THE VOLCANIC LANDSCAPES IN THE DISASTER MYTHOLOGY OF THE ANCIENT MEDITERRANEAN WORLD

Dr. Amanda Laoupi (Archaeoenvironmentalist / Disaster Specialist)
Centre for the Assessment of Natural Hazards and Proactive Planning – NTUA
alaoupi@gmail.com

The existing dilemma: Disasters. Curse or blessing? The volcanic landscapes, their formation, evolution and transformation, have played a pivotal role in disaster dynamics, impacting on various patterns and structures of past human civilizations. The Toba eruption, so far away from the Mediterranean basin, being the largest eruption of the last few hundred thousand years, caused a severe 'bottleneck' in human population,, but it was followed by a population explosion and possibly migrations of modern humans (Homo Sapiens sapiens). Later on, mighty empires collapsed and vanished or shocked irreversibly, in the aftermath of colossal explosions (i.e. Cycladic & Minoan due to Santorini's eruption in ca 1628 B.C.). Wide-ranging case studies have shown that those natural factors triggered the fall of well organized social systems when their normal coping mechanism failed.

By detecting this mythological substratum in the volcanic landscapes, unfamiliar, alien or hostile, of circum-Mediterranean areas (Anatolian plateau, Ethiopian & Sub-Saharan lands, Greek Aegean Islands, Italian peninsula and adjacent islands, Massif Central in France and SW Atlantic Europe), the writer tries to focus on these landscapes as perception spaces (imagined, sacred, educational / spiritual, therapeutic).

The economic aspect of volcanic landscapes' exploitation is far more complex than previously thought. Apart from the technological skills of detection and extraction (procurement), the adaptedness to local conditions, the resources' management, seafaring breakthroughs, and social patterns of trading exchanges, there is a variety of perspectives from the form of 'raw material', to 'preforms' or 'end products'. Such processes (from the perception of a volcanic landscape to its final modification) forged the identity of these areas and the communities that interacted with them in many ways (eg mining, redistribution, consumption, burial practices, zonation of influence, formation of mythological cycles), through engaging in different sets of overseas relations.

The most crucial parameter, though, are the environmental stimuli that made our remote ancestors to choose repeatedly the volcanic environments, where they survived, lived, reproduced and evolved. Some of the most numerous and extensive finds of fossil and archaeological material relating to the earliest phases of human evolution (eg Rift Valley, Jordan Rift, S. Caucasus, Sangiran Dome in Indonesia) are no coincidence, indicating a relationship between distinctive, topographically complex volcanic landscapes (fault-bounded basins, uplifted terrain, ubiquitous volcanoes, lava fields) and water bodies, that deserves closer investigation. Hominins' dispersal followed also the same patterns. Springfed water sources provided potable water, adequate iodine and other micronutrients as cobaltium and selenium, along with bedrocks & sediments containing iodine. The ideal spots to find big game in Pleistocene, were soils underlain or surrounded by volcanic sediments. Massif Central (France) is also one of the prominent Palaeolithic examples. Later on, during the last five millennia, the Neolithic era gives rise to five historical

civilizations principal hearths, more or less correlated with volcanic areas: (1) The Mediterranean-Middle-East - Zagros & Aegean Sea recent faults, Miocene/Current Cyclades archipelago volcanicity, (2) India - Indus hollow fracture, (3) China Tancheng-Lujiang and Xingan-Taihang Earth's crust fractures zone and Quaternary major faults, Taihang mountains risings and quaternary cracks, (4) Mexico - volcanic Top-Plates, and (5) Peru - Andes Cordilleras volcanic High-Grounds.

Keywords: Disaster Archaeology, Disaster Mythology, fire symbolism, humanization, iodine, obsidian religion, volcanic landscapes

1. Introduction

In the history of humankind, the mythological language and symbolism have been functioning based both on survival instincts and communication skills. So, the study of hazards' historic evolution has shown that the cultural patterns and networks are interdependent. Moreover, the characteristics, distribution, and complexity of Earth's cultural mosaics, all involve the parameter of disaster in their functional processes. Apart from influencing totally the course of human history (e.g. acute climatic episodes, epidemics), 'fire' disasters had also influenced the division and control of Earth's surface.

