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# Apollonia revisited

## THE STORY OF A PIONEERING SURVEY

In 1958, an archaeological team set out to undertake a trailblazing survey of the submerged ruins of Apollonia. **Nic Flemming** looks at what was accomplished, and what changed in the decades that followed.

**T**oday, the Greek city of Apollonia, founded by Battus the Theraean in 650 BC, lies on the sea floor, with the waves rolling over the ruins and fish swimming through the ancient doorways. The drowned city and harbour basins are now between the mainland of Libya and a chain of offshore islands, 200km east of Benghazi.

The ten rock-cut slipways that housed war galleys, the massive ashlar fortress towers that guarded the entrance to the inner port basin, and the docks, quays,

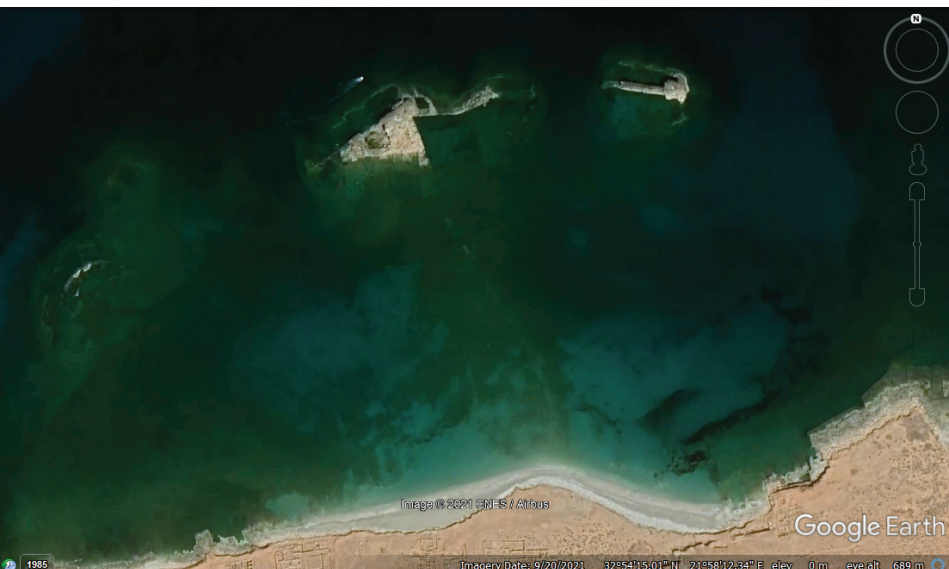
fish tanks, and warehouse foundations survive in the blue-green world of the sea, covered in a thin growth of algae, and battered by winter storms. The islands on the northern margin of the city are entirely carved and sculpted to provide accommodation for workers and military guards. Foundations for an apparent lighthouse can also be seen on one, while the seaward sides of two islands retain residual ridges of rock that were carefully carved to absorb some of the wave energy. These are called wave-traps.

**ABOVE** In the 1950s, a team set out to map the submerged remains of the ancient city of Apollonia. Here we see Nic Flemming on the left with the underwater movie camera, and Martin Minns on the right with the measuring reel that contained a 50m copper wire, marked in metres. The wire was used to measure the dimensions of individual buildings on the sea floor.

### Surveying a submerged city

In 1958, after completing my national service diving in the Royal Marines' Special Boat Service (SBS), I led a team of Cambridge undergraduate divers to





**LEFT** The submerged Greek city of Apollonia lies on the sea floor between the mainland and the chain of rocks, reefs, and islands that now mark its northern boundary. The two main islands have residual ridges of rock carved on the outer side to absorb and deflect wave energy that might damage buildings on the island. The islands are about 300m offshore from the beach. There are the foundations of a tower or lighthouse in the Eastern Island.

IMAGE © 2021 CNES/Airbus, Google Earth

make a map of the submerged ruins, to conduct shallow excavation at a few localities, and to raise any ancient artefacts that seemed important. By modern standards, our terms of reference were very flexible, but the survey was duly approved by Richard Goodchild, the Libyan Administrator for Archaeology. Retrieved artefacts were kept for the Libyan archives.

