'s paradise is much more bearable. For one thing you don't have to sleep in a hammock and also the Border is much nearer. So far no one has ventured as far as Tangier!

Diving has proceeded regularly as befits the temperature of the water in Gibraltar and we have made numerous night attacks on ships of the Home Fleet. These attacks were successful as many S.W.D.'s will bear witness!

Last week we put on a show for the children of members of the three services (and any one else for that matter!) The team was ably assisted by some steamers from H.M.S. *Glasgow* and, although numerous *faux pas* made the show not quite up to scratch, I believe the kids enjoyed it!

Now the time has come to pack our bags once more and say farewell to our many friends in Gib. On Monday we are going home in style . . . by air!! As I am trying to get my kit and rabbits together I'll close this epistle by wishing dip-chicks everywhere all the best of luck for the future and not too many wet dips!

CHIPS.

Since this news-letter reached me, news has been received that Leading Seaman Wilson, a member of the Home Station Team, has been awarded the Commander-in-Chief's Commendation for a specific show of resourcefulness during the 'Attacks' in Gibraltar. Congratulations, L/Sea. Wilson!

EDITOR.

JUST ANOTHER JOB

The following is an extract from *The Times of Malta* covering the grounding of the French Submarine *Mille* last year.

FRENCH SUBMARINE AGROUND OFF MALTA FORMER GERMAN 'U' BOAT

By our services reporter

'The seven hundred and fifty ton French submarine *Mille* went aground on the coast by Bahar Ic-Caghaq late on Wednesday night, whilst returning on the surface from exercises at sea off Malta. The *Mille* was making for an anchor berth when she ran aground.

'The *Mille*'s captain made a signal stating that he was aground, at about 1130 p.m. on Wednesday night. In reply to the signal the harbour tug *Aid*, the Fleet tug *Mediator* and the fast frigate H.M.S. *Whirlwind* were despatched to the scene at top speed.

'Among the first of the ships and smaller craft to arrive was a pinnace manned by members of the Mediterranean Fleet Clearance Diving Team commanded by Lieutenant P. A. White, R.N. In the pinnace was an assortment of diving gear and frogman's suits and other items connected with an operation such as that carried out.

While the *Aid* and *Mediator* made fast towing lines to the *Mille* as she lay with her nose pointing to the shoreline only fifty feet distance, Chief Petty Officer Stanley, the F.C.D.T.'s chief diver, went down in a frogman's suit to carry out a hull survey of *Mille*, using a waterproof torch.

French-speaking officers of the Royal Navy, and a team of submarine specialists from the submarine depot ship H.M.S. *Forth*, were soon at the scene of the grounding. Ashore close to the water's edge, was Admiral Sir Guy Grantham, C.in-C. Mediterranean, his Chief-of-Staff Commodore D. P. Dreyer, and other officers.

Chief Diver's Report

Shortly before 3.45 a.m. the weather began to break. The dark night became alive with lightning flashes and soon the calm surface of the sea was whipped up as rain came pelting, drenching the French and British sailors on the *Mille*'s casing, hauling in tow-lines.

C.P.O.'s report was relayed to the *Mille*'s Captain; it was to the effect that the submarine was aground by the bows and amidships, the boat was, in fact, lying across an underwater ravine. The soft underwater rock had been split by the *Mille*'s bows, and a hole was reported in the vicinity of the keel plate, measuring about 2 ft 6 in. by 2 ft.

No Damage Inside

'The boat was slightly 'lively,' i.e., she was not hard and fast, but bumping slightly in the swell, denoting that she was not immovable. She was high in the bows and had a list to port. Propellers and rudders were unharmed. Navy H.Q. later said that there was no damage inside the boat.

Shortly after Lieutenant White had swam ashore in frogman's gear to report to Admiral Grantham on the situation, the *Mille* was refloated by the *Mediator*, at the first attempt. This was at about 5.45 a.m., some six hours after grounding.

Once afloat, the *Mille* made her way into Maida Creek under her own power berthing astern of the submarine depot ship H.M.S. *Forth*. Divers were later sent down to continue the underwater survey.

The Commander-in-Chief congratulated those taking part in the operation connected with the *Mille*'s refloating, among them the F.C.D.T. The *Mille* was formerly the German 'U' 471, and is credited with a normal complement of 45 officers and ratings. She has a designed displacement of 517 tons, a surface displacement of 750 tons, and submerged 850 tons.

It was stated last night that preliminary inspection reveals that the damage to the *Mille* was not serious. The submarine will, however, be docked prior to sailing on further exercises.

The *Mille* moved to a berth alongside the submarine depot ship H.M.S. *Forth*, late yesterday.

By kind permission of THE TIMES OF MALTA.

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50th CLEARANCE DIVING TEAM

The highlights of life in the 50th C.D.T. since last going to press have been the Annual Inspection of H.M.S. *Diver*, a week-end at Granton giving displays in aid of the Forth Division R.N.V.R. recruiting drive, and last but not least Easter Leave.

The Annual Inspection went off very well and *Diver* collected another very good inspection report even though we did fail to find one limpet stuck 6 in. under the counter of the target ship. The rudder and propellers were well searched and one offensive missile recovered from this area but we didn't anticipate the Command Bomb and Mine Disposal Team would be so vulgar as to stick one in such an unmentionable position which is duly considered west country prerogative. The irony of it all was that it was so shallow it could have been removed without using a breathing set. However, it taught us that we ought to practise what we are taught and carry out search schemes properly as there is no short road to success, not even during inspections.

At Granton we combined with the Command B. and M.D. Team and *Safeguard* divers to put on three shows during the R.N.V.R. week-end recruiting drive. Conditions in Granton Harbour are difficult for divers at the best of times, as we found out last year whilst we were grovelling in the mud on our lawful occasions. Putting on a show for the public education or entertainment in this fisherman's haven really is difficult, and tests one's initiative to the utmost. However, our efforts were much appreciated and the shows went off reasonably well. Our most successful turn-out was undoubtedly the fast 'drop-and-pick-up' handsomely organised at very short notice by the B. and M.D. Officer. We had a very black 5 mins. during the first show on the Sunday which was being witnessed by our Base Captain and his family. The model cruiser we were using for ship attack demonstration started to sink of its own accord which might well have been covered up by the commentary had it not been for the fact that the broadcast system failed at the same time. To cap it all the standby broadcast system, although previously tested, was in league with the other gremlins and also refused to function. However our gremlin sweeper rapidly removed the termites and the temporary atmospheric peacefulness was once again shattered by the red-faced commentator. Our last show was delayed some thirty minutes whilst we carried out a rescue operation on behalf of a young lady who had no visible means of support in the water. Neilson's method of artificial respiration proved itself, *aqua marine* was ejected and breathing restored. The crowd had a grandstand view of the final stages of this drama which was naval rescue at its best, even to the extent of the Command Bomb and Mine Disposal vehicle doing duty as an ambulance. Needless to say the final show was performed to a full house.

With leave nothing but a pleasant memory, we have now started on the summer session of trials which have opened in a blaze of glorious weather making it a pleasure to be alive. There are buzzes of visits to areas other than the Forth but it remains to be seen whether or not these pleasantries will materialise particularly as our faithful Wumag main engine has been sentenced to retire; a British relief having been appointed, but not until we refit at the end of August.

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It is with deep regret that we heard of the loss of our revered colleague, Cdr. Crabb, after such a distinguished underwater career.

Happy hunting to all divers everywhere, our catch is mainly lobsters and missiles. 'B.F.'

MEDITERRANEAN CRUISE

On a cold blustery Monday in January, we sailed from England, bound for the sunny Mediterranean. With a certain amount of pessimism we pointed into an English Channel that surged and reared and flung stinging darts of wind-blown spume and spray as high as the bridge. Huddled miserably in duffles and oilskins, we surveyed with gloom an angry black mass of heaving water, lightened occasionally by a frothy white crest, which vanished in a second, whipped into spindrift by the roaring Channel wind. Fortune favoured us however, and after a few hours of being tossed around, the sea and wind subsided. By the time we reached the Casquets we were undulating along on a comparatively gentle swell.

Ushant came abeam during the morning watch, and we turned the corner into the dreaded Bay of Biscay. With trepidation we pointed towards the North Spanish coast. The Bay was in good humour having claimed a victim the week before, and we sailed merrily along in brilliant sunshine, accompanied by a shoal of porpoises, that gambolled and played under the forefoot. A long smooth swell from the North gave us a little additional speed, and on Wednesday evening we raised the looms of Cape Villano. We sailed south, past Finisterre, and down the Portuguese coast, sighting many daring little sardine boats, miles out from their ports. A friendly people these sardine fishers, and many waves and shouted greetings were exchanged between us.

On Thursday night Cape Roca, the most westerly point of the European continent, was sighted. Reducing speed as we were a little early, we timed our arrival off the mouth of the Tagus for 0730 on Friday. We stooed around for an hour or so off Giuia waiting for the pilot, who eventually arrived in a most peculiar looking craft, rather like a Thames barge but minus the sails. The trip up the Tagus was unfortunately spoiled by heavy fog, which at times reduced visibility to nil. Our 974 radar now proved its worth in a crowded river, and to the pilot's horror we sailed within two cables of our billet before we were forced to let go an anchor. A slight lift in the fog half an hour later gave us our chance, and in a very short time the anchor was aweigh and we nosed our way slowly to our billet alongside Alcantara jetty.

Lisbon proved no mean city. Beautifully situated on the River Tagus, it has a great number of unrivalled architectural wonders, dating back to Moorish and Crusading times. A short train-ride takes one to the millionaire playgrounds of Estoril and Cascais, where in the summer months one can rub shoulders with most of the uncrowned kings of Europe. The night life of Lisbon is hectic, but the unwary should be warned from *Reclaim's* experience that a languorous look from dark Latin eyes costs something like 15/- for a 'sticky green' to repay it. If a diver has a few £ s. d. to get rid of, he is recommended to look at the filigree silver work for

which the Portuguese are famous. Hand-painted tiles, depicting dancing or bull-fighting, are also worth buying, and look very unusual when framed and hung. Portugal being a dictatorship, albeit a benevolent one, one is struck by the swarms of police, somewhat unkempt little men, in dilapidated uniforms, all armed to the teeth with pistols, bayonets and truncheons.

It was rather a relief to slip on Monday morning. We all felt in need of a rest, and what better rest is there than a few hours quiet watch-keeping. The weather was pleasant as we sailed towards Gibraltar, and without any incidents we reached our billet in the harbour on Tuesday afternoon. Each watch managed to get a run ashore before we left for Malta on Thursday, February 2nd.

It is a long drag from Gibraltar to the island of St. Paul, and so to assist us we hoisted our mainsail, which, believe it or not, gave us at least a quarter of a knot, which rather put out the navigator, whose E.T.A. did not allow for the increase in speed. This part of our trip is best glossed over. The sunny Mediterranean belied its name and for four days we were buffeted by every wind that ever roared down from the Gulf of Lyons or swept up from the Sahara. With sighs of relief we sighted Goza light early on Monday morning, and in a very few hours we stood off Grand Harbour entrance waiting our turn to enter. The first signal we received from Valletta signal station was . . . 'Are you a R.F.A.?' Imagine!

Dockyard Creek was our billet, and a very convenient one too, the Black Cat bar being a pusser's pea throw away. A barber's shop happens to be quite close to the Black Cat, and it was amazing the number of sailors who discovered they needed a haircut during working hours. Night time was serenading time, the strains of that famous old sea shanty 'Side, side, *Reclaim's* ship side' being wafted on the scent-laden air of the Barbary coast, over the blue waters of Dockyard Creek, to regale the ears of us who had the misfortune to be duty.