The volcanic landscapes, their formation, evolution and transformation, have played a pivotal role in disaster dynamics, impacting on various patterns and structures of past human civilizations. The Toba eruption, so far away from the Mediterranean basin, being the largest eruption of the last few hundred thousand years, caused a severe 'bottleneck' in human population, leaving less than 10.000 individuals for a period of up to 20.000 years, but it was followed by a population explosion and possibly migrations of modern humans (Homo Sapiens sapiens). The genetic studies pointed out this putative marked reduction in the population of our human ancestors, confirming the subconscious nucleus of tremendous fear and reverence toward the volcanic powers, experienced by ancient populations. Later on, mighty empires collapsed and vanished or shocked irreversibly, in the aftermath of colossal explosions (i.e. Cycladic & Minoan due to Santorini's eruption in ca 1628 B.C.). Wide-ranging case studies have shown that those natural factors triggered the fall of well organized social systems when their normal coping mechanism failed.

The chaotic violent forces of volcanoes' mechanisms with their primordial impetus (burning heat, the phenomenon of 'nuclear winter', darkness, catastrophic accompanying phenomena like earthquakes or landslides and tsunami) gave birth to deities, creatures and heroes who formed famous mythological cycles, narrations and traditions (e.g. the Neolithic Goddess at Čatal Hűyűk, Hephaistos / Vulcan, the Atlantis' legend, the Titanomachy / Gigantomachy, the realm of Ades and the descent into the Underworld, the 'volcano' of the Biblical Exodus).

On the other hand, the positive response to hazardous volcanic phenomena may vary considerably. During the aftermath of such catastrophes or environmental changes, technological innovations are illustrated (e.g. sea-faring for the obsidian trade, metallurgy), new lands discovered (e.g. fleeing through waterways, prehistoric human migrations), new socio-cultural patterns (cooperation or conflict), new subsistence strategies and more efficient techniques were adopted. In essence, crises use to stimulate rather than devastate the cultural traits of a society. The emplacement of nutrient-rich volcanic tephras and alluvial soils counterbalanced the spread of

malaria in marshy areas, the repeated repair attempts after the experience of severe effects counterbalanced the dislocation of city's activities caused by volcanic phenomena.

By detecting this mythological substratum in the volcanic landscapes, unfamiliar, alien or hostile, of circum-Mediterranean areas (Anatolian plateau, Ethiopian & Sub-Saharan lands, Greek Aegean Islands, Italian peninsula and adjacent islands, Massif Central in France and SW Atlantic Europe), we try to focus on these landscapes as perception spaces (imagined, sacred, educational / spiritual, therapeutic). In general, we can group these disaster 'cycles' into two major categories of archetypal symbolism: a) the archetypal symbolism of chaos and disaster (Toba eruption Atlantis myth: Canary Islands, Thera & volcanic fields of sub-Saharan Africa, the ten plagues of Egypt & the volcano of Exodus, Titanomachy & Gigantomachy: Campi Flegrei, Etna, Vesuvius, Aeolian Islands & Nisyros), and b) the archetypal symbolism of creation, transformation and move (the volcanism of Massif Central and the Palaeolithic cultures of Europe, the Earth Goddess of the Anatolian plateau, the Mesolithic / Neolithic trade of obsidian in the Aegean Sea, the Hephaestus' pelasgic cycle: Lemnos – Sousaki – Methana, the Descend into Underworld: a journey into our subconscious).

2. The archetypal symbolism of chaos and disaster

1.1. The Pleistocene Toba eruption and its impact on human race

In Sumatra -Indonesia (2.58°N & 98.83°E) lays the Toba volcano, with a summit elevation of 2157 m. Its caldera (35 x 100 km) is the Earth's largest Quaternary caldera, created after the Pleistocene colossal eruption (the Toba ash layer in deep –sea Indian Ocean's cores, gave a 73.910 ± 2.590 yr BP date / the Toba ignimbrite deposits, gave a 73.500 ± 3.500 yr B.P. date, based on K/Ar method, or a 73.000 ± 4.000 yr B.P., based on the 40 Ar/39 Ar method).
Toba is a low latitude volcano, so dust & volatiles would have been injected efficiently into both Northern & Southern Hemispheres (total eruption volume ~2,800 km; estimated eruption cloud heights of 32±5 km; estimated duration of continuous fallout of Toba ash over the Indian Ocean at two weeks or less). That eruption produced an estimated 1015 to 1016 g of stratospheric dust & H2SO4 aerosols, the ice-core data & atmospheric modelling indicating an ~6 year residence time for the dense global aerosol cloud, and caused a 'volcanic winter' with possible abrupt regional coolings of up to 15oC & global cooling of 3 to 5oC (and possibly greater) for several years. The palynological records, the coral reefs, the ice cores and various sediment analyses speak of a global ecological disaster.

