BY THOMAS D. ALLAN

Memories from the Sixties

THE BEGINNING

Many of the disparate band of scientists and engineers who gathered in La Spezia to set up the new NATO SACLANT Anti-Submarine Warfare Centre (SACLANTCEN) had been recruited from their own national defense establishments. At that time, I was the only Brit to join straight from university where I had just completed my dissertation on marine geophysics. This was my first real job.

I had stretched my time as a student to the limit—nine years at three universities—and for the previous three years had participated in several geophysical research cruises to the eastern Atlantic. When I embarked on the research vessel *Discovery II* during the summers of 1957 and 1958, we tried out a number of new techniques and devices that would eventually reveal symmetrical patterns to support the concept of a spreading seafloor and the theory of plate tectonics.

At Cambridge, I was put in charge of the so-called "proton magnetometer," a beautifully simple device built around a bottle of water wrapped in a coil of copper wire that, towed behind the ship, could detect very small changes in Earth's magnetic field (Figure 1). Another new instrument that emerged about that time was a heavily damped spring balance placed in the center of the ship to detect small changes in Earth's gravity field.

Figure 1. Recovering a proton magnetometer, November 1959.

I had gathered enough data for a dissertation and was starting to put it all together when my supervisor asked if I fancied a cruise to the Red Sea. HMS *Dalrymple* of the UK Hydrographic Service was heading for the Arabian Gulf, and the captain had offered to tow my magnetometer on the way. In the new theories emerging at that time, the Red Sea was possibly an embryonic ocean. Here was a chance to seek a few clues.

Back in Cambridge in time for the birth of my first daughter, I took a phone call from Henry Charnock, one of my shipmates on *Discovery*, asking if I might be interested in applying for a post with a new anti-submarine warfare center that had recently been opened at a place called La Spezia on the Italian Riviera. The UK Ministry of Defense had just come up with a job offer, but I put that on hold while I flew out to be interviewed by the Centre's director, Gene Booth, and his deputy, Mel Arsove. I recall that the "interview" was more of a relaxed conversation over a Campari soda in the bar of the Hotel Jolly, but I can't recall why it was held there and not at the Centre.

Shortly afterwards, my wife Helen and I were winging our way out to Milan with our 10-week-old firstborn, thence on to Pisa after a seven-hour delay, to report for duty on May 2, 1960 (May 1 is a holiday in Italy).

SACLANTCEN was to become a fully

Figure 2 (left). R/V *Aragonese*.
Figure 3 (below). Author Tom Allan and the captain of the *Aragonese* officially open the bar, 1962.

fledged NATO center a few years later, but at that time a private, nonprofit, Italian company called SIRIMAR ran it (initially overseen by the Raytheon Company and subsequently by Pennsylvania State University). SIRIMAR employed two senior US administrators: Nat Maggio (in charge of finance) and Bob Nelson (in charge of personnel). The military side was the responsibility of a bevy of US naval captains. Another prominent American of that era was George Wood, who drove a Bentley and was such an Anglophile that on his birthday the Brits presented him with a bowler hat.

THE GROUPS

Canadian George Lindsay led the Operations Research Group; a well-respected German pioneer, always referred to by more junior scientists as Dr. Fischer, led the Sound Propagation Group; the UK's Bill Kelly led the Target Classification Group; and the bearded Dane Lars Brock-Nannestad, led the Electro-Magnetic Group. Oceanography's strength doubled when I joined Henry Charnock, its head. Roberto Frassetto, an Italian war hero turned scientist, recruited from Columbia University's Hudson Laboratories in New York, soon joined us in the Oceanography Group. Within a year, Andre Kermabon, a French engineer recruited from Schlumberger, joined us to design and use a new bottom corer.

To this day, the question may still be asked as to why a new antisubmarine warfare (ASW) research center, free to recruit defense experts from 15 NATO nations, should choose to include in its staff a few oceanographers. It was not a question that bothered me much at the time as my wife and I plus new baby, recent tenants of a one-room flat in England, moved into a picturesque villa in Maralunga overlooking the Gulf of La Spezia. My amateur effort to capture that view on canvas still hangs in my office to remind us of happy, sunny days.