On Tuesday morning we disembarked the Clearance Diving team with their equipment, and without any more ado we took ourselves round to Marsa-Xlokk to start trials on the Rashbass Decompression tables. Diving started after dinner and proceeded apace until well into the last dog. An augury of the future was a bend contracted by Able Seaman Day, and it was next morning before he left the pot, cured. A large swell now got up which interfered with diving, and after struggling all day trying to do accurate decompressions the Captain finally decided to look for a more sheltered spot. Accordingly next morning anchors were weighed and we proceeded to survey the Maltese coast line, but without any success. The prevailing wind set up a very large swell all round the island, and it was impossible to decompress a diver with any accuracy at the shallow and most important stops, owing to the variations of depths on the gauges. The Captain then decided that a talk with the Staff Navigator and the weather man was indicated, and so once again we found ourselves in Grand Harbour. Catania, on the Sicilian coast, was eventually decided on as offering the best prospect at this time of year, well sheltered and offering a variety of depths. On Monday evening, February 13th, we

accordingly slipped our moorings and sailed north for Catania. This proved to be a short trip and a rough one. We were battered all the way, nor' west winds and a beam sea making it a nightmare passage. Diving started on Tuesday morning and once again we had a bend, while many more of the divers had mild symptoms. A back-scratcher was installed in the diving flat for those who had least unpleasant symptoms, and Dr. Rashbass's calculations became known as the 'Bends and 'itches Tables.'



Mount Etna from Catania Bay

Shortly after this picture was taken the volcano was in eruption

Shore leave was given in Catania that evening for those people who were clear of decompression sickness. At midnight when the last boat was coming alongside, the Officer of the Watch was horrified to see every liberty man covered in blood. An anguished shout for the doctor brought him running, and the speculation was that our boys had got themselves mixed up with a Sicilian vendetta or the Mafia. On getting a gang of hilarious sailors aboard, it was discovered that the blood was really nail varnish applied as beards and moustaches by some of the local belles met at a carnival. Shaving next day was, without any doubt, a painful operation.

Diving carried on on Thursday, but owing to the weather we had to stop and close the diving doors in the afternoon. That night the wind got up and the Captain decided to shift ship to a better anchorage. This proved no easy task, as we were lying beam on to wind and sea, and the ship had drifted over the port cable. The rocks looked uncomfortably near in the half light but eventually the anchors came in and we removed off Cantania breakwater. Leading Seaman Stark, who had been lent to us for the trials, went down with a recurring bend during the night, and pot watch-keeping started once again.

Next morning, Friday 17th, we sailed for Messina for the weekend. Messina proved to be rather a pleasant city, with not really much to offer

Jack Tar in the way of amusement. A huge ancient church, with lifesize gilt figures super-imposed on the clock tower, that struck the hours and bowed to each other was the main tourist attraction.

Here we made contact with the Italian Navy salvage vessel *Proteo*. The officers and divers paid us a visit on Saturday and seemed very impressed with our deep diving equipment. *Reclaim's* diving officers and divers returned the visit on Sunday morning, and while they had nothing like our gear, they were at the same time very well equipped. Captain Oldoini of *Proteo* was very enthusiastic and hoped that eventually his ship, too, would be fitted with deep diving gear.

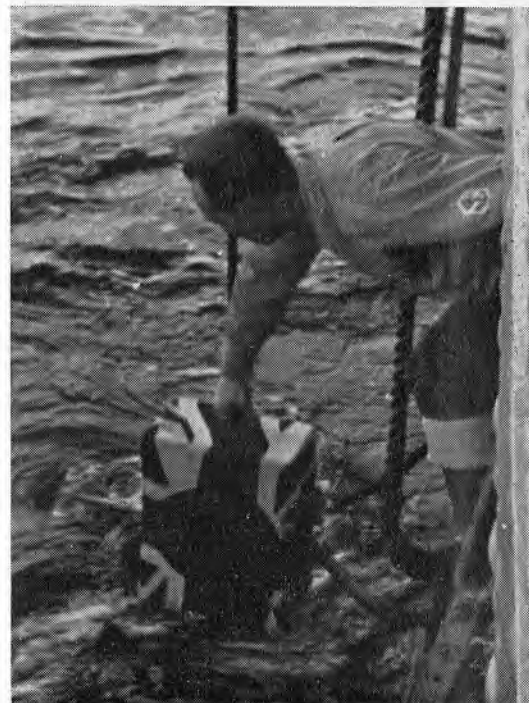


Taormina

On Monday, 20th February, we left Messina and once again anchored off Catania. We made about fifty dives up to Wednesday and had a number of bends, all of which were treated successfully. Surgeon Lieut. Commander Crocker now expressed himself as satisfied with the number of dives, so once again we weighed and proceeded to Taormina Bay to get in some deep work. This must surely be one of the most beautiful and eye-catching bays in the world. The waters are unbelievably blue and clear, and the land seems to rise in a series of cliffs, each cliff with its own cluster of white and red houses. Over all towers snow-clad Mount Etna, which at night presented an awe-inspiring sight, with the deep red glow of its crater throwing a lurid colour on the low-hanging clouds, and keeping in one's mind the latent power hidden in the bowels of the volcano.

Deep diving finished on Saturday forenoon, and we left Taormina for Messina. U.S.S. *Newport News*, one of America's crack cruisers, arrived in behind us. Both crews immediately struck up friendships, and inter ship visits were exchanged, and altogether there was a camaraderie that bodes well for future Anglo-American relationships. Yankee sailors ate roast beef and Yorkshire, and drank real pusser's tea, while the Limeys tried such exotic dishes as southern fried chicken and chocolate sundaes.

The Yankees' big drip was that they had plenty of coffee in their ships but no rum.



The casket containing Nigger being lowered to the diver, waiting just below the surface

Monday proved to be a stormy day so our stay in Messina was prolonged until Tuesday, when once again we proceeded to Taormina. On the way a sad event occurred that cast a gloom over the ship's company. Nigger, the ship's cat and mascot of many years standing, died suddenly. He received a sailor's burial, being taken down to 300 ft by a diver and buried at the bottom of the shot (see Obituary page 20). Somehow a garbled version of the death of Nigger had got ashore and, before long, we had a visit from the port health people and the Lord Mayor, looking for the body. They were most sympathetic on being informed that it was the ship's cat that had died and not a sailor.

On Tuesday evening we sailed for Malta to pick up the Clearance Diving team and to disembark the divers from *Rampura* and *Forth* who had been such a great help to us. Thursday morning found us retracing our course, but this time on the way to Naples, where we arrived on Friday night. Anchoring in Naples Bay, we seized the opportunity offered by the good weather and did another deep dive. Next morning a party of six left the ship for Papal Audience in Rome. There used to be a saying 'see Naples and die.' That must have originated before industrialisation took place. The air was sulphurous, and the state of the paintwork in a few hours made us wonder what the air must be doing to our lungs. There were compensations, however. Bus trips to the ancient city of Pompeii were arranged, and after seeing the high state of civilisation the Romans obviously enjoyed, the general opinion was that we had been born a couple of thousands years too late.

Tuesday came round and once more we put to sea, bound for La Spezia, where we arrived on the following day after a very interesting and

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calm trip. This is one of the main Italian naval bases, and no time was wasted in getting acquainted. The first thing we saw was an exercise, an assault by commando troops on a radar station perched precariously on top of a cliff. The ease with which the cliff was scaled, and the breathtaking descent, was most impressive. Next there was an attack by frogmen on a military H.Q. Live ammunition was used in vast quantities and, as we were close inshore, the ricochets were positively frightening. However there were no casualties and all got back on board safely. There was a good liaison between the Clearance Team and the Italians and much was learnt by both sides. Lieutenant Commander Brooks introduced the Italians to the intricacies of the canoe, while they in turn gave us an exhibition on the Italian sled.

On the morning of March 10th we sailed from La Spezia for Toulon, where we arrived next morning. Being Sunday, everything was quiet, so we had a day of pleasant relaxation. Monday morning started the official rounds, and on Tuesday a display was laid on for the French diving experts.

While in Toulon we had the good fortune to meet Frederic Dumas, Cousteau's right hand man, and what a nice unassuming man he proved to be. Cousteau's ship, the *Calyпсо*, was in for a refit prior to sailing for the west coast of Africa. Dumas took the Captain and your correspondent round for a 'look-see,' which proved very interesting. A feature of the *Calyпсо* is her false metal stem, which can be entered via the fo'c'sle (slim men only, as I proved). At the bottom of the false stem three large ports, with very thick glass, are fitted, and in this small compartment a man can lie with or without a camera and survey the wonders of the deep in comparative comfort. The amount of gear packed away in that small ship, and the economical use of the space provided, was a source of amazement.

On Tuesday afternoon, 13th March, our divers visited the French diving establishment, G.E.R.S., and were suitably impressed with the equipment they saw. Next morning we said goodbye to our Gallic friends with regret, and sailed for Gibraltar, where we arrived on Saturday, St Patrick's Day, to the joy of the Irish members of the ship's company, who seized the excuse to gallop ashore and imbibe freely of boiled oil and other exotic Gibraltarian drinks.

While in Gibraltar we learned of the loss of one of our brother divers from the Home Fleet Clearance Diving Team. Our sympathy and condolences go to his parents, commanding officer and team mates.

On Tuesday, 20th, we left Gibraltar to rendezvous with the Fleet, 40 miles west, and be escorted home in convoy. The armada assembled just after midday, *Reclaim*, for the first time in her history, keeping station on another ship, H.M.S. *Maidstone*. We didn't do too badly for the first couple of hours, but as the wind and sea increased in strength, so *Reclaim* lagged behind, in spite of signals from the Commodore telling us to pull another couple of revolutions out of the bag. Eventually every other ship was hull down on the horizon, but we still plugged on until the horizon was bare. From then on we were on our own, but nothing daunted, and by a tricky piece of Relative Velocity, we worked out that

if we kept on in a certain direction for long enough, we were bound to meet up again somewhere north of Cabo Roca. It worked and we met, much to the amazement of the rest of the convoy. Determined not to be left behind again, we broke out our sail, and we stuck to *Maidstone's* tail like glue to a blanket. Enjoying comparatively good weather, we sailed into the Channel, and at 1630 on Sunday, 25th March we detached about 25 miles south of Portland Bill. We headed for the Needles like a homing pigeon, and if the C-in-C had seen the Pompey revs. he'd have wondered how we were left behind down around Cape St. Vincent.

It's a great feeling coming home again, no matter how short the absence. The ship seemed to sense the old billet was near too, as she clocked the best part of 14 knots coming up the West Solent, with the result that we dropped anchor at Spithead at least an hour earlier than we had hoped. Next morning we weighed bright and early and proceeded up harbour, and before noon were secured alongside and positively inundated with wives, sweethearts and parents.

This surely proved our most interesting and instructive voyage to date. It was of immense practical value, and a lot was learned by all concerned. For our young sailors there was the novelty of foreign ports and strange languages. For our divers there was the wonderful opportunity of learning something of the equipment and techniques of our N.A.T.O. allies, besides doing invaluable work on the new tables.

For us all, old sailors and young, it was a grand trip, not too long not too short, but just enough to make us appreciate the old homeland all the more.

J. GRACE

OBITUARY

With deep regret I record the death of 'Nigger', the mascot of H.M.S. *Reclaim*.

Nigger was probably the most publicised cat in the world, reams having been written about him in various countries. He captured the imagination of the Scandinavian countries, and many things were attributed to him, not all entirely true.



Nigger and Chico

A large black neuter, no one is quite sure when he first joined *Reclaim*, but it is as far back as 1948 in all probability. During the years that followed, Nigger faithfully stayed with the ship, despite the ever-changing faces of the ship's company.

He was a friendly cat, but a little irascible in his old age. He liked a warm place, in the sun or beside a fire, and he did not like to be disturbed. Although he suffered badly from sea-sickness, he never tried to leave us, although he was always first over the gangway for a legstretch and a claw-sharpening session on the nearest tree or railing. Shoresides always palled quickly and he never spent more than half an hour away.