Fig. 1. Lake Toba is a crater lake. Image source: http://en.wikipedia.org/wiki/Lake_Toba

Apart from this event, another crucial process took place, a severe population bottleneck that left possibly only 3.000 to 10.000 Individuals (~500 breeding females), followed eventually by rapid population increase, technological innovations & migrations. The abrupt reduction in rainfall & temperature made tropical forests very vulnerable to chilling (some chimpanzee populations appear to have undergone such a bottleneck ~70.000 to 60.00 ya). The severely reduced, isolated populations in small refugia in Africa & Eurasia caused genetic drift and local adaptation, meaning a rapid racial differentiation. This is the 'weak Garden of Eden' version (Harpending et al., 1993 in Rampino and Ambrose, 1999).

1.2. The Atlantis Myth (Canary Islands, Thera, Ethiopian highlands & volcanic fields of sub-Saharan Africa)

While there are not volcanoes in South Spain, the Canary Islands in the Atlantic Ocean, beyond the most famous Columns of Hercules in the ancient world (Gibraltar Strait), are of volcanic origin, and it is known that past volcanic explosions and submarine landslides triggered giant tsunamis (Pararas, 2002). The Canarian Archipelago is constituted by seven major islands, the African continent is just at 100 km from Fuerteventura.

The Roman historian Pliny the Elder called the island Canaria, a reference to the large wild dogs (from the Latin canis, for dog) which he reported living on the island in his 37-volume Natural History. The artefacts of Guanches, these native original inhabitants of the Canary Islands, show several very though-provoking similarities with other prehistoric civilizations of N. Africa and NW & SE Europe. The whole area is one among the strong candidates for the location of the mythical Atlantis.

The Atlantides were the seven daughters of Atlas, the mythic Titan son of Poseidon (Oceanus) that founded the city of Atlantis. Greek myths tell that the Atlantides were also called Pleiades or Hesperides, and personified the seven Islands of the Blest, which the Greeks obscurely placed in the Outer Ocean (Atlantic). Ancient writers tell also about an island opposite the strait, larger than Libya and Asia combined (see Plato's Timaeus and Critias). From it travellers could in those days reach the other islands, and from them the whole opposite continent which surrounds what can truly be called the ocean. The Atlantis' case is taken mainly with some scepticism among many scholars because it disappeared an advanced civilization without leaving any trace.

Fig. 2. The Pleiades. Detail from a red - figured Hydria. End of the 5 th cent. B.C. Athens, National Archaeological Museum 17469

Nevertheless, many tephra layers are used as liable time markers in establishing a chronology for the Quaternary, because they occur within very short intervals of time over wide areas (Simkin and Siebert, 1994). Progress in characterization techniques for identification and dating methods has made possible a long-distance correlation between tephras. Studies of multiproxy data from distant cores offer narrow constraints to the timing and sequence of the major Holocene climate events in the circum-Mediterranean region, that may help in re evaluating the chronologies of the archaeological records (Manning, 1988 and 1992). The 10cm thick ash layer from the Minoan eruption of Santorini (3.57 ± 0.08 Kya B.P.) in the SE Aegean core LC21 and its correlation with GISP2, is a useful example (Rohling et al., 2002).

The story of Thera & Therasia is told at greater length by Strabo (*Geography* I.3.16):

"For midway between Thera and Therasia fires broke forth from the sea and continued for four days, so that the whole sea boiled and blazed, and the fires cast up an island which was gradually elevated as though by levers and consisted of burning masses—an island with a stretch of twelve stadia in circumference. After the cessation of the eruption, the Rhodians, at the time of their marine supremacy, were first to venture upon the scene..". This eruption, known as 'the Minoan eruption', was among the most catastrophic volcanic events of the last 100.000 years (VEI ≥ 6.0).

Volcanic eruptions have always played a crucial role in the evolution of human civilization. Their most evident impact on human communities were the massive death of unprepared people. Furthermore, other long-term impact caused more destruction in the flourishing communities of prehistoric Aegean after the Minoan eruption of Santorini's volcano in 1627 - 1600 B.C. Tephra layers have been found dispersed not only in the sea floor of E. Mediterranean / Black Sea and the lacustrine sediments of S. Turkey, but also in depositional terrestrial sequences and archaeological strata in the Greek islands (i.e. Anaphe, Kos, Rhodes, Crete), the Nile valley, inland Anatolia, Syria and Israel. Apart from the generated tsunami that swept the coast of E. Mediterranean, swarm earthquakes and the rainfall of volcanic ejecta, disastrous effects on vegetation and loss of cultivated land, death of animals, abrupt climatic changes, acidic contamination of aquifers, disruption of sea corridors between the states of the Bronze Age, plague, famine and socio-economic upheaval devastated the equilibrium of natural and human ecosystems in the region (Marinatos, 1939; Pararas-Carayannis, 1974; Driessen, 1999).