ARAGONESE

The Centre chartered an old freighter, which had to be converted into a fully fledged research vessel (Figure 2). Possibly, Gene Booth had concluded that giving a few oceanographers their heads to pursue their own, unclassified research might be one way to ensure that the conversion of *Aragonese* could be accomplished in short order. And, it proved to be so. Within a few months, the hold had been turned into a spacious laboratory equipped with a precision depth recorder, gyrocompass, course recorder, long-range radar, intercom, an air-conditioning unit, and two 60-kw generators to provide an independent power supply. On the upper deck, hydrographic winches and bathythermographs were installed. Contrary to US Navy regulations, we even managed to create a "rest and recreation" area, otherwise known as a bar (Figure 3).

Of course, with the exception of Roberto, our level of Italian was pretty basic and we depended enormously on the high level of competence and good will of our support staff, which consisted of the Port Captain Mario Mastrosanti, the ship's workshop staff under the direction of Vito Failla and consisting of highly skilled technicians such as Enrico Muzi and Celsino Montanari to name just two who were particularly helpful.

THE CRUISES

During the first half of 1961, with Henry Charnock as chief scientist, I undertook a number of short cruises aimed mainly at bedding down our new equipment. Henry ventured as far as Gibraltar on one cruise and I still have his cruise reports from that period. His unique, pithy style was clearly an attempt to bring everything up to speed as quickly as possible, but there is more than a hint that the Port Captain's office should model itself on UK procedures. Here are just a few examples:

- *The winch works fairly well but is not well enough fixed to the deck causing excess vibration.*

Thomas D. Allan *(tom.allan@sky.com) is Retired, SACLANT ASW Research Centre, La Spezia, Italy.*

- *Mark sample bottles with white paint on caps.*
- *On four occasions the Captain expressed his concern about the stock of fuel oil, recommending that we should drift, or steam on one boiler. Please let me have a statement of the fuel oil on board at La Spezia on 24 May and the amount used per day.*
- *On June 1 it was reported that the water supply was critical. It was said that 100 tons of saline water had been taken on by mistake at Gibraltar. It was decided to take fresh water at Almeria and the operation took two whole days.*
- *Please arrange that official messages are addressed to the Captain or Chief Scientist. Do not send unnecessary messages such as, 'Tell the bridge when you have finished with the winch' or, 'You can buy petrol in Gibraltar.' Do send important messages e.g.,* 'Aragonese *is not required at the Centre until June 25.'*

I was to get to know *Aragonese* rather well over the next two years. During that time, I was chief scientist on 10 geophysical surveys and spent a total of almost nine months at sea. We completed over 50,000 miles of track covering the entire western Mediterranean basin, all of the Aegean Sea, a large part of the Ionian Sea, and the whole of the Red Sea from top to bottom, including an excursion into the Gulf of Aqaba (the bit at the top of the Red Sea opposite the Gulf of Suez). These cruises, of course, were a follow-up to the earlier investigations carried out on *Discovery*.

We made many port calls. To check on any cumulative drift in our ship-borne gravity meter, it was necessary to compare its reading in port with a calibrated station of an international terrestrial grid of control points. It was recommended practice to make these checks as frequently as feasible, thus providing us with a splendid excuse for a short run ashore. Over this two-year period, *Aragonese* called at Gibralter, Almería, Barcelona, Monaco, Villefranche, Cagliari, Civitavecchia, Naples, Valetta, Siracusa, Palermo, Piraeus, Rhodes, Izmir, Alexandria, Beirut, Port Sudan, and Aden. Judged by the prices asked today for a Mediterranean cruise with a fraction of that number of port calls, I can appreciate in retrospect what a marvellous profession I had stumbled into.

One clear advantage to the Centre, in supporting an oceanography group free to pursue a program of unclassified research, was that many well-established research centers and scientists from around the world were keen to collaborate with us. Our location on the Italian Riviera might just have been a contributory factor.

Fifty years on I can look back on these times not just through rose-colored spectacles, but also with real affection.