French and Italian archaeologists in the mid-1950s had employed commercial or navy divers to recover artefacts from ancient shipwrecks, but nobody had tried to map precisely an underwater city in its entirety. My idea was to adapt the survey methods that I had learned

in the SBS for seabed mapping prior to amphibious warfare landings, and use them to achieve the same accuracy underwater as conventional archaeology on land. The team of ten divers were all trained to observe and record underwater, writing their notes and sketch-maps on plastic boards. We experimented in advance in England with both still and movie photography underwater, using colour-reversal film. The engineering laboratory at the university designed and built a pressure-proof steel case for my movie camera.

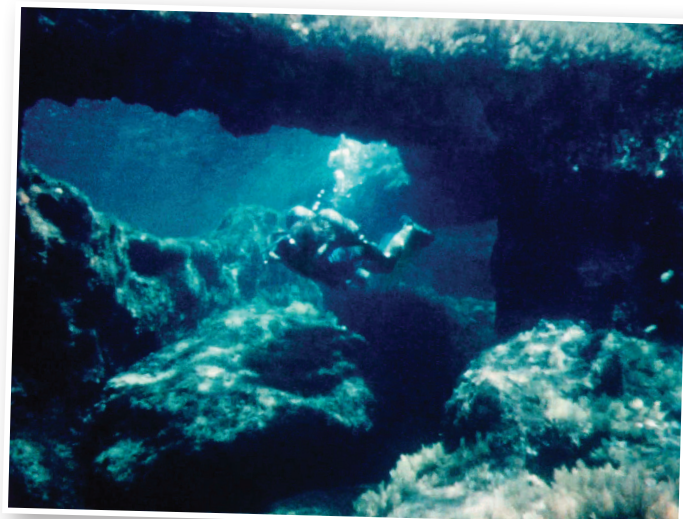
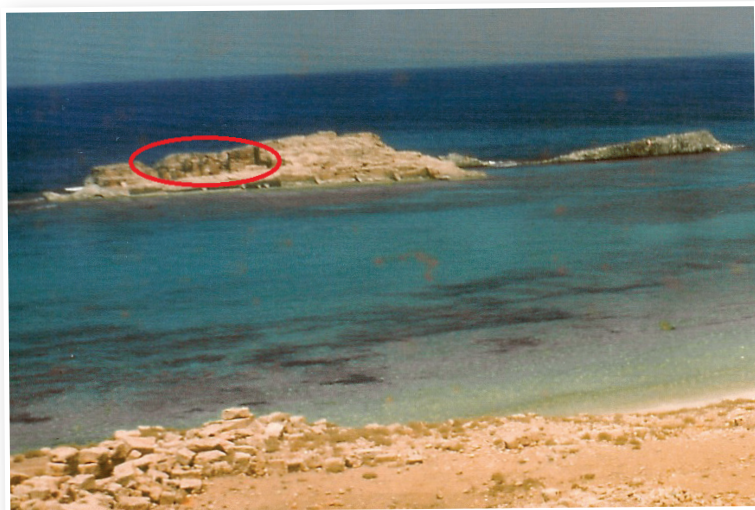
The British School at Athens and the Royal Geographical Society provided support with equipment and funding. We constructed an 800m-long baseline on shore, and used a telescopic alidade to take fixes on divers and snorkellers in the sea, each holding a bright-painted coloured ranging pole over a key location, such as the corner of a large building, the termination of a wall, or the edge of a rock cutting. Our architect could fix about 30-50 points each day using this