Before he died, Nigger met a pup, Chico, a pretty little animal we found during our travels. Strangely enough, a kind of guarded friendship grew up between the two, and they were seen round the ship very often in each other's company. Little did we think that it was a case of 'Reliefs close up.'

Nigger died quietly one morning as we slipped from Messina, en route for Taormina.

He now lies in 300 ft of water in Taormina Bay, having been taken to the bottom by a diver, and buried at the foot of the shot.

We miss him very much.

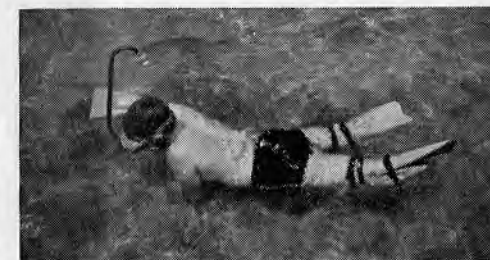
BADGER

PAGES FROM THE AUSTRALIAN DIARY (I)

NEW DEVELOPMENTS; TRAINING OF CONGENITALS.

A congenital lad thirteen years of age with his heart set on swimming, travelled from Melbourne (Vic) to Sydney (N.S.W.) to visit Mr. Don Linklater, manufacturer of under-sea products, with the hope he would be able to be equipped with flippers and accessories, thus enabling him to try out his youthful ambition.

A new type of flipper with riveted straps and fitted over Esta Foam sheet to stop slipping, was used in this experimental stage. Having only one limb whole, that being the left arm and hand, three flippers were used (see photograph).



The result was amazing, both in the lad's swimming ability and the lift he got out of being independent.

This idea is now developing with teams in N.S.W. and Victoria.

R.F.

This is not only technically interesting, but also a fine example of hope and enterprise which we trust may encourage many others who have physical shortcomings, either congenital or as the result of accident.

Water is certainly a medium to bring an active life to many for whom activity on land is out of the question—Editor.

MED FLEET CLEARANCE DIVING TEAM NOTES

It has been quite a time since we last wrote for the magazine (pressure of work, you know, and all that kind of thing!) and it is about time we let you know what life is like out here now.

We have had the usual spate of exercises, jobs and fleet work, intermingled with quite a lot of bomb and mine disposal work. One incident of the latter stands out, namely a 4,000 lb. 'Satan' which had lain 3 or 4 ft. below the surface at Kingsway, in the heart of Valletta, since the war. It was rendered safe and removed by Mr. Lawrence and the team. For this, Mr. Lawrence was awarded a well-deserved Commander-in-Chief's Commendation.

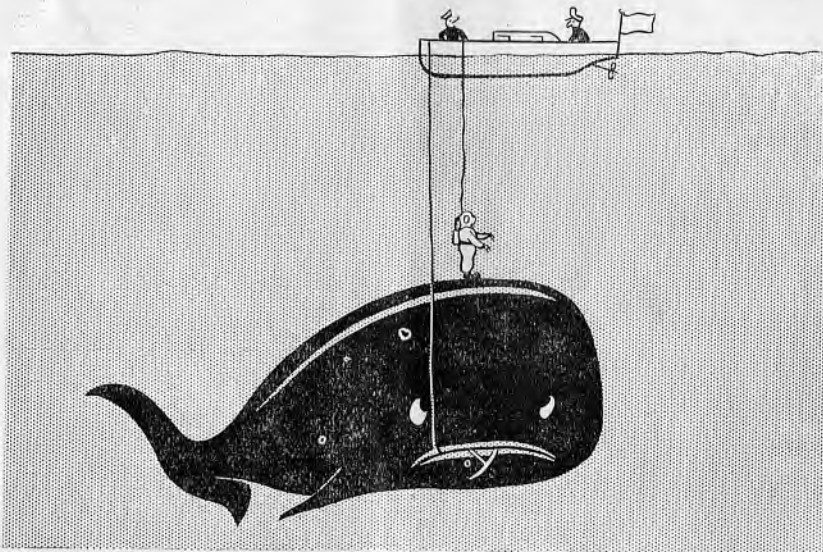
The Trials Team inflicted themselves upon us with various sorts of weird and wonderful contraptions, specially designed to add grey hairs to some C.D. heads.

Reclaim also called on her way home; so, befitting the occasion, we laid on a 'Tramps' Ball—a bigger and more realistic crowd of tramps has never been seen before. It was unanimously voted a 'roaring success', 'roaring' being the operative word.

Our 'friends next door', the steamers, are having a brand new diving school built, and it is looking very pretty—we will have to look to our laurels and have another storey built on top of ours. Or at least something as classy.

It is time to drag out our travel guides, dust our flippers, and fish out our sun-glasses again; so once more, to the tune of distant church bells, we bid you farewell from this sun-drenched, beer-soaked and work-ridden Island.

SAM.



'That was quick for 180 feet!'

THE SIMPLIFICATION AND SPEEDING UP OF UNDERWATER WELDING AND CUTTING BY ELECTRIC ARC PROCESSES

by

VINCENT RODNEY FOSTER, *Ex. Wreck Dispersal Groups.*

The many questions I am constantly asked concerning the work of a Diver/Welder—Salvage, have prompted me to write the following article in the hope that it will be of interest and enlightenment to all dip-chicks and particularly those of you who intend to qualify in Underwater Welding and Cutting.

I do not intend to give any history on the subject except to say that early experiments go back to 1912, and add the little-known fact that Professor A. Piccard, of bathysphere fame, was responsible for much of the earlier work and experiments on oxy-hydrogen cutting.

Underwater cutting has been simplified by introduction of the oxygen-arc process to the point where the average diver, using only a little special equipment and with only a short period of instruction can make rapid cuts in almost any metal, even under the most difficult diving conditions; and, while considerable training is necessary, underwater welding of mild-steel can be done with very little special equipment and by any diver experienced in ordinary electric welding on the surface.

Up to 1942, the oxy-hydrogen underwater cutting process was almost universally used. But the use of oxy-hydrogen equipment requires extensive training and only a few divers are qualified in this speciality.

Underwater welding was completely out of the picture as it had not been available, excepting in its experimental stages, prior to 1942.

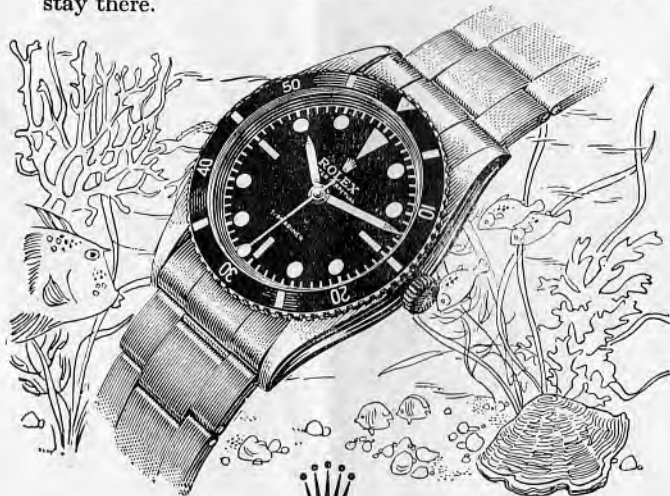
Rapid development has followed improvement of the oxy-arc process of cutting and electric-arc underwater welding since it was developed to the practical and commercial stage in 1942. Commercial development of satisfactory electrodes and equipment have advanced oxy-arc uses to the point where a diver who is already experienced in surface oxy-arc cutting, but without previous underwater cutting experience, can soon handle underwater cutting of steel, cast-iron, and bronze and other non-ferrous metals, with any local salvage team.

THE OXY-ARC PROCESS

The basic principles of oxy-arc cutting have been known for about 22 years and are very simple. The electric arc is used as a means of pre-heating the metal, combined with use of pure oxygen under pressure as the cutting agent. In practice, one lead of a standard direct-current electric welding machine is connected to the work as an earth and the other lead to a suitable torch held by the diver. A tubular electrode is inserted in the torch and the oxygen delivered through the hollow centre of the electrode. The oxy-arc underwater cutting torch is really a very simple tool, but must be fully insulated and carefully designed to meet the special conditions under which it is to be operated. It consists of a copper alloy head, set in a plastic holder to which a short length of leader cable is directly connected, and into which the electrode is inserted through a

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holding device that establishes a firm electrical contact and at the same time seals the end into the oxygen supply line. Oxygen is brought to the head through a lever control valve in an insulated handle.

Continuous cutting in any position with full penetration is easily accomplished by an average diver. It is only necessary to strike the arc and drag the end of the electrode across the work.

Underwater cutting electrodes commonly used are tubular steel (14 in. long), flux coated, waterproofed and thoroughly insulated over the entire useable length. These are lower in cost and require less skill for use than do hollow-carbon electrodes or tubular ceramic electrodes that are also used with the process.

RAPID CUTTING UNDERWATER

An average diver, working under ordinary underwater conditions, will cut $\frac{1}{2}$ in. to $\frac{3}{4}$ in. thick steel at an average rate of 25 to 30 ft per hour. A highly skilled diver will do better, while even a beginner will approach the average speed within a few days after he makes his first cut.

Visibility is a minor factor in this oxy-arc process. The diver places the end of the electrode on the work, calls for 'current on,' strikes the arc, and drags the electrode across the work, cutting continuously until the electrode is consumed. The time for change of electrode is no longer underwater than on the surface.

Because of the basic relations between the 'arc time,' the length of the rod and volume of oxygen required for cutting metals of known thickness at a specific depth, the consumable supplies required can be estimated very closely. For example, 100 lbs of tubular steel underwater cutting electrodes and four cylinders of oxygen will be consumed by an average diver in cutting 300 to 350 linear feet of $\frac{1}{2}$ in. to $\frac{3}{4}$ in. thick steel at a depth of about 40 ft. For $\frac{3}{8}$ in. or $\frac{1}{4}$ in. thick steel, the consumable supplies are about 20 to 40% less than the above and for 1 in. thick steel are only 10% more.

Cast-iron can be cut as readily as steel although at a somewhat reduced rate, the rate depending on the skill of the diver, as the rod requires a certain amount of manipulation. The speed will compare very favourably with oxy-acetylene cutting of the same materials on the surface and consumable supplies will be proportional to the arc-time.

CUTTING NON-FERROUS METALS

The oxy-arc process will successfully cut monel, bronze and other non-ferrous metals. Monel and bronze cutting, either underwater or in air, is no more difficult than cast-iron and very similar in speed as well as in the electrode and oxygen consumption. A few hours practice on the surface using the oxy-arc torch on the 'hard to cut' metals will enable the diver to learn and apply without difficulty the special technique necessary underwater. Metals such as stainless steel, which cannot be cut with oxy-acteylene in the usual way, can be cut with this process with ease and to close dimensions.

UNDERWATER-WELDING

Underwater welding requires far more skill than is the case with oxy-arc underwater cutting. However, the diver who is skilled in

electric welding on the 'top side' will have no difficulty in learning to weld underwater after some practice; but he must apply himself diligently and carefully to every inch of weld deposited. At the present time it is possible to weld only mild steel underwater. Good welds will develop 80% of the tensile strength and 50% of the ductility of welds made on the surface. The fillet weld is the easiest type to use as it provides a natural groove that the diver can follow, a great convenience under the conditions of limited visibility that frequently prevail.

The only special equipment needed in addition to a 300 - 450 amp D.C. welder and leads, is a fully insulated underwater electrode holder, a supply of coated and waterproofed electrodes of the proper sizes for the work in hand, and welder's lenses for face-plate similar to those used for cutting. The welding electrode holder is much simpler and less expensive than the oxy-arc cutting torch as no gases are used with the welding process.