Apart from being a rich geoarchive due to island's location at the subduction zone on the Hellenic Arc, the LBA 'Minoan eruption' of Santorini's volcano (see references in: http://www.newworldencyclopedia.org/entry/Minoan_eruption) is also a very dynamic disaster case because offers excellent geosequences that imprint the event per se, its phases, duration and magnitude, and its short-term and long-term results. Respectively, the most recent interdisciplinary research has disclosed new evidence for the magnitude of the event (being bigger than the mega-eruption of Tambora in 1815), the socio-cultural parameters of the event (there was no time available for preparedness or mitigation) and the revision of the chronological sequences of the Eastern Mediterranean civilizations (Vougioukalakis, 2006).

Even more, scientists correlate the eruption and its impact with archaeological and philological testimonies, such as the Bamboo Annals which describe the turbulent years of the collapse of the Xia Dynasty in China with a year without summer (approximately in 1618 B.C.), the calamities of Admonitions of Ipuwer (a text from Lower Egypt dated to the Middle Kingdom or the Second Intermediate Period), the

Rhind Mathematical Papyrus and the Tempest Stela of Ahmose I (Redford, 1992; Polinger Foster and Ritner, 1996; Balter, 2006; Friedrich et al., 2006; Manning et al., 2006; Sigurdsson et al., 2006). This event, apart from being selected for the explanation of the Ten plagues in Egypt (turning of rivers into blood, invasion of frogs, lice, mixed hordes of wild beasts, grievous pestilence, rain of naptha, Hail, locusts, dungeon darkness, death of the first born children) and the Biblical Exodus, is the second strong candidate for Atlantis' myth (Friedrich, 1999), being an excellent example of how a complex natural phenomenon can overturn flourishing societies into chaos.

Fig. 3. The Ahmose stele (Tempest Stele), erected by the first pharaoh of the 18th Dynasty, were unearthed in Karnak by Henri Chevalier in 1947. In it an unknown god incurs one of the same plagues described in the Biblical account (darkness, also described as "a great storm").
Image source: http://www.archaeowiki.org/Ahmose

But, while other scholars have proposed that Sinai was in Arabia, Prof Humphreys argues (2004) that the Holy Mount must have been an active volcano, since it shook and emitted fire and smoke (Exodus 19:18). After carefully examining ancient and modern records, he chose his candidate, present-day Mount Bedr in north-western Saudi Arabia, since there were no ancient volcanoes in what was later named the Sinai Peninsula. In fact, a swarm of 30,000 earthquakes in northwest Saudi Arabia stunned geologists in May 2009. These quakes were triggered by magma pushing up through the crust, causing a five-mile-long crack to appear, in an ancient, dead lava field. Harrat Lunayyir (Al-Shaqah) is a late Cenozoic to Holocene basaltic lava field north of Yanbu . The oldest lavas near Madinah are only about 2 million years old, and the youngest lavas (less than 6000 years old) resulted from 11 eruptions, with 2 historic eruptions in AD 641 and AD 1256. Geothermal phenomena occur also, as shallow water wells with elevated temperatures, fumaroles and hot springs. The recent Saudi event, as well as the more damaging intrusions of magma in Ethiopia, along the southernmost part of the Red Sea, were created by the same volcanic "hotspot" which has caused the crust of the Earth there to weaken and spread apart, with volcanic eruptions filling the void. The Afar region in Kenya is world's most famous example of such geological activity.

Prof Humphreys also offers other "naturalistic" explanations for wondrous events. For instance, he thinks that escalating natural disasters explain each of the 10

"plagues" that forced Pharaoh to let the Israelite slaves depart. The Nile "turned to blood" meant that toxic red algae killed fish, the dead fish forced frogs ashore, gnats and flies were drawn to the dead fish and frogs and the insects transmitted a virus that killed livestock. Similar phenomena of massive leakage of carbon dioxide to the surface were seen in 1986 at Lake Nyos in Cameroon, a lake situated on a fault line within the Oku Volcanic fields. Similar but smaller scale occurrences happened on a another lake in Cameroon preceding this and following it on a lake in Rwanda.

