

# THE AEOLIAN ISLANDS

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The Aeolian Islands are a volcanic group off the northeast coast of Sicily, the nearest being visible from the mainland. The name is sometimes modernised to Eolian. They are also known as The Lipari Islands, see Fig. one.

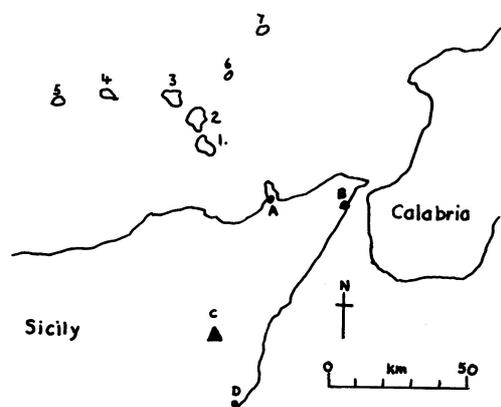


Fig. one: The Aeolian Islands

- |             |            |
|-------------|------------|
| 1 Vulcano   |            |
| 2 Lipari    |            |
| 3 Selina    | A Milazzo  |
| 4 Filicudi  | B Messina  |
| 5 Alicudi   | C Mt. Etna |
| 6 Panarea   | D Catania  |
| 7 Stromboli |            |

All formed within the last million years and most have been inhabited since prehistoric times. They are the source of the generic word volcano and of two types of vulcanism. Southern Italy has eleven volcanoes that have erupted in historical times and is the nursery in which the science of vulcanism was born. The Tyrrhenian Sea in which the islands sit is generally considered to be a back arc basin relating to the subduction of the African Plate beneath the European Plate. The group therefore forms an island back arc with the two southernmost, Vulcano and Lipari, on a north-south trend that extends to Sicily. This area of the Mediterranean is extremely complex and much remains to be understood. One problem is the apparent difference between Mt. Etna and Aeolian Vulcanism, despite their close proximity. Etna, whilst not exactly fitting any recognised type, has many of the characteristics of an ocean island volcano, rather than a plate margin one, whereas the islands relate to subduction zone magmatism. The various islands within the group show a wide variety of activity such as fumeroles, hot springs and actual eruption. They have been the source of economic materials since Neolithic times.

During last September I was one of a small group of friends who visited the islands. We were based on Lipari, which we examined by land and sea. We also visited

Vulcano and Stromboli, and circumnavigated Salina (with suitable ports of call for morning coffee and lunch!). Lipari is the most populous of the group and the town of the same name provides a good base for exploration, either by the regular ferry services or by tour boat, both having their advantages. Lipari Town is dominated by an impressive acropolis built on top of a remnant rhyolite dome. This separates two harbours, a large commercial one and one much smaller and more attractive with seats for non-geologists to idle the day away and restaurants in which everyone, geologists included, can enjoy the warm evenings. On the acropolis is a fine archaeological museum that reflects the many peoples who have lived here. It also has an excellent section on vulcanism in general and a detailed account of each island's origin and structure. It is from the small harbour that tour boats sail. Flexibility is required when planning visits between islands, for they are well named. It was here, in book ten of The Odyssey, that King Aeolus, Warden Of The Gales, gave Odysseus the bag of winds. This was later opened by his crew, thus adding to his considerable woes. Although conditions are usually good, sea states can be variable and quite suddenly so.

The southernmost island of the group and nearest Sicily is Vulcano. The bulk of the island was created in two main phases, see Fig. two.

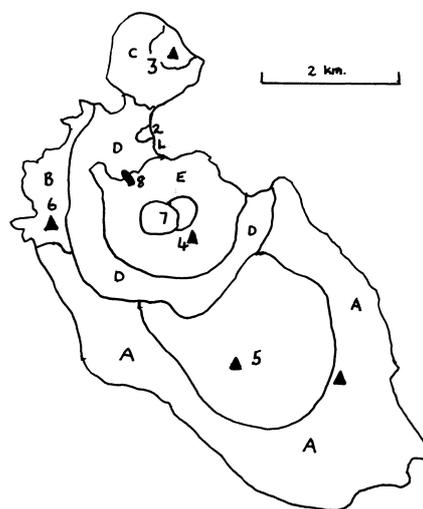


Fig. two: The Geology of Vulcano

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|-------------------------|---------------------|
| 1 Vulcano port          |                     |
| 2 Faraglione            | A andesite          |
| 3 Vulcanello            | B rhyolite          |
| 4 Fossa Cone            | C tephrite          |
| 5 Piano Caldera         | D alluvium and tuff |
| 6 Mt Lentia             | E tuff              |
| 7 Forgia Vecchia Crater |                     |