WELD 15 TO 20 FEET PER HOUR

A capable diver, experienced in electric welding above water, who has acquired the proper technique for underwater work, will be able to make fillet welds at an average rate of 15 to 20 feet per hour when working under favourable diving conditions. A skilled underwater operator will do considerably more. More important, however, than speed, is the quality of each inch of weld deposited so that it will be capable of carrying its proportional share of the load. Due to limited visibility and the lower ductility obtainable in underwater welding, a high factor of safety is indicated. As an example, a pad-eye intended for a lift of 10,000 lbs, or a bracket for a similar load, should be designed to allow for a minimum of 10 linear inches of fillet welding. The figures above are based on the assumption that the metal will be deposited in a horizontal position by a diver adequately skilled in the process and that the work will be done under favourable diving conditions. The actual time for welding such a pad-eye, after the diver reaches the work and 'gets set,' will be only about five minutes.

For a critical structure or connection, it is recommended that a sample weld, similar in design and position to that required, be made underwater and brought to the surface for inspection and test under full load. If desired, a sample weld can be cut out and stressed to destruction.

Recent practical use of underwater television in underwater welding and cutting operations has resulted in commercial salvage organisations using this instrument to watch welder/divers at work and for relief divers to observe their 'oppo' at work and so have a clear picture in their minds of what has been and is to be done. Of course these underwater television observations of underwater welding are, at the moment, only experimental. However, there is no doubt that these experiments will certainly have a great bearing on future development and techniques for all types of underwater cutting and welding.

With my very best wishes to all you dip-chicks who are about to qualify in these processes.

V.R.F.

CHATHAM DIVING SCHOOL NOTES

Life goes on as usual here, although we have had some very interesting diving jobs recently. Needless to say, of course, they all came more or less at the same time, thus clearing the school. To date we have recovered a weapon from the middle of the Serpentine; recovered two bodies, one from a chalk pit, the other from a creek; searched for an aircraft which unfortunately disintegrated upon hitting the water; rendered safe and recovered a German 'D' ground mine at Harwich; cut through some piles for the Royal Engineers; and we are still demolishing a pier, besides the usual jobs that accrue from the yachting fraternity who are continually dropping things over the side.

Not to be outdone by Devonport's achievement (last edition refers) we have our eyes on some extra large concrete pipes which may, with a little luck, eventually materialise into a 20 ft Diving Tank.

Navy days went with quite a swing; especially for the frogman on the helicopter! It was reported that a witch was seen, complete with broom, orbiting the diving school during this period.

Should any Chatham readers be interested, we have put out a Nore Temporary Memorandum with a view to starting a Sub-aqua Club on the same lines as the Royal Naval Sailing Association. It has been rumoured that it is only an excuse for the diving fraternity to get away for a dive in nice clear water with a sandy bottom. We are so fed up with this Chatham Mud!

Here are the complement changes:

Mr. Rea is to be relieved by Mr. Heatley as Officer-in-Charge. Mr. Rook will be leaving next term, his relief being Mr. Otley. Soapy Watson, Tom Welsh and Bill Bailey are off to Civy street and Chief Gates will be joining the clear vis team in H.M.S. *Forth*, at Malta. You won't know the old place after all the changes. I have a feeling that it may fall down!

It is with regret that we hear of the death of A.B. Chipperfield and the loss of Commander Crabb and our deepest sympathy goes to the bereaved families.

This is all from Chatham, Cheers to divers everywhere. J. REA.

HYTHE'S WATER BABIES

No doubt one ponders at the title Hythe, and wonders if it exists, although it does—on the shores between Southampton and Calshot or that more prominent landmark, Fawley Oil Refinery. It is a small village having Her Majesty's shore establishment *Diligence* as its ready purse every other week.

I, the lonesome Diver 3 borne on the ship's books, am almost like a fish without water. To accompany me here are two Shallow Water Divers, A.B. Cope and P.O. Gillette. A.B. Cope, to whom I'm greatly indebted, and myself, have been partners for over a year (did I hear a squawk; hoist your anchor) although many times he is away in all parts of the country, on ferry crew trips bringing new minesweepers down to the

base for trials, which often left Mr. Craggs, Snr. Cd. Gnr. T.A.S., as my stand by.

Although sometimes we have hailed the experts of *Vernon* to help out, also *Annet*, we do achieve a little in our own patch of water with our outfit of diving equipment.

During last year we averaged over one a month of clearing foul screws; the majority were wires, in most cases not caused by bad ship-handling or carelessness on deck, but due to navigational hazards in position of berths. The largest task was in September last when diving on H.M.S. *Sparham* to free her of using propellers for bollards when securing to a buoy. To free her took two and a half hours, and then to commence on the turns, but I was hastily called up and dispatched to H.M.S. *Swanston*, leaving *Sparham* to a slipping party and shipwrights, who took one and a half hours of surface drill in freeing the wire; a new rope guard was then required.

On arrival at *Swanston*, which lay in mid-stream, A.B. Cope took the first dip on the starboard screw to find it being used as an upper deck reel with 40 fathoms of 2½" wire. The job of clearing her screw continued the next day; with much hack-sawing and chiselling, plus tackles and strops, and the help of the conveniently placed derrick on the sweep deck and a winch, all was freed. Diving time alone was 10 hrs 50 mins; the last two hours were spent in a very wet suit, having managed to vent-off with a hack-saw. As all divers will know, a flooded suit in September is not a pleasant experience.

Still in September, '55, we had the 108 Squadron leaving on time on their hasty mission to Cyprus. Not wishing to hold up the programme of departure for *Floriston*, who had a Royal Marine band to play them away and wives and sweethearts to wave them goodbyes, we roped up her stores lost overboard and freed her screw of a 2½" wire; I was still on the ladder when she left on the hour, with no appreciation from wives and girl friends!

Also in September came C-in-C's inspection, which included the usual exercises of clearing dummy limpet mines from under the mine sweepers; the operation was an A1 turn out.

Before closing this epilogue I would like to mention that the above is the usual part-time work! At present I find myself at sea almost every week plodding up and down the Solent on various sweep-decks of new mine sweepers, as I am in the sweep trials party.

From here to you it's the best of shrimping to all, overseas and at home, from A.B. Cope, S.W.D.; P.O. Gillette, S.W.D.; and P.O. Allen, Diver 3.

P.S. Any spindlers, Ex-*Ceylon* 52 - 54? It's off I gather! I trust that in her new commission she has four well-secured nuts and bosses. J.R.A.

UNDERWATER EXPLORERS' CLUB, 40 Cotton Road, Dundee.

The above club has been formed to further underwater exploration and sport in Scotland. Full membership 10/- a year.

THE SUBMARINE RESCUE BELL

TRIALS—November, 1955

by

Cd. Bosn. F. WALKER, Q.D.D., R.N.

In previous issues of the magazine, you will have no doubt read with interest the articles on the submarine Rescue Bell by Lt. Cdr. R. Clutterbuck, D.S.O., R.N., Commanding Officer of H.M.S. *Kingfisher*.

This vessel (the only submarine rescue ship at present in service in the Royal Navy) carries, apart from the Rescue Bell, a team of divers, mooring equipment necessary for any rescue operation she may be called upon to undertake, and equipment for supplying air to sunken submarines.

... UNDERSTOOD—
KEEP A LEVEL HEAD ...

Trials had been carried out with the bell, over a long period, in various depths and tidal conditions, to a depth of some 300 ft. Our present assignment was to take the bell down to 800 ft—her reputed maximum working depth. It was proposed to carry out this trial in the deep waters off Roma, Isle of Skye, where the ship finally secured in a four-point moor at 1830 on Saturday, 12th November.

Weather conditions were ideal, with a flat calm sea and light winds. A glorious sunrise the following morning augured well for our trial, the first part of which required the bell to be lowered empty to test the W/T efficiency, etc. The lower compartment and ballast tank were flooded; a ½ cwt sinker and five lead 'pigs' were placed in the upper compartment; and the bell, with gasket protection ring firmly secured, was slowly lowered. An alarm clock had been secured near the microphone in the bell, to check the communications at depth and could be heard ticking throughout the trial, along with various banging noises—these were most probably caused by the backhaul wire working in its shackle.



Mr. F. Walker, Cmd. Bo'sn,
Q.D.D., R.N.

THE BELL FINALLY BOTTOMED AT 804 FT

It had been decided to leave the bell on the bottom for a period in order to give it a fair test. After two hours it was hauled back to the surface, and hooked on the derrick and secured. On the upper hatch being opened, water to a depth of some 6 ins was found in the upper compartment.

The actual trial dive, with the bell manned, was planned to take place the following day—Monday, 14th November; and, after preliminary preparations, the bell was hoisted out and manned at 1300 on that day. Again, conditions were ideal. The usual ribald remarks were exchanged

between the ones who were not and the ones who were and, with a 'Good Luck' from the Captain, the upper hatch was closed and the trial commenced. Although the crew normally consists of two operators, our team on this occasion was increased to six—all members of the ship's Deep Diving Team (non-members not allowed on *this* trip!!!) consisting of:—

Cd.Bos'n F. Walker (Q.D.D.), D.O1
Cd.Bos'n E. W. Smith (Q.D.D.), D.O.2
C.P.O. Peach, Diver 1, Chief Diver
P.O. Preston, Diver 1
P.O. O'Connor, Diver 1
P.O. Nickells, Diver 1

'Comfort of the diver at all times' being one of our mottoes, flasks of coffee and piles of sandwiches (various) had been embarked, along with a supply of nautical humour (which prevailed throughout the dive!!). The descent of the bell was checked every 100 ft, and reports made to the surface regarding depth-readings, pressures, valves, etc. At 320 ft, a jet of water through the motor spindle gasket arrived and stayed with us to keep us company! Odd drops of water, from various glands, all combined to keep us busy, tightening (?), checking, and reporting!

As the needle on the depth gauge passed 535 ft a brazen *Cheerio!* *Bollard* and *Passing* rang out in the bell. There's no limit to some people's imagination! It must be noted here that, although the bell and team descended to a depth far beyond the World Record Dive set up by P.O. Bollard using a flexible diving suit, his record still stands, for this dive in the bell was of a totally different nature. Time passed (so did many a good 'crack'), and the gauge registered more and more hundreds of ft, until we realized we were almost at our destination—the dummy hatch.

Suddenly, the bell lurched, the motor took up slack—and we had arrived!! Next thing was to make a seal!!

It was quickly appreciated that the hatch was at an angle (due to the uneven sea bed), and weight was distributed accordingly.

When all possible had been done to ensure a good seal, a pause was made, reports to the surface checked, and over went the quick-acting valve lever.

With an almighty thump we sealed onto the hatch, which evoked numerous comments from everyone (including the surface team)!

On looking through the sighting port to the lower compartment, a large fish was seen to be idling about!—and although our orders were that the lower door was not to be removed, permission to do so was requested and granted. So we proceeded with the normal drill, and embarked A/B Fish (a 2 ft Saith).

It would have been possible to fix all four holding-down bolts. The lower door was then replaced, all preparations made for coming up—and *Stand Easy* sounded (I'll bet it's the first time that's taken place at 800 ft!).

Coffee and sandwiches were enjoyed, amidst a most hilarious atmosphere! Meanwhile on board *Kingfisher*, the First Lieutenant had not been idle! A most hard-working and willing member of the diving team

himself, unbeknown to us, was busily engaged in setting the stage for our return to the surface.

After a ten-minute break, we broke our seal, and commenced our return trip. By the time we reached surface we were doing a continuous 'nought to six' in our self-contained pool! A small one, admittedly, and nothing to worry over.



On opening the upper hatch, we were greeted with loud cheers, warm sunshine, and *most* unkind remarks from the 'non-players. Then the crowd opened up, to reveal the First Lieutenant's masterpiece!—one of our lead pigs, painted yellow, coyly representing a bar of gold resting dormant in a box marked 'Treasury Bullion'—Diving Payment!

A fitting climax was the discovery of the twin to our fish passenger, resting on the ledge behind the reel in the lower compartment.