Finally, the Minoan eruption of Thera and volcanic fallout may well have inspired the myths of the Titanomachy in Hesiod's *Theogony*, its background derived from the Kumarbi cycle, a Bronze Age Hurrian epic (later Hittite) from the Lake Van region, and some elements of western Anatolian folk memory. Hesiod's lines have been compared with volcanic activity, citing Zeus' thunderbolts as volcanic lightning, the boiling earth and sea as a breach of the magma chamber, immense flame and heat as evidence of phreatic explosions, among many other descriptions. Especially the dormant stratovolcano Nemrut Dağı, in Eastern Turkey, is the most southern and youngest of the chain of volcanoes in eastern Anatolia. It was named after King Nimrod (great-grandson of Noah and the king of Shinar in N. Mesopotamia; extra-Biblical traditions associating him with the Tower of Babel) who is said to have ruled this area in about 2100 BC. The eruption of Nemrut volcano led the formation of Lake Van, the largest lake in modern Turkey. Moreover, Erciyes Dağı is a massive stratovolcano, the highest mountain in central Anatolia, with its summit reaching 3,916 metres. The volcano is heavily eroded, but may have erupted as recently as 253 BC, as may be depicted on Roman era coins. Strabo (Geographica 12.2.7) called the mountain *Argaeus* (□ργα□ος); he wrote that the summit was never free from snow and that those few who ascended it reported seeing both the Black Sea to the north and the Mediterranean Sea to the south in days with a clear sky. The Karapınar is another volcanic basaltic field located in central Anatolia, consisting of five cinder cones, two lava fields and several explosion craters and maars. Finally, the massive double-peaked stratovolcano Hasan Dağı in central Anatolia has undergone four episodes of caldera collapse. A group of more than 25 Quaternary cinder cones, maars, and lava flows dot the plains surrounding it. Geologic evidence supports its eruptive activity continuing into the Holocene.

A third, vast area, now totally different from its early/mid Holocene version, the sub-Saharan Africa (from the Ethiopian highlands to the SW Libya and NE Mauritania), with its disperse volcanic landscapes and a vast system of lakes /rivers, due to different past hydroclimatic conditions, seems to fit perfectly to the data derived from the ancient historians, geographers, poets & philosophers, who wrote about a 'sunken continent' that flourished many thousand years ago. This radical point of view, had already presented as an interpretation in *Atlantis : The Antediluvian World* by Ignatius Donnelly & Egerton Sykes (http://www.unexplainedmysteries.com/forum/index.php?showtopic=124435). Among other research proposals that focus on N/ NW Africa, one is worth-mentioning, made by Greek independent researcher G. Saranditis in the recent Atlantis II International Symposium held at Athens, (November 2008). Generally speaking, active volcanoes in Africa pose a serious threat to life and property. Africa has about 140 volcanoes that have erupted during the last 10,000 years, of which 25 are active and 60 are located in Ethiopia (Siebert & Simkin, 2002). Volcanic eruptions

produce lava and ash flows, pyroclastics, carbon dioxide emissions from volcanic crater lakes, earthquakes, and landslides.

Fig. 4. Haruj is a large volcanic field spread across 45,000 km^2 (17,000 sq mi) in central Libya (27.25°N 17.50°E). It contains about 150 volcanoes, including numerous basaltic scoria cones and about 30 small shield volcanoes, along with craters and lava flows.
Image source: http://en.wikipedia.org/wiki/Haruj

1.3. Gigantomachy (Campi Flegrei, Etna, Nisyros/Kos)

Two cycles of events in the ancient Greek mythology deal with a long and " painful " transformative process from the chaotic and primordial natural forces into a ruled universe, the Titanomachy & the Gigantomachy. The later is a sequence of different events and persons with a various symbolism, naturalistic, environmental, cosmic, religious, sociological, historical, anthropological, folkloric, linguistic, e.t.c. The rivalry, the pursuit and the battles between the Olympian Gods and the Giants, in Greece and Egypt, incarnate the internal changes of the elementary primordial natural forces and the cosmic reordering that took really place in the Mediterranean Region, during a remote period of time. Shifts of the crust, submarine trenches, orogeny, erosion and sedimentation, the emergence and fragmentation of the mainland of Aegaeis, tectonic faults, volcanic eruptions and sea-level changes symbolize the perpetual struggle between the natural elements (fire, water, air, soil). In fact, it is a cosmic climax of clash and environmental upheaval.