We worked closely with scientists from Scripps Institution of Oceanography in California, from Woods Hole Oceanographic Institution (WHOI) in Massachusetts, the UK's National Institute of Oceanography, and the US Coast Guard. Rendezvous were made at sea with WHOI's *Atlantis* and *Chain*, and with Jacques Cousteau's *Calypso*. Scientists from France, Germany, Italy, Turkey, the United States, and the United Kingdom sailed with us on several of the cruises. So, although the program may seem to have had little direct link with the main ASW thrust of the Centre, this collaboration helped to create joint programs with well-established centers of research during the Centre's formative years. Several joint publications bearing the Centre's name appeared in a variety of well-respected scientific journals.

Inevitably, there were many teething problems to overcome as we struggled to convert a comparatively old lady into an effective research vessel. Cruise reports of the time reveal some of the frustrations we faced in trying to generate the right sort of power day and night, seven days a week, for a variety of European and US machines.

A blow-by-blow account of individual cruises would be tedious and repetitive. I have retained copies of the original cruise reports and what comes across is that the frustration gradually diminished with each cruise. The geophysical tools with which we started were augmented by tools for sampling the seafloor—corers, dredges, and the like, as well as underwater cameras, probes for measuring the heat flowing from the seafloor, and "sparkers," hydrophones, and small explosive charges for acoustically investigating the seafloor's substrata.

FIRST CRUISE IN CHARGE

After a series of short one- or two-day trials during that first year, my first serious cruise began in July 1961 and

involved the participation of many volunteers from other groups (including the director), and tracking the ship day and night with theodolites mounted from stations atop Palmaria and Montenegro as the ship steamed east-west tracks off the Cinque Terre. I can still remember the endless communications from the ship to these stations beginning*: Fox 2 and Fox 3. This is Fox 1. How do you read me? Over.*

We had one or two summer students helping out. Handing over to one of them at the end of a long day I asked him to verify that we were being tracked during our program of measurements. This he did—but without first checking the ship's position on the radar screen. The conversation as related to me went: *Fox 2—this is Fox 1. Can you see me, can you see me?* To which a weary voice replied from the top of Palmaria: *See you? From where I'm standing I could spit on you.*

Seaborne gravity meters had just arrived on the scene, and there was still a lot of uncertainty regarding their performance. Two different models were available—the Askania from Germany and the LaCoste-Romberg from the United States. The business of trying to detect small changes in Earth's gravity field to a few parts per million on a heaving ship had always presented a daunting challenge. Essentially, heavily damped sensitive spring balances were used to measure an average value over 10–15 minutes.

But, the very significant contribution to the measured value from the ship's motion had to be assessed and corrected for as precisely as possible. There was no GPS in those days, and radio navigational systems for civilian use in the Mediterranean had yet to emerge. Hence, there was a need for the best possible reconstruction of the ship's speed and course and for frequent sights from land stations.

We had invited Italian researchers from a center in Trieste to install their recently acquired Askania meter on *Aragonese*, and we set this alongside the Lacoste model flown in by scientists from La Jolla, California. We planned a number of trials under different sea conditions and at different ship speeds.

Due to the efforts of many willing collaborators, my first cruise in charge produced a successful outcome. At the end, we understood much more about the behavior of these meters under different operating conditions than we knew beforehand. The results were subsequently published jointly in the *Journal of Geophysical Research.*

THE RED SEA

Another cruise that provides vivid memories was the one to the eastern Mediterranean and Red Sea completed between October 19 and December 16, 1961.

I was meant to take charge over the whole of this cruise, but our second daughter, due to be born a week before my departure, decided to delay her appearance. My wife was booked into a hospital in Pisa but even a climb to the top of the leaning tower and a quick descent failed to persuade Giulia to cooperate. Aware of my reluctance to abandon Helen in Pisa, Henry Charnock made an eleventh-hour intervention, offering to sail with the ship as far as Beirut. By stepping in, Charnock gave me an extra week at home before flying out to take the ship on into the Red Sea.

When after a week there was still no baby, I was forced after all to leave my wife in the hands of friends in Pisa and board a plane for Rome and another to Beirut. Arriving on board *Aragonese* the next morning, I was handed a telegram announcing that I was father of a second daughter—born just hours after I left.

We entered the Suez Canal on November 11 and started our planned survey of the Red Sea the day after. Over the next four weeks, we were to crisscross the sea 58 times and cover 6,000 miles, making this by far the most detailed geophysical survey of the Red Sea ever undertaken.