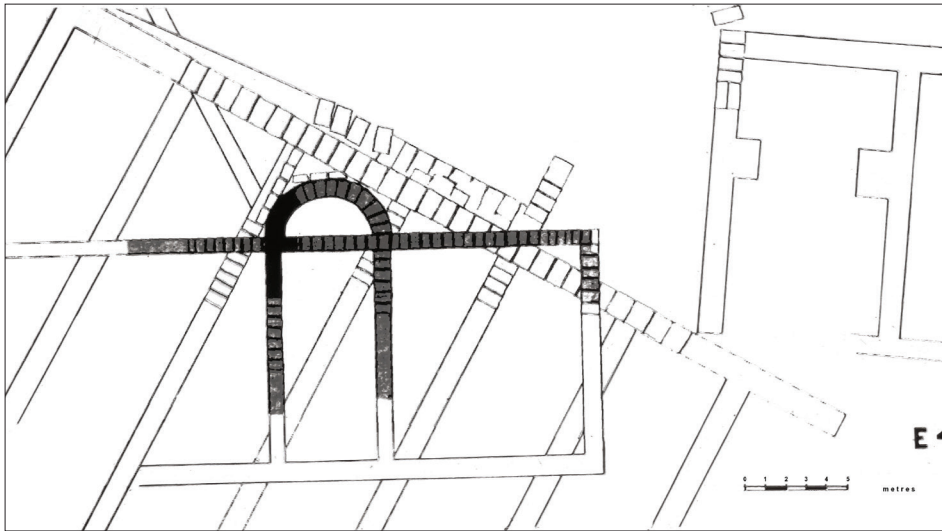
method. The raw drawings from the plane table were transferred each evening to a linen-backed architectural map about one metre across. Then the divers used a 50m reel of copper wire marked in metres to plot the corners of smaller buildings, trilaterated from previously fixed points, and finally a 2m rule to measure block sizes, wall thickness, and wall heights above the sea floor. There were no tools or tape measures made of plastic, so we had to improvise materials that could be used underwater without corrosion, or stretching and shrinking. Since the islands are about 300m offshore, the total area mapped underwater was around 25ha. We conducted this work in four weeks on site in 1958.

In 1959, a team of six divers returned to Apollonia, where we measured accurately ▶

**BELOW** The West Island at Apollonia has ten slipways cut into the rock surface sloping towards the harbour basin in the centre of the picture. You can just see the upper ends of the walls between the slipways. This picture was taken in 1958 through a polarising filter, so that many of the buildings on the sea floor can be seen very obliquely. The red ellipse marks the rock wall left standing at the back of the island that was extensively hollowed out to provide accommodation and workshops.

**BELOW** This picture is a still taken from the 16mm colour movie that we shot in 1958. The diver has swum through the 17m-long corridor carved through the rock island or outcrop that we called Grotto Reef. The corridor ends with these square solid rock arches that open on to a rock-cut roadway.





**ABOVE** This is a typical architectural drawing of the building foundations that we discovered at a depth of 2m to 2.5m underwater. The apsidal building rests on top of three earlier structures.

the dimensions of a submerged fish tank, or *piscina loculata*, in which we also found the torso and head of a marble faun. This suggested that these fish cultivation pools were also places of decoration, and provided relaxation on the adjacent terraces for the more prosperous citizens.

The most extraordinary discovery was a rock-cut tunnel or corridor, carved through a large outcrop that we called Grotto Reef. The Reef would have been a substantial island more than 100m in length, rising several metres above the sea when the city was occupied. The flooded corridor of rectangular cross-section was over 17m long, and cut through from the central harbour area to the outer defences of the city on the north-west side. The solid-rock roof of the tunnel was submerged, with the floor more than 2.5m below the sea, and the tunnel terminated in a series of arches carved from the stone that opened on to a rock-cut incised roadway. Its strategic location would have enabled a military patrol to move quickly on to the city wall defences without being observed by an attacker approaching by sea.

In several places we found successive stratified layers of superimposed structures, including the remains of an apsidal building overlying three earlier elements. So far as I know, the plan we created of

**RIGHT** The final map from our diving survey in 1958-1959 at Apollonia. Note the massive wall and quay that separates the inner harbour basin from the outer harbour, so everything to the north of that is underwater. The much more recent Byzantine ruins are on the land south of the beach.

this was the first ever drawing of stratified structures of different date underwater. In other locations there were the foundations of later walls built right on top of the galley slipways, showing that these had lapsed from use, and then been built over as dry land. This suggested that earthquakes had uplifted the town slightly before its final subsidence into deep water, which is quite a common geophysical sequence.

The final map that we made is shown below. Items that we raised included some pottery, the marble faun statue, and a chunk of glass ingot. The glass has recently been dated and was cast in the Levant in the 5th century AD, showing that the harbour was still in use by cargo vessels at that date. My research into the distribution of earthquakes and the study of plate tectonics showed that the original city was probably uplifted by about 20cm at the start of the Roman

imperial era, and then submerged by major earthquakes in about AD 700, by almost 3m. The movie that we shot in 1958-1959 can be seen at [www.nicflemming.net](http://www.nicflemming.net).