Moreover, the historically active volcanoes of the Mediterranean are confined to only a few areas: the Hellenic Arc, Sicily and the Strait of Sicily, Southern Italy and the Aeolian Islands. All these regions were within reach of the early navigators. Archaeological finds from Neolithic settlements testify that obsidians were exploited as tools and arms. Commerce between the islands and the continent seems to have flourished, possibly as early as the tenth millennium BC. The early inhabitants observed volcanic activity and new myths were born to account for such portentous events. A plethora of ancient writers mentioned the giants (Aeschylus, Apollonius Rhodius, Aristophanes, Diodorus of Sicily, Euripides, fragmenta of various historians & comedians, Herodotus, Hesiod, Homer, Kallimachos, Lucian, Pausanias, Pindar, Plato, Sophocles, Vergilius).

The core AD91-17 recovered in the Otranto Strait - S. Adriatic Sea, the sediment of which consists of hemipelagic mud with intercalated tephra layers has spoken about this western area that gave birth to rich cross-cultural disaster mythological patterns. These layers correspond to the tephra of Campanian volcanoes and their eruptions, 'Agnano', 'Mercato-Ottaviano' , 'Agnano Monte Spina',

‘Avellino’, and the historical paroxysm of Vesuvius at A.D. 472 (Sangiorgi et al., 2003).

The Phlegrean Fields caldera formed about 40. 000 years ago with the eruption of 80 cubic km of ash (the Campanian Tuff). The caldera is about 13 km in diameter and includes numerous cones and craters, 25 km west of Vesuvius and 5 km west-southwest of Naples. Accurate geologic studies of the volcanic formations have reconstructed the evolution of the area, as they marked by some catastrophic events that have substantially modified the territory. Recent data drawn by the distribution of the volcanic products in the Mediterranean point out that, in the period between 40 000 and 27 000 years ago, in the Phlegrean Fields there at least five explosive eruptions occurred. Those events gave the most violent volcanic paroxysm of the circum-Mediterranean area during the last 200.000 years. A whole region from Italy to S. Russia suffered dramatically and the Palaeolithic natural and cultural landscapes changed. Even the climatic shift of Heinrich Event 4 has been attributed to the post shock results. Later on, a volcanic ‘paroxysmal’ period along the S. Italy and Sicily dominated during Early Neolithic Era.

Fig. 5. Campi Flegrei. Solfatara crater. Image source: http://en.wikipedia.org/wiki/Campi_Flegrei

There is no evidence for Giants’ birth in the written texts of Greek Classical Period, but a later tradition says that the pregnant Gaia half - opened the Phlegrae plain and brought them to life as adolescents. The final battle of Gigantomachy took also place in Pallene, former Phlegraean or "burning" fields, which could be located in Italy, according to a later tradition, reported by Strabo, who locates the place of the battle in Campi Phlegrei or Burning Fields. During that battle, Zeus and Hera exterminated Porphyrion, Hercules beated Alcyoneus, Athena won Enkelados & Pallas, Apollo Ephialtes, Poseidon Polybotes, Dionysos Rhoitos, Hecate Klityos. Hephaistos, after being in serious trouble , saved by Helios , killed Mimas. The Greek names of several Giants are related to some physical phenomena and ecofacts derived from the volcanic phenomena: Enkelados < ancient greek word “ kelados ” (= the loud noise, the meteorological or geological crash), Mimas < “ mimichmos ” (= the subterrenian dull sound, the neighing), Rhoitos < “ rhoibdos ” (= the deafening sound) & “ rhoisos ” (= the hissing sound), Porphyrion < “ pyr ” (= the fire, either as a mass of hot missile, or as a person who causes a fire destruction) and Pallas & Pallene < “ pella ” (= the stone and its correlating words), e.t.c. Typhoon, a monstrous creature of the Greek and Egyptian mythology, was the son of Tartarus and Gaia. Typhoon bellowed like a bull and roared like a lion, symbolizing the strong winds, the hurricanes and the burning steams of the volcanoes. Lernean Hydra, a huge serpent with nine heads, was the daughter of Echidna and Typhon.

He was the largest monster ever born, his bottom portion and hands were a mass of coiled snakes. He frightened the gods of Olympus sending them fleeing to Egypt. When Zeus was taunted for his cowardice he returned to fight Typhoon. After a long and dreadful battle Zeus defeated the monster. Its punishment was to lay under Etna. The artistic motif of Typhoon originated from Egypt, where existed a long tradition for the strange bodily combinations of men and serpents and Asia, where the artistic standards are more clearly presented. The figure of the dragon penetrates into the Greek art, during the second half of the 7th cent. B.C.