Both Wardroom and Diving Team thoroughly enjoyed a generous fish course at the evening meal. The whole trial was considered highly successful as it was the first time the bell had been down to 800 ft. The angle of the hatch had been conservatively estimated at 15°.

Since our refit and Easter leave, the ship has been 'working up' again, which has included bell trials (with the hatch angled up to 28°), training for deep diving, using air, and O₂H₆ to 400 ft, and doing full mooring runs.

Later in this term, it is hoped to carry out a further 800 ft bell dive on an angled hatch in a tideway, probably in the waters off Rathlin Island, Northern Ireland.

In closing, credit for a great part of the success of the bell dive must be given to the handling party on deck. They have the task, often in very trying conditions, of manhandling the necessary air hoses, backhaul, retrieving line, etc., whenever the bell is operated.

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COMMANDER L. K. P. CRABB, O.B.E., G.M., R.N.V.R.(S)(Ret.)



I am sure I can say without any fear of contradiction that Commander Crabb was one of the most beloved characters of the R.N. Diving fraternity. Respected by both officer and rating alike, he was a most welcome guest to either company.

His first association with the underwater world was in 1940, when, as a Naval Bomb Safety Officer, he completed a shallow water diving course and became second in command of an anti-limpteer unit at Gibraltar. His exploits in these operations have been widely publicised, and they need no enlargement from me.

After the war he was called on for similar activities during the Palestinian trouble, and 'CRABBIE' became a household word among the ships of the Mediterranean fleet at that time.

When he was finally demobbed, he turned from searching of ships' bottoms, to an interest in underwater photography, and records of his work are screened weekly for the benefit of would-be divers.

In 1951 he again donned his uniform and renewed his acquaintance with the Navy, this time in the roll of a Diving Trials Officer, and in this capacity he served until 1955. During this period he was promoted to Commander.

His last operation is something of a mystery but I feel that is how he would have wished it. He was after all a bit of a mystery himself.

It is hard to believe that 'Crabbie' is now lost to us, and that his familiar jaunty figure will never grace our company. However, he will long be remembered by those who had the honour of making his acquaintance, and never forgotten by those who were privileged to call him a friend.

G.A.F.

NOTES FROM H.M.S. FLATHOLM

It seems such a long time since the name of *Flatholm* graced the pages of our magazine, that I thought it high time some of our brethren were reminded that there is more to the C.D. side than armchairs and cavorting in sunny climes. So to introduce ourselves once again to readers, here is a quick re-cap (who said I never went to Corsham?) of our activities during the past year.

Most of the time has been spent in Liverpool on survey work (you know, thousand ft. jackstays and all that, old boy), although it is noticeable that certain team members do more surveying of the lovely Merseyside girls than surveying the river.

Last June, P.O. Roberts was relieved by P.O. Ben Claxton, who was just in time for a trip to that pleasant little place called Alderney, where, it seems, divers are not only well known, but popular. Then early this year we said goodbye to Lt. Dowland, and welcomed Lt. Gillam in his place. We also bade farewell to L/Seamen Teddy Rose, Knobby Clark and Willy Waller, and again laid down the rug of welcome to A.B.s Newman and Horrocks and L/Seaman Sherpa Housden (the slave) in their places. Then it was once again goodbye to the Captain, Lt. Cdr. Tyson, who has now retired, and a hearty welcome to Lt. Cdr. Roberts, who, we hear, has worked with divers before, so the ardent prayer at the moment is that they were good to him—for our sakes.

August, and again in December, saw us in Devonport for leave, where C.P.O. Bill Soper and his not-so-merry men spread forth the cloak of hospitality in the usual manner. At the time of writing the ship is just completing a two-month refit in Devonport, and everyone is busily engaged in preparing in more ways than one for the return to our old hunting grounds and the charms of those lovely Merseyside girls. At this point, Mr. Editor, will you allow me to go on record, on behalf of the ship's company, and say how hospitable the Merseyside people have been to us. And, in particular, may I mention the committee and members of the Royal Naval Club and the Wallasey Ferries Club, who have been outstanding in their hospitality to the ship.

At the present moment the team have got the 'Refit Blues' but they still think they can 'run, dive and drink' any other team under the proverbial table, so any prospective visitors will be well advised to bring a spare byepass and Alkaseltzas with them.

Cheerio for now, and the best of luck to all divers everywhere. And don't forget, 'Ther's old divers, and bold divers, but there ain't no old bold divers'. (With apologies to P.O. Nicholson, R.C.N.)

BREAKING THE WORLD'S DIVING RECORD (1948)

by

LIEUTENANT COMMANDER H. WARDLE, R.N.

(Note—This article continues from Part 6 in Vol. 4, No. 1)

Part 7—The Final Dive

On completion of the 360 ft series it was clear that with the helium remaining we would have to reduce the team down to two. Needless to say this was going to cause considerable disappointment to the other four. After careful thought I decided that the two to go would be P.O. Soper and P.O. Bollard.

The team took this decision well and like the fine team they were all buckled down to the routine—but so important—testing of equipment, P.O. Yates and Jackson checking over the helium cannisters with the usual meticulous care and P.O. Hopewell and L.S.B.A. Soulsby producing incredibly accurate Oxy-Helium Mixtures at the diving panel.

On Tuesday, 24th August, we were all ready to go for the 400 ft series using a 15/85 mixture. Some adjustments had been made to the drill. A five cwt sinker had been put on the main shot. To ensure that the diver did not catch any turns round the shot a wire guide shot, also with a five cwt sinker, was rigged about 10 ft from the main shot. The diver was wearing extra woollies, and the front glass was cleaned with anti-dim to prevent misting up.

P.O. Bollard dived first without difficulty except for getting down the last 100 ft to 398 ft. On completing his decompression he was doubled sharply round the upper deck with a home-made Olympic Torch—a holed 'Tickler' tin mounted on a wooden handle containing some foul oily waste which burnt most efficiently.

P.O. Soper carried out the next dive. When near the bottom he reported that the shot rope was foul of the cable. He asked to be pulled up 10 ft to clear the cable. The whole operation was carried out with the same efficiency as at 40 ft, 396 ft fortunately not quite qualifying him for the torch.

The weather continued to be bad at Tarbert. In view of this and the bad holding ground there we sailed up to Inveraray for the 450 ft series.

26th August was another good day. P.O. Soper led the way with a dive to 451 ft on a 13/87 mixture. By beating the 440 ft American depth he was, for a short while, the World's Flexible-suit Deep Diving Champion and was therefore eligible for *Reclaim's* Olympic Torch marathon around the upper deck.

P.O. Bollard carried on next with a successful dive to 455 ft, again just pipping Soper's depth. Both divers had no difficulty except for getting down when nearing the bottom.

We had literally reached the very bottom at Inveraray and so once more we returned to Tarbert.

We now faced another 'snag.' Allowing a reserve of gas for emergency we only had enough helium for one dive to 500 ft. The question was, which of the two divers was it to be? It was quite impossible to choose on merit, both divers having shown sterling qualities in their previous dives and both were mighty keen to go on.

The decision was eventually made by the simple expedient of drawing lots by using short and long sticks. P.O. Soper drew the short stick so it was P.O. Bollard for the final dive.

The next 24 hours were probably the most nerve-racking of all. In the process of testing equipment we found that each time we connected the air pipe up and applied the test pressure of about 300 lbs \square to the air pipe it burst with a tremendous bang!!

Bollard looked the other way and pretended not to hear whilst the team busily inserted another length in lieu of the burst pipe. I think it was only at this stage that the full import of the effect of the pressure experienced by the diver at 500 ft was brought home. After all it was to be about $15\frac{1}{2}$ Tons per square foot!!! Little imagination is required to work out the effect of a burst air pipe at that depth. It says much for Bollard's cool confidence that he was undeterred by these snags. His only omission was failure to initial my diving daily order book which included the statement—'Set World Deep Diving Record of 500 feet plus'!!!

At this stage Commander Shelford recalled that some time previously Siebe Gorman's had prepared and specially tested a number of lengths of air pipe. Off went a telegram and Siebe's quickly came up trumps with the serial numbers of the tested air pipe and soon all was well. By about 8 p.m. that Friday evening every possible check had been made on the equipment and Surgeon Commander 'Bill' Davidson ex. *Deepwater*, with Surgeon Lt. Barnes, checked and re-checked the stops to be given for this dive which was to be carried out using an 11/89 mixture.

Saturday, 28th August, 1948

This day, which was to become famous in the annals of British Deep Diving, broke with the weather-man kind to us. The strong south-easterly wind which had been blowing up Loch Fyne had eased and Commander Shelford had the ship comfortably at anchor in a 90 fathom patch on the eastern side of Loch Fyne opposite Tarbert.

Soon all was ready in the Diving Flat; Bollard was dressed with only one addition to his gear, an extra 5 lb weight secured to his front weight to counteract previous difficulty in getting down. So after my final word to the diver and the good wishes of the team, Routine of the Diving Drill went into action:—

'Diver ready to test Injector.' 'Open Injector.' 'Close Injector.'

'Diver ready for the water, Sir.' 'Lower S.D.C.' 'S.D.C. at Two Four O feet, Sir.'

(Note: If the reader has ears hold your nose and blow gently.)

'Carry on with the diver.' 'Diver entering the water.'

'Diver testing for leaks.' 'Diver has no leaks.'

'Diver leaving surface.' 'One O, Two O,' etc.

'Two Four O.' 'Diver stopped.' 'Off air.' 'On O₂/H_e.'

(After about one minute the noise of the gas passing through the helmet assumed a higher pitch as the helium reached the diver.)

'Tell the diver to start counting.' Over came Bollard's voice already 'Donald Duckish' and after a few numbers it was clear that helium being supplied had removed the air from the helmet.

'Tell the diver to carry on down.' 'Two Five O.' 'Two Six O' . . .
'Four Eight O.' 'Four Nine O.' 'Five Double O'!!! 'Five One O.'
'Check the diver.' 'Ask the diver if he is fit for another 25 feet.'
'Diver ready to carry on down.' 'Carry on down, diver.' 'Diver stopped.'

'Diver on the bottom.'

'Diver's depth Five Three Five Feet, Sir.'

'Open Injector.' 'Injector Open.' 'Injector Steady.'

At this stage Commander Shelford and I were standing by the Oxy-Helium Panel when Commander Shelford summarised very well, I thought, what we were all feeling. 'Little did I think,' he said, 'Back in 1917 that we would be standing here so calmly with a diver down at five hundred and thirty five feet!!!'

'Ask the diver if he is quite comfortable.' 'Diver reports fit for another 200 feet, Sir'!!! After a few more questions, all of which the diver answered without hesitation, showing no sign of Nitrogen Narcosis, or Helium Helicosis as we thought we might call it, $12\frac{1}{2}$ minutes from leaving surface with 5 minutes on the bottom.

'Call the diver up.' 'Ready to leave.'

'Pull the diver up to his first stop.' 'First stop Two Four O feet'

(See my former re. clearing of ears.)

So the diver was pulled slowly up to his first stop with his injector still open to give the diver maximum ventilation and therefore keeping down the danger of carbon dioxide. 'A little slower.' (This from Shipwright Harfield who was controlling the speed of ascent by stop watch.)

'Two Six O.' 'Two Five O.' (From S.D.C.) 'Diver on the Ladder.'

So here we were with the diver comfortably on the ladder at his first stop 240 ft with the drill working out like clockwork.

'Hoist the S.D.C.' 'Check.' 'S.D.C. at One Nine O feet.'

So it went on until, with the diver at 100 ft about 70 mins after entering the water, he reported feeling cold. This may indicate that the electrically heated suit may be desirable during the long period of inactivity while decompressing.

'S.D.C. at Six O feet.' 'Call the diver up and into the S.D.C.'

'Ready to Close Lower Door.' 'Close Lower Door.'