From the charts of gravity, magnetics, and bathymetry that this survey generated, we were able to confirm not only that the Red Sea was a new ocean in the making, but also that following the seafloor spreading models being developed at that time, we could make a pretty good estimate that it was opening at a rate of 1.1 cm per year. Give it another few hundred million years and it will be as wide as the Atlantic!

THE LAST OF THE GEOPHYSICAL SURVEYS

During my time at the Centre, I served under five Directors—two Americans followed by a Norwegian, a Dutchman, and a Canadian. It was fairly obvious that we could not expect to be allowed to carry out our own research program forever. But we had had several good innings.

We continued with geophysical surveys until1966, later on board *Maria Paolina G.,* which replaced *Aragonese.* Our last cruise was a serious attempt, strongly supported by the US Naval Research Laboratory, to make a more direct contribution to submarine warfare. Our previous surveys had identified areas of anomalous magnetic field values caused by underwater volcanoes. It was decided to resurvey one of these anomalies in great detail using a spacing

between profiles of no more than half a mile. By this time, the radio navigational system Loran-C was working well for us, and we chose to survey following Loran lanes using a Loran repeater installed on the bridge.

The idea was to investigate how a submerged submarine might locate its position accurately without giving away its position. It would enter the selected site (in this case an area some 20 x 20 miles) and make passive magnetic field measurements. By matching its profile with those stored on its computer, it might determine its position uniquely without having to surface or give out any active acoustic signal.

I am not sure if this work ever came to anything, but at the time it seemed an idea worth pursuing. This little survey, our last, was completed in 1966 and represents the only classified survey we ever made.

Many of the incidents of these early years stay in the mind—some involving scientists on a learning curve who subsequently went on to greater things.

RECOVERY OF THE GIBRALTAR BUOY

We laid one of Roberto Frassetto's submerged buoys in the Strait of Gibraltar with an array of thermistors suspended beneath it to record the passage of internal wave trains. The buoy had to be submerged to avoid ship traffic and was fitted with an acoustic release system attached to the anchor. The idea was to call it up at the end of the mission by transmitting a coded signal. In case of failure, it also had a back-up clock, set to release at a certain time.

When the time came to recover this buoy, the weather took a turn for the worse and for several days, while we took shelter in a bay, the winds steadily increased. The sea was a maelstrom and no ship was to be seen passing through the Strait. The time for the clock release approached. I was chief scientist, but a young German oceanographer, Jochen Ziegenbein, who had recently joined Frassetto's group, was in charge of the buoy operation and was understandably agitated at the thought of losing a month's worth of valuable data.

Safety of the ship was and remains the sole responsibility of the captain. It seemed to me to ask too much of him to venture out onto the teeth of a gale. Tension rose on the bridge and eventually I suggested to our young oceanographer that he might want to wait in the lab. I stayed with the captain on the bridge, but neither of us said much. I had let him know how much this recovery meant to us, but under the circumstances a recovery seemed unlikely. With 40 minutes to go to release time, the captain crossed to the bridge telegraph and signalled to the engine room to start engines. We crept out into the Strait at a speed of around four knots, course one-eight-zero.

We reached the buoy position with a few minutes to spare. The sea raged and the wind howled. Suddenly, like a rocket emerging from the deep, the buoy shot out of the water and landed on the surface of a foaming sea fewer than 10 meters from the ship. The bosun threw out a rope with a grappling iron attached, and a few minutes later the buoy was recovered and lying on the deck. That evening in the mess, champagne was on our German colleague who was not only able to report the findings in the journal *Deep Sea Research*, but some years later went on to become German representative on the Centre's Scientific Committee of National Representatives.

THE NIGHT *MARIA PAOLINA* DID NOT RUN AGROUND

Ralph Goodman, who later returned to the Centre as Director, and who at that time had never been to sea, asked if he could join us on one of our geophysical surveys to the eastern Mediterranean.

By then, watch-keeping had become a fairly routine exercise involving checking that all instruments were functioning as they should, writing the time on each record at fairly frequent intervals, plotting our position on a navigational chart, and making entries in a log book. Ralph quickly learned the drill and the time came for him to do a middle watch (midnight to 4 am) on his own.