The easternmost volcano of the Aegean arc forms the 9-km-wide island of Nissyros (it is truncated by a 3-4 km wide caldera). The island was constructed during the past 150.000 years, with three cone-building stages. The whole scenery was related to the mythical Polybotes, a giant who fought Poseidon in their war against the gods. He was pursued by the god across the sea and crushed beneath the rock of Nissyros which formed the tip of the island of Kos. His name is derived from the Greek noun polybôtos, meaning "fertile," or more literally "feeding-many". The Thermoluminescence dating of four volcanic samples (material of eruption ejecta), from the island of Yiali near the Nissyros volcano, has revealed, according to the scientists who conducted the measurements (Liritzis, Michael & Galloway, 1996: 361 – 371; Sampson & Liritzis, 1999: 95 - 107), for first time, a volcanic eruption which occurred during the 2nd millennium B.C. (c. 1460 B.C). This one could be a 'rival' for the environmental disasters correlated to this period!

2. The archetypal symbolism of creation, transformation and move

2.1. The geoclimatic/anthropogeographical cycles in Massif Central

The Massif Central area is the largest magmatic province of the West-European Rift system, being named because it is right in the middle of France. Auvergne is at the heart of this area. The Massif Central is made up of extinct volcanoes, reaching heights of 1,885m in the area surrounding the region's capital Clermont-Ferrand. The highest peak is Mont Dore (1,885m) in this, the largest group of volcanoes in Europe. The volcanic cones are called *puys* (pronounced *pwee)*, the most famous and impressive of which is the Puy de Dôme on the west of Clermont-Ferrand.

The spatial-temporal distribution of Tertiary-Quaternary volcanism in the area, shows that three magmatic phases can be defined, each of them characterized by different volumes and different locations. These continental alkaline volcanics range in age from 65 Ma to 3450 years BP and can be divided by geography and age into 20 separate areas (Michon & Merle, 2001: 201 – 211; Downes, 1987: 517 - 530).

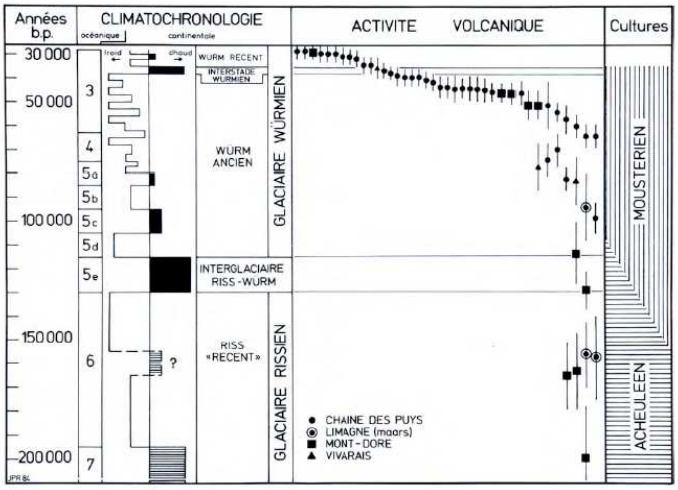

Fig. 6. After Raynal & Daugas, 1984: p. 17, Table 2.
Climatic chronology, volcanic activity and human occupation in Massif Central, between 200.000 and 30.000 years BP. Note the reduced volcanic activity during Riss and first half of Wűrm Glacial in Basse-Auvergne. On the contrary, an intense volcanic activity took place during the end of Lower Wűrm. Absolute dates from D. MIALLIER (1982) & G. GUERIN (1983). Climatochronologies from H. LAVILLE, J.P. RAYNAL & J.P. TEXIER (1984)

According to modern archaeoenvironmental research, the Pleistocene volcanic activity in the French Massif Central, was often brutal and devastating, with volcanic products dispersed far away into vast geographic zones, some lacks of occupation could result from it, showing that prehistoric populations adjusted to the volcanic activity's periodicity. In a second time, effects and products of volcanism favour human settlement (crater lakes, rock-shelters under lava flows, e.t.c.). Noteworthy is the fact that human presence in the area dates back to the Upper Pliocene, ca 2mya, adjusting to the climatic cycles of glacial /interglacials. Between 40.000 and 25.000 ya, a peak in the basaltic flows caused the geological formation of rock-shelters, that were occupied 20.000 or 10.000 years later, during the Magdalenian. A final eruptive crisis with Plinian/Strombolian cataclysmic eruptions, took place between 11.000 and 7.000 ya, probably explaining the absence of Mesolithic tool industries in the area of Basse – Auvergne. But, the Pleistocene interglacial & Holocene landscapes were extremely favourable to humans, with lush vegetation, rich fauna, fertile soils and abundant tool-fit materials. The most recent stage of biotopes' full exploitation comes with the Neolithic , ca 5000 BC., through a gradual ecological / economic readaptation. All these volcanic sceneries seemed to enhance the pastoral / agricultural processes (Guilaine, 1998; Daugas & Raynal, 1988; Raynal & Daugas,1984: 7 - 20).