'Lower Door Closed.' 'Hoist S.D.C.'

The S.D.C. was then hoisted from the water and lowered into the foreward hold with the gas inside at 60 ft pressure.

'Break down to Fifty.' 'Break down to Forty.' 'Break down to Thirty.'

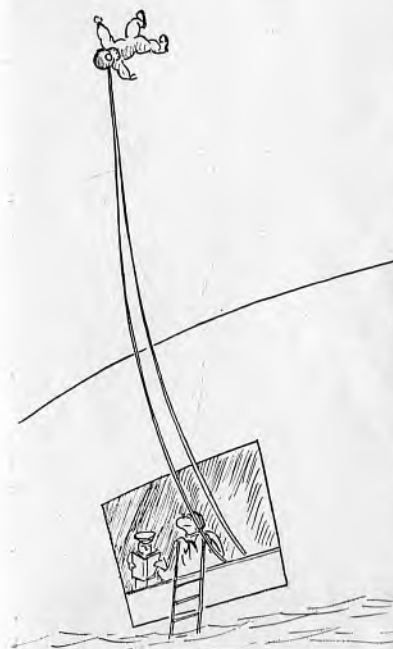
The next stop was the evolution. The transfer from the cramped quarters of the S.D.C. to the comfort, hot drink, etc. of the Main Recompression Chamber. 'Break down to Surface.'

The S.D.C. door was quickly opened and willing hands helped Bollard and his attendant L/Seaman Londesbrough out and on their way down to the Flat. On the way down, between grateful puffs at a cigarette, Bollard indicated he had a slight pain in his left arm.

This had gone when he was back at 30 ft in the Main Recompression Chamber—But, to be sure, he was taken down to 70ft and decompressed



from there. This bend was almost certainly attributable to the transfer procedure at 30 ft when the diver still had a couple of hours decompression time to do.



Helium—a non-inflammable gas used in airships?

Once again P.O. Bollard wended his merry way around the ship with his Champ's torch to the cheers and laughter of every man-jack on board, a crowning triumph for our Captain, Commander Shelford, who was shortly to leave us.

The drawing by Commander Shelford shows pictorially our progress. The two characters at the top of the chart—'Deep' Fields and Weeks—are our Engineer Officer Mr. Fields, and E.R.A. Weeks, who were 'accidentally' put under pressure whilst working in the S.D.C.

After suitable week-end celebrations in Tarbert, H.M.S. *Reclaim* set sail for Portsmouth on 30th August barely three months after commissioning, holder of the World's Deep Diving Record for Flexible-suit Diving in the Sea—which has yet to be equalled. I, and all who served on board these hectic three months, had every reason to be proud of *Reclaim's* company, which had shown every quality of team spirit which a small ship can achieve.

CLEARANCE DIVING TEAM, PORTLAND

Since last appearing in these pages life has shown more variety (although it lacks the spice!). Two events predominate, one was the recovery, during a certain ship's absence, of over a hundred meat dishes; these were located during a search exercise which purely by coincidence took place in her old mooring berth a couple of days after she sailed. We hope that our subsequent action in returning them has not caused too much consternation and trust that the gash-shoot sentries are enjoying their new job and that the galley routine for the benefit of laggard cooks of messes is working satisfactory, Oh! and our best wishes to men under punishment who no doubt are still employed refurbishing these treasures from the deep. Somehow I think we must be very popular in some quarters. Nuff said!

The other event, ending in more pleasant consequences, was the team's visit to Portsmouth where we were engaged in trials work for a few days. It was a nice change to renew acquaintances, exchange yarns and

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do a 'one way' swap in stores items. However, as far as the latter were concerned, it must be admitted that *Deepwater's* security arrangements were excellent (Wot's wrong, don't anybody trust us?). Arrangements for our stay in *Deepwater* were wonderfully organised and consisted of burglar-proof locks, armed guards, and ABANDON SHIP exercises; but, quite seriously, we were very well treated and should like to express our appreciation through these pages. The arrangements made for us and the provision of boats and other facilities certainly made our task a lot easier.

By the time you read this we shall be the proud possessors of an M.F.V.; this should obviously extend our capabilities and incidentally make life more comfortable. Working in the 'Bay' a 30 ft open boat isn't really fun in mid-winter round these parts, besides, Chum, think of the prestige.

Our relationship with the Boom Defence Section—Ring-Master Mr. 'Syd' Enwright, and the 'X' Craft unit, is still on a good footing although we are sorry to see several departures from the latter, including Lieut. Cdr. M. Todd, Lieutenants Swinley, Mitchell, and Strang, also Chief E.R.A. 'Yorkie' Baker; we wish them the best of luck in their new jobs and extend our greetings to their successors.

The social programme has been rather limited, although the season did produce the team a new Pin-up Girl, Miss Julia Christmas, who arrived a few weeks ago. To Petty Officer and Mrs. Christmas we offer our hearty congratulations.

From all members of the team we wish you all the best. C.D.

A CHILLY OUTING WITH THE UNDERWATER EXPLORERS

It was a dreich, grey Sunday—just the sort for drawing your chair up to the fire.

The water of the Tay at Waukmill Ferry, four miles above Perth, looked cold. In fact it was 38°F—yet a couple of Dundonians plunged, splashed and swam in it as if it were blazing midsummer.

Walter Deas, 40 Cotton Road, and Geoffrey Wilson, 220 Ferry Road, members of Dundee Underwater Explorers' Club, seemed impervious to the cold in their frogman's suits. Geoffrey was handselling his new suit (£16 6s. 6d. with hood).

Under their rubber suits the underwater explorers wear several sweaters, and long drawers or ordinary slacks and long stockings. Over their hoods go their glass-fronted diving masks and snort breathing tubes. On their feet they wear the well-known flippers.

Walter wore Navy-type rubber kapok-lined gloves which lock over the sleeves of the suit. Geoffrey made do with ordinary red rubber gloves over woollen ones. When he came out of the water after 15 minutes and removed his gloves, there was no difference in colour between the rubber gloves and his hands—the latter were so cold. That was why he came out. But after 10 minutes he was in again—in search of pearl mussels. The Tay at Waukmill is a happy hunting ground for the club on this ploy.

Walter and Geoffrey swam to the opposite side. Their snort tubes looked like submarine periscopes as they ploughed along just underneath the surface scanning the river bed. After 20 minutes they fought their way back against the strong current with their haul—two shells in an old respirator case at Geoffrey's belt.

The shells were opened quickly by other members of the club, while Geoffrey and Walter were helped out of their suits. There was nothing but the mussel in either shell.

Last summer club members gathered hundreds of shells. One pearl per 50 was the best average take. As many as 300 shells in one expedition have produced none and as few as 52 have yielded four. Allan Doyle, another member, sold one of his last year's pearls for £2 the other day.

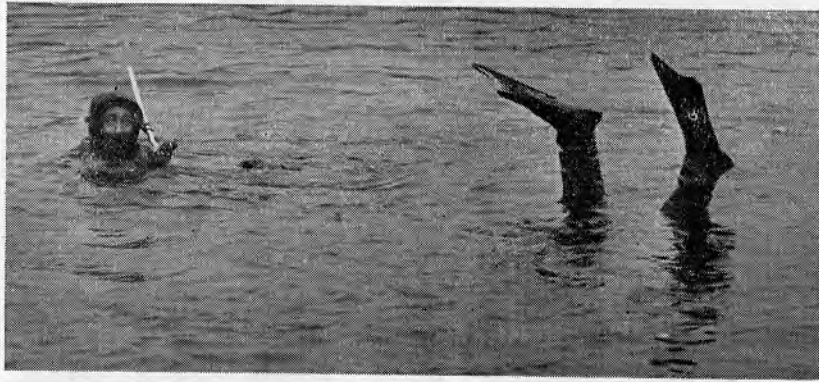


Photo by kind permission of the Courier & Advertiser, Dundee

BROKE THE ICE

Geoffrey was well pleased with his suit. His clothes were quite dry apart from a narrow band of dampness round his top sweater. It marked the place where the top half of his suit, a blouse fitting tight round face and wrists, met the bottom, comprising feet and trousers in one piece. The overlap in the middle is locked in place by a tight rubber cummerbund.

Although the weather for the trial of Geoffrey's suit had been cold, it was not the worst these hardy swimmers have known. Recently they broke two inches of ice in a quarry near Dundee with an axe, to test their equipment in what they consider 'really cold weather.'

DEPTH RECORD

For deep diving members use weighted belts (7 and 14 lb.) and aqualungs. Twin cylinder ones cost £65 each and single £40. The aqualungs hold not oxygen, as is popularly believed, but compressed air at 1800 lbs. per square inch. This pressure is reduced by valves and delivered by tube and mouth-piece at the flow demanded by the lungs.

Allan Doyle holds the depth record for the club. He was 100 ft. down on one occasion last summer.

Depth of dive is checked by a gauge worn on the wrist.

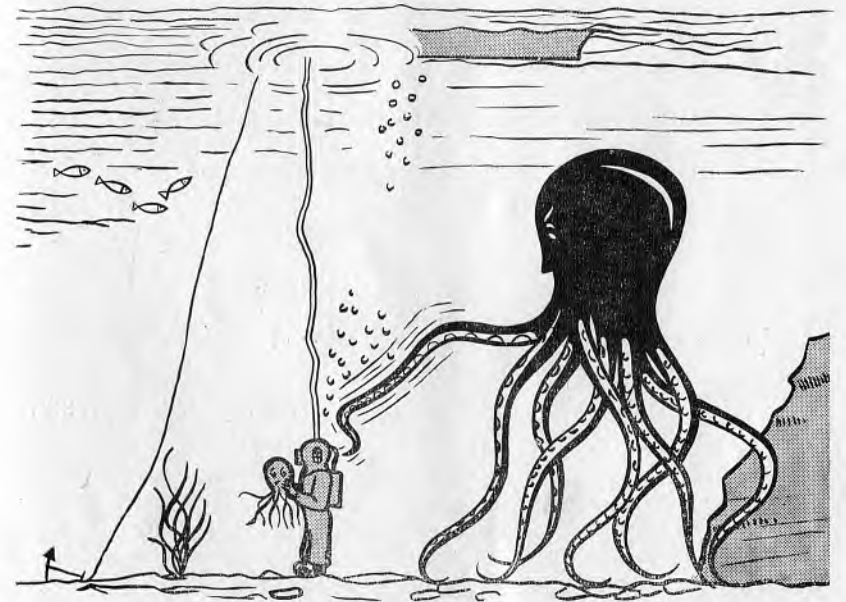
The club (annual subscription 10/-) is the only independent one of its kind in Scotland. It was formed three years ago by Mr. Davidson, 57 Strathern Road. There are twenty members, with the average age in the early twenties. Mr. Stanley Stamper, 8 Noran Avenue, is President; Mr. Deas, Secretary; and Mr. J. Pope, 2 Ford's Lane, Treasurer.

In the club's ranks are joiners, painters, labourers, a journalist, a bricklayer and a shop manager. Meetings are held at the Central Baths or at members' houses.

Apart from the hard core of keen types, who swim all the year round in quarry, river or sea, the club's main activities are held in the summer. Then they train in Broughty Harbour. On outings farther afield, they search for wrecks and hunt fish with spear guns.

Holidays are spent on the west coast south of Oban, around the island of Easdale. The club caught a young shark there last year. A party intends returning this summer.

This article was sent to us by a subscriber from Dundee and re-produced for the R.N. DIVING MAGAZINE by kind permission of the Editor of the DUNDEE EVENING TELEGRAPH AND POST. Editor.



Famous last words No. 1: 'Lucky it's only a sprog'

51st CLEARANCE DIVING TEAM (H.M.S. Brenchley)

At Present Residing at Port Edgar.

Greetings and Salutations to all divers everywhere.