The first phase at 100kaBP created the southern section of the island, the Piano Caldera. This is the collapsed remnant of the basaltic and andesitic activity. A second caldera collapse to the north cut into Monte Lentia and was the site for the second phase of activity at 10kaBP when the Fossa Cone was created, *see Fig. three*. This is one of the main sites of present activity. From the rim of the Fossa Cone plumes rise from the many fumeroles and the ground is yellow with sulphur, crystals of which form round the vents. The upper slopes are scorched free of vegetation. An eruption of 1739 produced an obsidian flow that can be accessed in a quarry not far from Il Faraglione. Here flow banded obsidian can be seen in situ and loose material provides a good collecting ground for specimens.

remnant of Vulcanello activity. Alum was formerly mined here and today the area is protected as an SSSI equivalent. In places the ground is too hot to touch. The various fumeroles heat a large mud pool by means of hot springs and intrepid folk commit themselves to the pale grey, muddy water in search of health. The nearby sea, warm and sulphurous from shallow submarine fumeroles, is visited after the muddy immersion.

Had Vulcanello been much more extensive, it might have joined Vulcano to the next island north, Lipari. As it is, a narrow channel separates them. Lipari is the largest of the islands and has the most complex geology, *see Fig. five*.



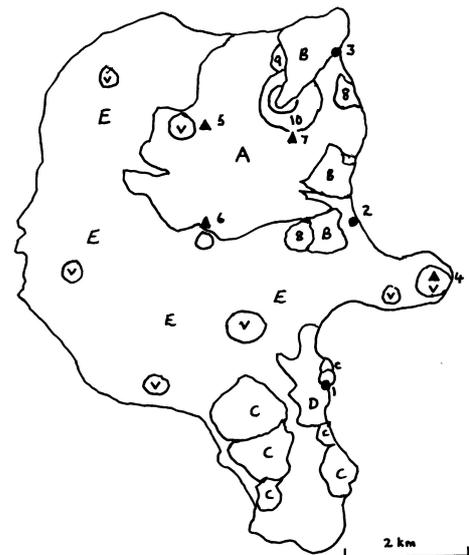
*Fig. three: The Fossa Cone, Vulcano with the Forgia Vecchia Crater  
View from the west coast of Lipari*

The final phase of volcanic activity in 183 B.C. led to the formation of Vulcanello, *see Fig. four*.



*Fig. four: Vulcanello from Lipari*

In the shipwreck room of the Lipari Museum are amphora from a ship of classical age that went down whilst making for the lee of Vulcano. When it foundered, the safe harbour provided by Vulcanello was just not there. Landing on the island today, one is greeted by the all-pervasive smell of sulphur, for next to the harbour is Il Faraglione, the last



**Fig. five: The Geology of Lipari**

- |                      |                  |
|----------------------|------------------|
| 1 Lipari town        | A younger pumice |
| 2 Canneto            | B obsidian flows |
| 3 Porticello         | C rhyolite domes |
| 4 Mt Monterosa 239m  | D alluvium       |
| 5 Mt Chirico 602m    | E Older lavas    |
| 6 Mt San Angelo 594m | and pyroclastics |
| 7 Mt Pilato 476m     |                  |
| 8, 9 Pumice Quarries |                  |
| 10 Rocche Rosse      |                  |

In broad terms, it consists of andesitic volcanoes on a basement of elevated pillow lavas. The massive M. St. Angelo volcano in the north dates from 100-80 kaBP and, with earlier eruptions, forms the elevated north of the island. The eastern double volcano of Monterosa grew during the earliest phase of activity, 150-130 kaBP, and overlooks Lipari Town, *see Fig. six*. Behind the town and creating the south of the island are a series of rhyolite domes that include that of the Lipari acropolis. A major event occurred around 700 BC when Monte Pilato expelled huge amounts of pumice. This now forms a 200m thick bed along the south coast. This is of great economic value



*Fig. six: The double andesitic volcano of Monterosa, 239m on the east coast of Lipari*

and before mechanisation slashed the workforce, here as elsewhere, over six hundred people worked in the now derelict factories that line the water's edge, *see Fig seven.*