One of our instruments was the precision depth recorder (PDR). The width of the paper on which the bottom echo was displayed was 400 fathoms, but one had to add to that depth the particular phase of the recorder. So, for a measured depth of (say) 1000 fathoms, the depth would appear to read 200 fathoms and the phase was +800.

When Ralph took over the watch, he wrote the phase on the record as +1200. All went well. The instruments were all ticking over and the stillness of the lab at night was punctuated only by the rat-tat-tat of the punched paper tape recording magnetic field values at half-minute intervals. The ship was sailing north, approaching the coast of Crete. The second officer was on the bridge. The depth showing on the PDR began to rise, the echo passing out from one edge of the record and reappearing at the other. Ralph wrote in +800. Within a few minutes, the process was repeated with the depth decreasing rapidly. Ralph noted +400. Soon it got to +0—that is, on the last 400 fathoms. The bottom continued to rise steeply to 350, 200, 100, 30. When

it reached 10, Ralph realized the ship was about to run aground. And this was his first watch in charge.

The bridge was not equipped with our precise depth recorder. In a panic, Ralph reached for the intercom to warn the bridge of impending disaster. "Ponte! Ponte!" he yelled, and watched in a sweat as the echo trace went to zero before appearing at the other side of the chart. The depth, of course, was really 400 fathoms, and he had been on the wrong phase since the start of his watch.

AN UNLIKELY BET WITH A GERMAN

On another of our cruises, we embarked two scientists from the German Hydrographic Office to test and compare their gravity meter against ours. One evening over supper, the conversation turned to chance and probability. I remarked how strange it seemed that it required a group of no more than 26 people to have a 50-50 chance of finding two people with the same birthday. One of the Germans refused to believe this statement and bet me he could prove it to be complete nonsense. I was not overconfident myself, but could hardly back down now. As it happened, the second officer held the list (with birthdays) of all personnel on board—11 in the scientific party and 16 officers and crew, for a total of 27.

The list was produced, and to our astonishment (not least mine) there were not one but two pairs with the same birthday. There was champagne all round that evening.

A CONSUMMATE LIAR

The bar proved a great success on these cruises and its very presence signalled one of the great achievements of the Oceanography Group. It was a place for those of the scientific party not standing watch to gather in the evening and relax over a beer. I introduced my Italian colleagues to the joys of poker dice. In the early stages, I could win fairly consistently—but they were fast learners. One technician who hailed from Naples became the most proficient liar I had ever come across. The pupil soon became the master, and I was soon to lose a few beers.

WORK AND PLAY IN THE 1960s

There was undoubtedly a pervasive pioneering spirit abroad in these early years. We liked to think we worked hard and played hard. There seemed to be a party in the Hotel Jolly or the Circolo (Italian officers' club) every other week. SACLANTCEN became a favorite place to visit for many senior NATO naval officers and we dutifully turned up with our wives to entertain them. The camaraderie that flourished then was partly a result of the group's international flavor—roughly 50 of us drawn from 11 NATO countries. There was also mutual respect and recognition of the different talents that each individual brought to the Centre.

Of course, it helped to be located in one of the most beautiful spots on Earth. And it helped that that spot was in Italy. Not only were we made welcome by our Italian hosts but we also quickly came to appreciate the warmth of their hospitality. Without their generous support and unfailing good humor and courtesy, we would have achieved little.

Fifty years on I can look back on these times not just through rose-colored spectacles, but also with real affection. When we left the Centre in 1974, the 10-week-old baby we had brought out with us was a 14-year old schoolgirl, and we had produced four siblings, all born in Italy. The Italian connection remains strong with all of my children; two of them now live and work within a 30-minute drive of La Spezia.

> ...if part of the spirit of those early years lives on in the Centre, it will survive for another 50 years!

The Centre may have changed its name (no more SACLANTCEN) and the work program has certainly changed. Most of the people I worked with then have retired and some of my dearest friends and colleagues, these original pioneers, have passed on. But, if part of the spirit of those early years lives on in the Centre, it will survive for another 50 years!

CONCLUDING NOTE

Colleagues of that era who have read this account have pointed out that although much of our "pure" research came to an end around 1966, a firm foundation had been laid on which studies in ocean acoustics, seafloor structure, and military oceanography were able to build. But that is for another chapter.