Yes! We are still around, even though you have not heard from us lately it doesn't mean we are inactive. Our usual trip southwards proved a boon to 'Smoke' natives, as we spent our time between Harwich, Chatham and Sheerness. Then as a break from the mundane mud tasks we paid a visit to our namesake village, Brenchley, an 'olde worlde' village, deep in the heart of Kent. We played them at soccer and came off winners by nine goals to five (and it wasn't even muddy either!). A crew of twenty-four to select eleven footballers from; still, the 'Mid' did have one practice game in goal to convert him from rugger to soccer! The housewives provided plenty of fare for the hungry and whoever heard of a 'Drinks for Sailors Fund,?' We have! The village 'Yorkshire' never ran dry. They did us proud! Are we going again?—Are We!

What a contrast awaited our return from this most pleasant visit. Annual Docking and all the privations that it entails. We are now back again on the south side of the river and free from the rhapsody of windy hammers, etc., ready to re-join our compatriots the 50th Clearance Diving Team, Lt. Cdr. Filer and his boys.

We welcome the arrival of Mr. Dodd, Q.D.D., to *Safeguard* fresh from that diver's paradise, Horsea Island Diving Section.

Our team to date reads as follows:—

Lt G. A. Worsley, L/Sea Neve C.D.II., L/Sea Atkinson C.D.III., A/B Harrison C.D.II., A/B Wilson C.D.III., A/B Lott C.D.III., A/B Hills C.D.III. and our latest arrival from Poole, A/B (No Legs) Ayre C.D.III.

All members send their deepest sympathy to the wife, relatives and friends of A/B Chipperfield. A grand chap who will be missed by all who knew him.

Congratulations to Lt Worsley on his promotion of the 'Half' due in two days' time.

Ta-Ta! from the HIE-lands, any time you are passing, drop in on us, you will be Welcomed Aboard. D.A.N.

PRINCIPLES AND TECHNIQUE OF FREE ASCENT IN SUBMARINE ESCAPE

by

SURGEON LIEUTENANT COMMANDER W. E. CROCKER, R.N.

PART I

Since the submarine first became an effective weapon of war at the beginning of this century, a variety of methods enabling the crew to escape if the vessel fails to surface have been devised. Some have proved to be valuable life-saving measures, but many others have been unsuccessful because they failed to overcome the physiological hazards involved or were incompatible with the principles upon which submarines are designed and operated.

The submarine, more than any other warship, spends the greater part of its operational time out of contact with friendly forces and in waters controlled by the enemy. Any escape apparatus, to be effective, must be designed to operate independently of surface vessels and immediate friendly aid. It is, moreover, essential that a reasonable balance should be struck between the efficacy of the escape method and the fighting qualities of the ship. There is a limit to the amount of escape apparatus with which a submarine can be equipped without affecting its warlike attributes and, if this is exceeded, the whole purpose of the safety measures may be defeated by rendering the vessel more vulnerable to enemy action or to the normal hazards of the environment in which it operates.

The submarine service has recently started to train its personnel in a new method of escape which goes farther than any other to meet the foregoing conditions. In this method the survivors ascend to the surface without breathing apparatus and, to appreciate its advantages, it is necessary to consider the existing escape routes and apparatus and their shortcomings.

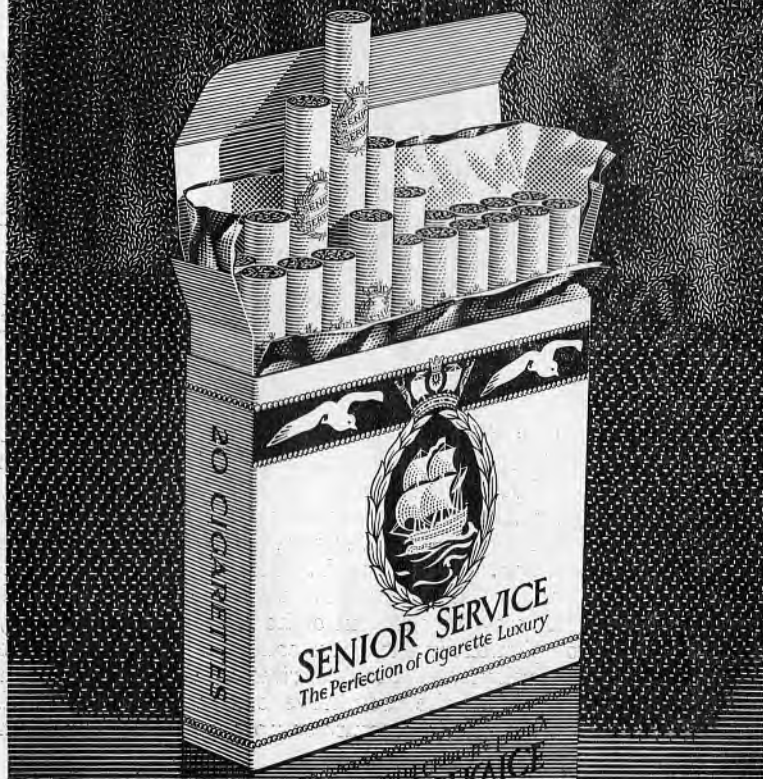
Existing Methods.

Existing methods may be divided into those requiring help from the surface and those in which the survivors reach the surface by their own efforts. The first group includes the raising of the submarine by salvage methods and an American invention known as the rescue bell. The latter is a diving chamber divided into an upper and lower compartment, with a communicating hatch. It is lowered to the sunken submarine and fits over a specially designed hatch so that a watertight seal is made allowing members of the crew to climb into the rescue bell with safety. When there is a full complement in the upper compartment, both hatches are closed, the seal is broken and the bell rises to the surface. This operation is repeated until all the crew have been saved. The whole process takes place at atmospheric pressure so no physiological problems are involved.

All methods requiring surface ships need a considerable amount of good fortune to be successful. Firstly, the surface forces have to get to the scene of the disaster and locate the submarine with considerable accuracy. Secondly, the crew must be rescued before they succumb to the accumulation of carbon dioxide and oxygen depletion in the submarine's atmosphere, and finally such methods are at the mercy of the weather, tide, and the enemy in the time of war. For these reasons salvage methods have no place in the Admiralty submarine escape policy and the rescue bell is intended to be used at greater depths than those permissible for individual escape.

Experience has shown that forms of escape which are independent of assistance from the surface are likely to result in the greater saving of life, even though the attendant physiological hazards make any escape a risky undertaking except from the shallowest depths. These hazards arise from the fact that the survivors must be exposed to an ambient pressure equal to the depth of water in which the submarine is lying

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before it is possible to open a hatch and get out. There are two ways in which the pressure of the escapee's environment is equilibrated with the outside sea pressure.

The first is known as 'compartment escape'. The members of the crew congregate in certain compartments towards the ends of the submarine which are isolated from the flooded parts by watertight doors. These compartments are fitted with hatches from which a collapsible twill trunking is lowered to within a few feet of the deck. Valves are then opened to admit sea water and, as the water-level rises, the air in the compartment is compressed. When the pressure is equalized the water stops rising and the hatch may be opened. The trunking fills with water and prevents air escaping through the hatch because the bottom of it is below the surface of the water. The air trapped in the compartment prevents any further rise of water when the hatch is opened. The survivors may then duck inside the trunking and rise through the hatch to the surface.

The other route is by a special chamber, built into the hull of the submarine, by which the men leave singly or in pairs. The chamber is flooded till the pressure is equalized, the pocket of air remaining is vented through a small valve into the sea, the hatch is opened and the escapee floats upwards.

Escapes by either of these routes give a reasonable chance of success from depths down to 300 ft, but below 300 ft the effects of nitrogen narcosis while under pressure and decompression sickness after surfacing, reduce the chances of survival so drastically that the rescue bell, even with its disadvantages, becomes the method of choice.

Oxygen breathing sets were, until recently, used in conjunction with these two escape routes. These sets (the Davis submarine escape apparatus) were intended to be worn during the flooding period and the descent, and provided the buoyancy necessary to bring the men to the surface. Although many lives have been saved with this apparatus it has two main drawbacks. The first is that oxygen has poisonous effects when breathed in high concentrations at great depths and the second is that, like all other diving gear, it demands a certain degree of composure and self-discipline on the part of the user - qualities which may be lacking under the conditions of a submarine accident.

In April, 1946, an Admiralty committee was set up to review existing methods of escape and to make recommendations for future developments. It collected a great deal of data concerning all previous submarine disasters in our own and foreign navies and interrogated many witnesses who themselves had made successful escapes.

The committee found that a surprising number of men reached the surface without any kind of breathing apparatus. It also learned that many other men who had sets used them incorrectly and lost their lives. It was also aware of the fact that oxygen is liable to have toxic effects if breathed at pressures of more than 2 atmospheres absolute. These three facts encouraged the committee to enquire more closely into the possibilities of ascent without apparatus, and, finally, to recommend its adoption as a standard method of escape.

The new form of escape became known as free ascent and the principles upon which it depends will now be considered.

A man of average build is buoyant because he weighs less than the water he displaces. The degree of buoyancy, and therefore the rate at which he rises through the water, depends upon a number of anatomical factors, particularly the relationship between the size of his thorax and the weight of his solid tissues. Consequently the rate of ascent depends upon the degree of lung inflation; if the lungs are expanded he rises, if they are deflated he sinks.

At the beginning of the ascent the lungs are filled with air at a pressure equivalent to the depth of water. As the man ascends the air in his lungs expands as the pressure decreases (Boyle's law) and the excess must be allowed to escape from the mouth. If the breath is held the intra-pulmonary pressure rises above that of the surroundings and the lungs may be damaged. On the other hand, if he exhales too quickly he will lose buoyancy and sink.

The man's oxygen supply depends upon the amount contained in his lungs at the beginning of the ascent. This being at a high partial pressure is more than adequate in the early stages, but the volume lost by exhalation and his own oxygen consumption, introduces the risk of anoxia during the later stages of a prolonged ascent.

The carbon dioxide produced during the ascent is partly eliminated by exhaling but again, if the ascent is prolonged, the partial pressure in the alveolar air may rise to a dangerous degree. In such circumstances, the oxygen lack and carbon dioxide accumulation, being the main stimuli to respiration, may force the subject to breathe water into his lungs before reaching the surface and drown.

Rate of Ascent and Buoyancy.

From these principles, it becomes obvious that buoyancy and rate of ascent are the factors upon which the success of the method depends. The committee realised that if the method were to be adopted it would, for reasons already mentioned, have to be practicable for depths down to 300 ft, and doubts arose as to whether a man's natural buoyancy would be sufficient to bring him up from such a depth with safety. It was, therefore, decided to carry out experiments at the Royal Naval Physiological Laboratory to determine the optimum rate of ascent.

In these experiments human subjects were compressed while sitting in a tank inside a chamber to the equivalents of depths from 33 ft to 300 ft of water. They then put their heads under water and exhaled continuously while being decompressed to atmospheric pressure. It was deduced from these experiments that the optimum rate of ascent is about 4 ft per second and that the ascent from any depth should not take longer than a normal man's limit for breath-holding which is about $1\frac{1}{4}$ minutes. The rate of ascent with natural buoyancy, however, is only $2\frac{1}{2}$ ft per second and is quite inadequate for an ascent from 300 ft.

A further argument against free ascent with natural unaided buoyancy is that it requires a considerable degree of skill and experience

to be successful. The novice is liable to breathe out too fast so that he loses buoyancy and sinks or he holds his breath in order not to sink and damages his lungs. These considerations caused the committee to decide that if the method of free ascent were to be introduced, it would have to be carried out with some form of artificial flotation to bring the survivors up at the requisite speed.

Free Ascent In Practice.