*Fig. seven: Pumice Quarry, Porticello, Lipari*

Today it is recovered by a handful of workers. Pumice, being as light as it is, can still be encountered off shore floating in strings and clumps. After a stormy night, the beach at Canneto, just south of the main quarry area, had a white tide line of pumice that had been washed up. This included some of the lightest, more air than substance, and was a good collecting ground. The pumice phase of the eruption ended with two huge obsidian flows. Its highly viscous movement has left some very interesting exposures, *see Fig. eight.* Earlier obsidian flows in the area, 11-8 kaBP, provided the raw material for a Neolithic flake tool culture whose products have been recovered from many places across Europe and the Western Mediterranean. The Lipari Museum has excellent displays about this culture. Having been on the wrong side in the Punic Wars, the island was the base for a Carthaginian Fleet, Lipari was reduced by Rome. It was they who discovered the hot spring on the west coast of the island and, inevitably, built a *thermae*. Part of this has been excavated. I found the still surfaced road leading to the spa particularly impressive. Attempts to revive the spa have so far failed and a purpose built centre has never opened. It is



*Fig. eight: Stratified and flow banded obsidian Porticello Road Junction Lipari*

not only Bath that has its problems! The springs are now called Bagni Termali S. Calogero being attributed to a Christian saint rather than pagan Romans.

North again from Lipari is the island of Salina, *see Fig. nine.* It is named for the former salt pans, which can be seen at Lingula. The original name was Didyme meaning 'twin' a word, which describes its overall shape. The two peaks are M.Fosse Della Felici, 962m, and M. Del Porri, 800m. The island formed between 500 and 13 kaBP.



*Fig. nine: Salina from the south*

Facing the sea on the western side is a huge half bowl that comfortably contains the village of Pollara. This is a half caldera, the rest being lost to the sea. Small villages like Pollara are dotted around the coast and the steep slopes between them provide good geological exposures at sea level. The beach at Lingula displays a wide variety of the materials that constitute Salina. Alicudi and Filicudi form the western arm of the island arc. This is extended further west by a series of seamounts. From the heights of Lipari they appear as single volcanic cones that overlap. The reality is more complex but they do have a single main centre of activity. Filicudi is the oldest extant island of the group, touching 1maBP, although this age is exceeded by one of the seamounts. Filicudi grew in four phases that finished 40kaBP. Alicudi is both smaller a structurally simpler and younger in age at 90-28kaBP.

The sea journey from Lipari to Stromboli leaves the island of Panarea on the port side. The coast near Milazzese, a spot usually visited by tour boats, displays columnar jointing, dyke swarms and volcanic plugs. Away to starboard at a distance of 2-3 km are several small islets. These and the main island are all that is left of a volcanic rim and the boats sail across a huge caldera, now mainly submerged. From certain directions some of the islets display one vertical and one steeply sloping face, confirming their origins. Bubbles coming to the surface in that area together with a sulphurous smell indicate continuing submarine fumarole activity. Divers have confirmed this and recorded the subsequent change in the marine biology of the area. Activity into historical times is indicated by Roman ruins now 14m below sea level. Conversely, the island has a series of raised beaches. Alone of all the island group, a positive gravity anomaly has been detected beneath Panarea. This is considered to be due to an intrusive basaltic body at depth. Sub aerial Panarea was created between 200 ad 40kaBP. Submarine dredging has recovered material dated at 780 kaBP.

Approached from the direction of Panarea, Stromboli rises from the sea in a classic volcanic cone shape, its active crater sending a plume in to air, *see Fig. ten.*

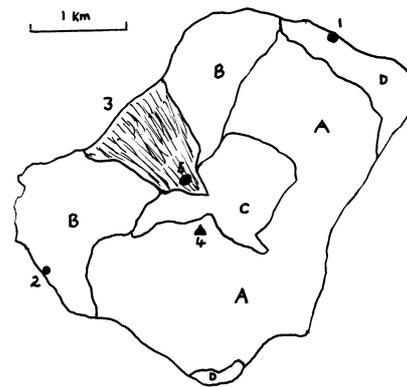


*Fig. ten: Stromboli from the west*

I was reminded that, at different times, both Arthur's Seat, Edinburgh and Snowdon had looked similar to this, although then they were considerably more active than what I was seeing now. Whereas most of the island has a covering of vegetation the northwest is scarred by the Sciara Del Fuoco, the River Of Fire. This is where material erupted from the active vent makes its way to the sea, *see Fig. eleven.* Created by gravitational collapse, it contains mainly pyroclastic material with that on the upper slopes still smoking. First formed on a 200kaBP base, it has been active since at least 300 BC with "strombolian" eruptions characterised by modest explosions from deep-rooted and, critically, dry magma chamber, *see Fig. twelve.* Although most activity is modest, there have been more violent interludes, 1915, 1930, and 1993 being examples. The main village is also called Stromboli and is on the north side of the island. It is only 3 km from the Sciara Del Fuoco. Although the shape of the island offers some