The experience of mapping Apollonia at the age of 21 introduced me to the world of marine research, both archaeological and geoscientific. I conducted a PhD in the measurement of submerged ruins and underwater caves to calculate sea-level change. This in turn led me into marine technology, and eventually marine economics and the law of the sea at the United Nations. I retired from most scientific and administrative work in 2000, and returned to the study of older archaeological sites underwater, including those of Bronze Age date and earlier lithic-based cultures. Working with colleagues all over Europe I participated in projects to catalogue all known prehistoric occupation sites found underwater in European seas.

## The sea takes its toll

In 2003, I decided to return to Apollonia, accompanied by my wife and our two late-teenage children. We hired a Libyan escort team with two Toyota Land Cruisers, and drove from Sabratha in western Libya along 1,100km of coast to Apollonia. At first sight, not much had changed in 44 years. A quick snorkel swim over the ruins showed that most building remains were

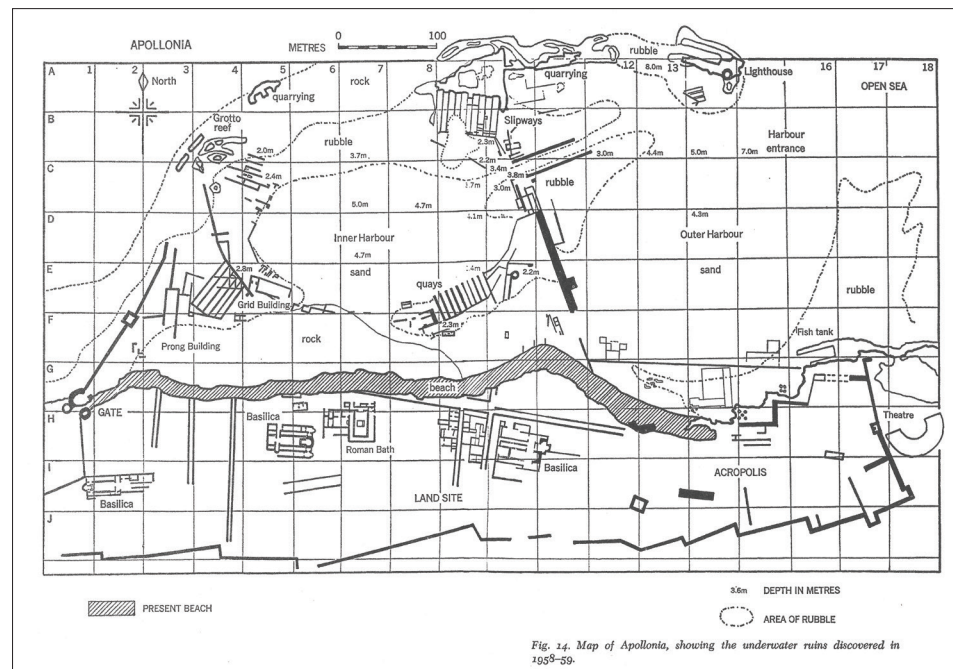


Fig. 14. Map of Apollonia, showing the underwater ruins discovered in 1958-59.





**LEFT** My wife, Jay Kleinberg, photographs the gap left by the smashed rock wall that was broken through by the waves after 1959. Compare with the photograph on p.43. You can see the top of the wave-trap ridge immediately beyond the foaming white water. The dark entrance cut into the far cliff leads into a series of excavated chambers, and steps up on to the top of the island.

**BELOW LEFT** Numerous slabs of rock weighing more than 10 tonnes each are the remains of the smashed rock wall from the north side of the West Island. They have been rolled on to the sloping surface of the early Greek slipways that were built to protect the war galleys.