The United States Navy has been training its personnel in free ascent for many years. Instruction is carried out in a diving tank 100 ft high and the trainees start their ascent from air-locks placed at intervals between

the bottom of the tank and the surface. Natural buoyancy only is used but the trainees come up a line hand over hand so there is no danger of sinking should they breathe out too fast. Although considerable experience has been gained in this technique, the primary escape route in U.S. submarines is the rescue bell, and free ascent is still only an alternative to other methods

For reasons stated earlier, the Admiralty's escape policy favours techniques which are independent of surface assistance and feasible for any depth from which an ascent is a physiological possibility. It is considered that free as-

cent with artificial buoyancy is the only method which meets these requirements and a 100 ft tank similar to those in the United States has been built at Fort Blockhouse, Gosport, to put these views into practice.



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CENTAUR CHRONIC!

Diving, what's that? Since the ship left Blighty on her flag-showing tour we've almost forgotten what a diver looks like. Not that it's our fault mind you, nor even the fault of our big white boss Mr. Fox.

What can you do, though, apart from draping a wire round the screws yourself? We're truly nipping about, plenty of sea time and all that—some of you older diving school stanchions may have forgotten what that is—but it's what we're doing plenty of. Two days in Gib.—cor' what a rush on the White Suits that week end—then on to Malta.

That was a lucky place for us poor under-worked divers; some silly twisted 'fly boy' dropped, pushed, or otherwise lost, an aircraft-maintenance ladder from the flight deck. Almost before the splash had subsided Davy (not of the Jones variety) was plummeting down after it. Somehow he missed it, and after about half an hour at 76 ft he was brought up. His place was taken by our scribe, who spent about an hour in the murky depths. The only thing he succeeded in doing was to make the depths murkier. However, it was enthralling and quite a change for us Chatham-trained divers to be able to see at all, for the visibility at the bottom of Bighi Bay was about 20 ft—until one moved and stirred it up.

Undaunted by our failure we spent the next afternoon, under the parental wing of Mr. Foster and his dip-chicks, at Manoel Island, with the hope of a little self-contained diving but fate decided otherwise. We chose the coldest day Malta ever had, 34° F, so no diving. Several times we thought the school roof was coming in, as hail stones the size of—well pretty big ones any-way—hurtled down in torrential ferocity. Dismayed and dry, we returned aboard.

The next day we tried for the ladder again. Who can claim responsibility I don't know, but we put the shot right on to the top step, the ladder having landed upright. Davy, being first down again, nonchalantly climbed to the bottom step before he thought this might be the ladder we were looking for. Including his stop, that dip gave him six minutes under pressure, so you see we've been rather short of penny minutes.

Since then both Karachi and Colombo have been barren of any dives (except 'Dick's Dive' in Colombo) but shortly we'll see Singapore and Hong Kong—and maybe a dip or two. So it's cheerio from us both.

DAVY AND DANNY.

THE FAR EAST CLEARANCE DIVING TEAM "SHARK REPELLENT TRIALS"

From time to time suggestions and theories on shark deterrent have been submitted, and this story tells about the trials carried out by the Far East Clearance Diving Team.

In June, 1955, the team embarked in H.M. Tug *Enigma* and sailed for Paula Tioming, an island off the east coast of Malaya. We arrived on the morning of Thursday, 11th June. After anchoring, the team embarked in the motor boat and proceeded in a shoreward direction to study the fish life through two glass-bottomed boxes which were soon nicknamed 'Shuffy Boxes'; these proved most effective in depths up to 30 ft. The fish were so numerous and colourful that it was like being in a tropical

aquarium. Unidentified large fish broke surface in their chase of smaller fish but no positive shark sightings were made.

In the afternoon all the team were exercised in pairs, wearing a black undersuits and breathing apparatus; rubber suits were not worn in view of the heat and excellent visibility. Were it not for a tendency to look over one's shoulder to see if there were any sharks about it would have been very enjoyable. The team theme song was 'Look over your shoulder, who's swimming behind?'!!!

The next day we exercised again wearing suits. We had no shelter from the sun when dressing and waiting to dive, and by the time we entered the water we were nearly exhausted. Later when wearing suits we dressed in the shade and frequently washed down the diver with buckets of water.

The exercise that night brought little of interest from the diving aspect, though F.C.D.O. with A.B. Chaplin in company hit the bottom at 120 ft (cannot forget he is a Qualified Deep Diving Officer). Mr. Mappley's account was amusing; apparently during the run he found Jock Egan nestling close to him. On looking round he saw a manta ray twice the size of a pusser's blanket close by (his story). Fortunately, it appeared that it belonged to the Starboard Watch, in which direction it disappeared.

On Sunday morning, 19th June, we started the Shark Trials. The first object was to entice the sharks around the ship. To do this we had attractive baits of pork and rabbit streamed from the ship whilst Mr. Mappley, his fisherman's instincts fully aroused, went inshore with a number of hand grenades.

Our aim inboard was to entice sharks around and then hang bait from the ship's side with shark repellent attached, to test its effectiveness, while those in the motor-boat exploded the grenades where the bottom was visible to see if the sharks would go in to eat fish stunned by the charge.

No bites were experienced on the ship, though the motor-boat trip proved most illuminating. Several grenades were dropped, and after about 5 mins a shark-like fish was seen eating the stunned fish. One hour later a 1½ lb charge was dropped in the same area. A small shark immediately leapt out of the water. After a couple of further leaps it appeared to quickly settle down to the business of eating the fish so easily on hand.

The next day brought success to the ship. Six shark hooks were baited with pork, three forward with no shark repellent and three aft at 30, 60, and 90 ft with shark repellent. After about 3 hours a shark about 8 ft long was hooked on the after 90 ft line. Unfortunately the shark slipped the hook when brought to the surface. Five minutes later it was sighted again and hooked on the crew's line, which was baited with mutton, but when brought to the surface it again slipped the hook. To continue in narrative form:—

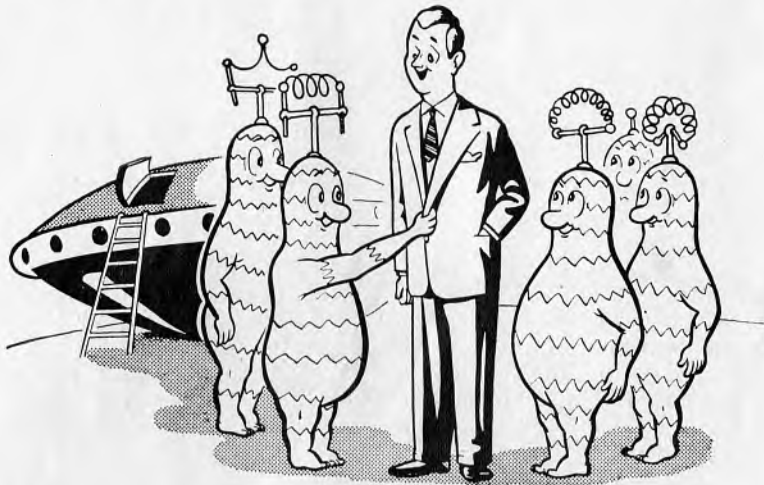
1210 Renewed shark repellent on three after lines.

1440 Bite on after 60 ft line.

1450 Shark seen aft.

1500 Small shark hooked on crew's line. Four larger sharks sighted swimming around after-end of the ship. Second shark about 8 ft long

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hooked on 30 ft line. Held on the surface about 4 mins and shot at with .38 pistol. The shark, however, still parted the line and swam away. The small shark about 5 ft long was safely landed.

1550 Hooked large shark on 60 ft line. Brought it to the surface well hooked. Length about 12 ft. While trying to get the shark inboard, however, it straightened the hook and escaped. At this stage six bites had occurred on lines baited with shark repellent, and two on the crew's line. No bites had occurred for'd. It appeared, therefore, that the sharks preferred their bait covered with shark repellent powder!! The pork aft was blue with powder.

Perhaps the sharks were reluctant to go under the ship to get at the bait streamed for'd. So the repellent-baited hooks were changed round.



The Receiving End

The state at 1600 was two hooks for'd fitted with shark repellent bait (one lost), 3 hooks aft with no shark repellent, plus the crew's line with the same bait.

1650 After the third bite aft, hooked an 11 ft shark. Because of previous experience of losing sharks from hooks, a .303 rifle was available to kill the shark at an early stage. This proved most effective and after 5 rounds rapid through the head the shark was apparently dead. After some excitement, during which the diver who hooked the shark almost

went frantic in case he lost it, the shark was hoisted inboard. This shark, like the small one caught earlier, proved to be a Tiger shark, one of the few known man-eaters, and believed to be the most dangerous type of shark. The *Enigma's* crew quickly set about removing the fins, whilst the divers cut out the jaw bones for the teeth. By 1810 it looked like a boned herring, though surprisingly enough the heart was still beating when removed at this time.

1830 A shark about 7 to 8 ft long was hooked aft. The same procedure was adopted. The shark was apparently killed outright with two shots through the head. Unfortunately a third shot parted the line and the shark sank like a stone.



Hooley Hough with his Shark's Teeth Necklace

The next day no bites were experienced. The sharks had probably had their lesson the previous day, with:

- 2 caught
- 1 shot dead
- 1 shot, probably died later
- Several with sore jaws.

In addition there was at least one dead shark for them to feed on.

The motor-boat went away again and repeated Sunday's drill. Again the sharks quickly swam in to eat the injured and stunned fish, with no particular concern for the odd 1½ lb charge being dropped.

On Wednesday, 15th June we sailed for Singapore having learnt the following lessons.

- a. Shark repellent 33c/1126 is ineffective after it has been in the water 2½ hrs, although visually it seems to be reacting strongly.
- b. Sharks are not frightened in any way by small explosives. Although they may receive a brief physical jolt, their instinct to eat seems to be far stronger than their fear of another jolt.
- c. Sharks do not appear to like going under the shallow of a ship by day to take bait.
- d. Tiger sharks normally only show their fins when attacking an object on the surface.

On arrival at Singapore we were given the task of looking for projectiles in Keppel Harbour, as one or two had been recovered on the beach. A week's hard work produced negative results. During this time some amusing backchat from the team kept things lively. One or two tried to slip into the water without shark repellent, expressing a desire to call it 'Shark Attractent,' There was nothing in the trials to support their view, though we ensured that the repellent was renewed hourly.

On the 18th July we sail once more on H.M.T. *Enigma* to try and learn a little more about the habits of sharks.

The aim this time was to entice sharks to the area with pork and then fit shark repellent to the bait line, renewing it hourly to see if sharks still took the bait.

Progress the first day was slow. At 1215 the bait on the 90 ft line was taken with no sight of the shark. The next bite was at 1700, when a 15 ft shark was hooked and brought to the surface. Unfortunately it slipped the hook and escaped.

At 1815 a 6 ft Tiger shark was hooked and landed. Whilst the shark was wriggling and snapping on deck attempts were made to stab it through the so called 'soft under-belly.' Although the knife was brought down with the full force of the forearm in no case did it penetrate the shark's skin. So much for film and fiction. There is obviously some difference between a Tiger Shark's and a Nurse Shark's skin.

As will be seen we had only limited success in enticing the sharks around, but as time was short the next day we fitted the shark repellent and spent a tedious day renewing the repellent hourly. We viewed with mixed feelings our lack of success. The fact remained that we had 3 large and tasty pieces of pork down all day, in an area where sharks were present, and they hadn't been touched. Whether because of the shark repellent or not it is impossible to say, but it was encouraging.

That evening we visited a fishery protection launch which had arrived in Pulau Tiomin the same day. She informed us that there had been sharks at Pulau Aur that morning. As Pulau Aur was on the way back to Singapore, and in view of the poor results at Pulau Tiomin, we called there on the morning of 21st July. We fished for 7 hours, again renewing the shark repellent hourly. We had no bites.

The shark repellent used during this trip was a fresh supply to type 22c/1399 from U.K. which, in view of 2 day's fishing with no bites, seemed to be effective for up to one hour. The next day we sailed for Singapore.