*Fig. eleven: The Sciara del Fuoco, the River of Fire*



***Fig. twelve: The Geology of Stromboli***

- |                     |                         |
|---------------------|-------------------------|
| 1 Stromboli village | A Older lava and tuff   |
| 2 Ginostrata        | B Younger lava and tuff |
| 3 Sciara del Fuoco  | C Ash                   |
| 4 Vancori 924m      | D Alluvium              |
| 5 active vent       |                         |

protection, the village has had its moments of excitement and the plume is often overhead, *see Fig. thirteen.*

There are however, at disembarkation points, detailed instruction what to do if the tsunami siren sounds, this being considered the greater risk. The culmination of the visit occurred on the return journey in the dark. Opposite the River Of Fire the boat's engine was idled and all lights were put out. In a star filled, cloudless sky a bright moon hung over the shoulder of Stromboli, reflecting light patterns on the sea and silhouetting the volcanic cone. The summit, glowing red, reflected onto the underside of the plume. At one point incandescent material was ejected onto the black outer slope. A memorable sight.

The fact that Stromboli was quieter than usual was attributed by some locals to the increased activity by Mt. Etna which was certainly excelling itself at the time. On our coach journey from the ferry port of Milazzo to the airport at Catania, a journey interesting in itself, we passed

Etna. The upper part was covered in angry black cloud that was expressive of what was happening beneath. For a short while it was possible to see fumeroles on the south flank. Later our aircraft over flew Etna. The cloud had cleared and it was possible to see the extent of the eruption, an unexpected bonus to what had been a very rewarding trip.

I would like to thank my travelling companions, Pat Bennett, Allan Comer and Roger Stockwell. A particular thanks to Pat for organising the visit.

#### References

Guest J., Cole P., Duncan A., Chester D., *Volcanoes Of Southern Italy*. The Geological Society 2003



Fig. thirteen: Active Crater Plume, Stromboli

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## EXTRACTS FROM THE AUSTRALIAN GEOLOGIST (TAG)

*The following extracts are reproduced with permission from the Editor of The Australian Geologist (TAG) and submitted for this Journal by Valerie and David Burford.*

#### Notes for editors, readers and authors

While I would not recommend writing your next paper in a rich Shakespearean style, there are many well known quotations from this play which are particularly apt for editors, readers and authors.

*'For this relief much thanks.'* - on reaching the end of a boring paper.

*'List, list, O list!'* - some things are much better set out in tables.

*'Neither a borrower or a lender be.'* - avoid plagiarism.

*'Brevity is the soul of wit.'* - keep it short and more people will read it.

*'More matter with less art.'* - don't waffle.

*'To be, or not to be: that is the question.'* - is it worth writing the paper in the first place?

*'I once did hold it ... a baseness to write fair, and laboured much how to forget that learning.'* - all too evident in some authors.

*'If it be now, 'tis not to come; if it be not to come, it will be now; if it be not now, yet it will come: the readiness is all.'* - when will that blasted editor return my paper.

*'The rest is silence.'* - Thank goodness.

Tony Cockbain  
Editor AJES

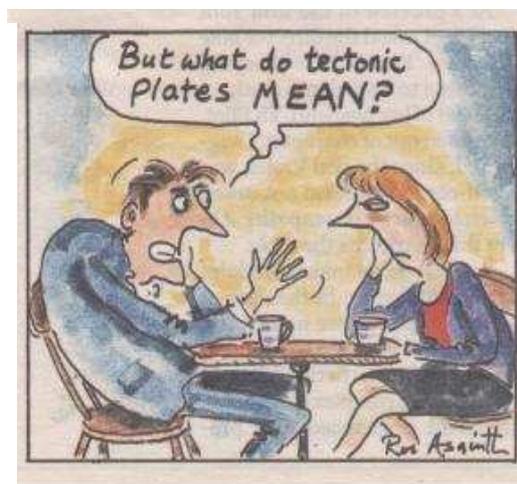
*from TAG, December 20th, 2004 - -*

## ASIAN TSUNAMI, DECEMBER 2004

*Cartoon and quote submitted for this Journal by David and Valerie Burford*

From Guardian Review, 29-01-05, Letters

In response to the tsunami:-



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Quote from Richard Hamblyn, London -

*"Indonesia spiritually evolved in the presence of constant geophysical threat. Those who live along the Java trench have long accepted seismic instability as an inescapable part of their existence . . . ."*