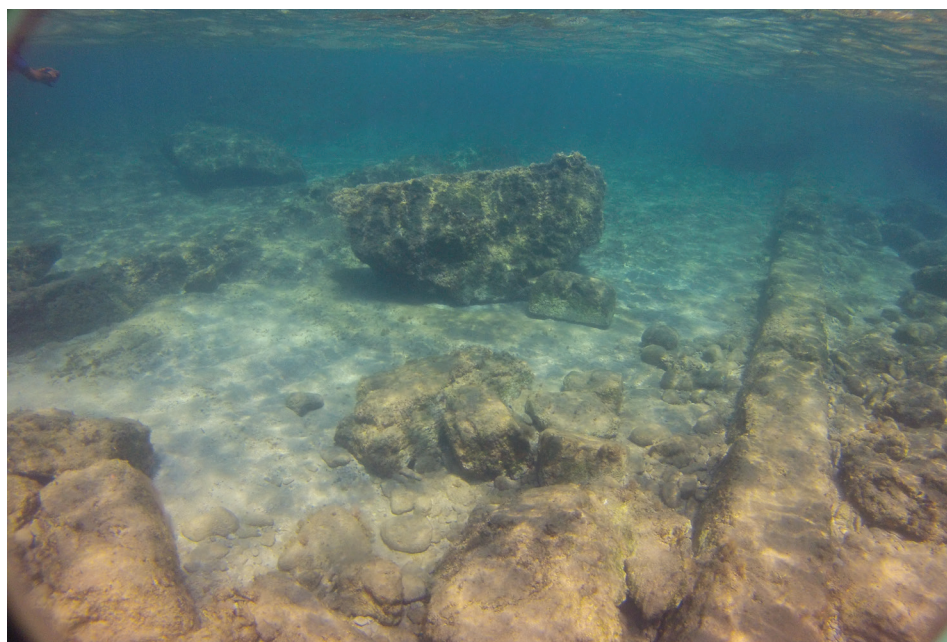


IMAGE: Jean-Pierre Misson

parts of the rock wall that had been swept into the city by storm waves.

It is now clear that Apollonia has suffered considerable damage in the last 44 years, and the coast in this part of Cyrenaica is currently being studied to assess the amount of erosion. At Apollonia itself, the shore has been eroded back about 100m in one region, compared with a map made by Royal Navy sailors in 1827, showing the shoreline at that date. However, the offshore islands still protect the mainland shore from the worst attacks by winter storms.

The experience at Apollonia in 1958 was my introduction to archaeology, and it influenced my whole subsequent career. Although I wandered intellectually into other disciplines and topics, I was always occupied by archaeological sites underwater to some extent every year. My return to Apollonia, and the opportunity to write about it now, has been a profound source of satisfaction. I have recently composed a memoir of my research career, entitled *Apollonia on my Mind*. It uses the frame of the first mapping of Apollonia and the final collapse of the city to tell the story of my life. ■

unchanged. There seemed to be more sand covering some foundations, and more weed growing on the ashlar blocks. Previous correspondence with a French archaeologist who had worked on the site in the 1980s revealed that the tunnel through the Grotto Reef had partially collapsed, but we were unable to check that because the sea was too rough. My family, who are all trained scuba divers, were excited to swim and snorkel over the huge masonry structures on the sea floor.

To examine the remains on the western island on the seaward side of the city, I hired a small fishing boat, and we motored out to beach the boat on the upper edge of the Greek slipways. My family landed on the island with cameras, while I motored round the outside of the island to examine the wave-trap. The ridge of submerged rock extended for 70m along the seaward side of the island, separated from it by a trench or artificial lagoon 18m wide. The

volume of rock that had been excavated to create this defence against the waves was truly enormous. Much of the stone extracted was probably used to construct buildings in the city, and also to create rubble sea walls in other parts of the perimeter of the harbour.

As I motored along the northern exposed side of the island, I was astonished to see that a huge part of the cliff or rock wall on the island itself had been destroyed. It had been intact in 1959 (see red ellipse in the photograph on p.43) and was 20m long, 5m high, and 2m thick. I quickly hailed my wife who had a camera on the island, and she photographed the damage. You could see the freshly broken rock where the solid stone had been cracked and uprooted. Later, I obtained photographs from a French colleague, Jean-Pierre Misson, showing colossal chunks of rock lying on the slipways underwater. These were

#### FURTHER INFORMATION

My book *Apollonia on my Mind: the memoir of a paraplegic ocean scientist*, by Nicholas Flemming, is sponsored by the Honor Frost Foundation, which supports maritime archaeology, and published by Sidestone Press (Honor Frost Foundation General Publication 2: pbk ISBN 978-9464260328, £65; hbk ISBN 978-9464260335, £150). It can also be enjoyed as an ebook or read online for free at [www.sidestone.com/books/apollonia-on-my-mind](http://www.sidestone.com/books/apollonia-on-my-mind)