2.2. The Anatolian volcanoes and the Neolithic Goddess

During Neolithic Times Anatolia was the centre of an advanced culture. Excavations during 1961 - 1965 unearthed Çatalhöyük in central Anatolia (modern Turkey) as a major site. The settlement consisted of brick houses with entry over ladders from roof level. The houses contained a hearth and stove and had platforms for sleeping and working. It is believed to have had a population of around 7.000 people, who cultivated grains and oil seeds and may have practiced animal husbandry.

Eruptions from Hasan Dağı impacted Neolithic communities and were dramatically recorded in paintings that depict apparent caldera formation about 7600-

7500 BC. Other paintings illustrate eruptions producing pyroclastic flows and lava flows that destroyed towns and villages.

The religious quarter of Çatalhöyük contains several shrines with wall paintings of outstanding quality. A vivid, nearly naturalistic wall painting from one of the shrines depicts the plan of the city and a remarkable Neolithic portrayal of the active twin-peaked volcano of Hasan Dağı, eight miles to the east of the city. This is the earliest known visual record of a volcanic eruption, dating to about 6200 B.C. with an error margin of less than 100 years. The mural shows a cinder cone, perhaps one of the cinder cones in the Karapinar volcanic field that lies about 30 miles east of Çatalhöyük, ejecting tephra from the summit vent. The volcano is shown exhibiting only mild Strombolian activity.

Several features suggest that the painting is not simply a landscape, but is an icon of the Volcano Goddess. The contours of the volcano are breast-like and the overall shape of the volcano closely matches schematized "bison-woman" Palaeolithic designs and other goddess representations; it looks distinctly like a body, much more so than like a mountain. The spots on the volcano's flanks, described as 'glowing firebombs of lava', are very similar to the 'leopard-skin spots' that are a characteristic sign of the Goddess of Çatalhöyük throughout the city's artwork.

Fig. 7. James Mellaart, Catul Hüyük: A Neolithic Town in Anatolia, McGraw-Hill, 1967

The painting is a shrine mural (north & east sides), an expression of religion, and clearly a representation of the Mother Goddess of Obsidian. Mellaart, W.I. Thompson, Marija Gimbutas, and others have connected the animal art in Lascaux with the animal art of Çatalhöyük with the hundreds of representations of bulls, rams, leopards, vultures, and other animals (Gimbutas, 1989**;** Leroi-Gourhan, 1982**;** Mellaart, 1967; Thompson, 1981). The evidence suggests that dozens of shrines, as well as the city's artwork, artisanry and architecture, may have all been inspired and supported by a religious control of the sacred obsidian trade. The Anatolian obsidian, "purchased" in Çatalhöyük with an exchange of valuable lumber or Mediterranean seashell, in its way a thousand miles southward to Jericho. Jericho's craftsmen, paying for the black volcanic glass with equally black chunks of bitumen from the shores of the Dead Sea, would work the obsidian into a variety of stone tools that were sharper and harder than steel (Carter et al, 2008; King et al, 2008; Carter, 2007; Carter & Shackley, 2007; Carter, 2006).

2.3. The Aegean island of Melos and the Mesolithic / Neolithic sea trade

Obsidian, this black and shiny volcanic glass, has been one of the main features of Mesolithic / Neolithic and Bronze Age trade across the circum-Mediterranean world, as it was considered a semi-precious stone by the ancients, initially, a very important raw material for the manufacture of weapons and tools. Since prehistoric times, humans noticed that obsidian was more abundant and sharper than flint, later, more easily worked and even cheaper than copper.. Especially, the

Neolithic Era, in the Holocene between 12,000 and 3,000 BC connected with vast demographic growth and the development of agriculture, marks the steady arrival of man on the Mediterranean islands and the outbreak of the transformation of the natural environment.

Melos and adjacent small islands have grown from submarine and subaerial volcanism that initially was dominantly andesitic and basaltic, but ended with predominately rhyolitic eruptions. Melian obsidian is found at many sites, as far as W. Mediterranean, N. Aegean, and Egypt, and researchers have recognised the Aegean island as a very important trade centre of the ancient world (Farrand, 1999; Karimali, 2002). In fact, the famous inland cave of Franchthi, gave with its geoarchaeological evidence (Farrand, 1999) the clues for a Mesolithic trade between the islands and the mainland. The second phase of the Mesolithic is characterized by the appearance of large quantities of large fish bones and the appearance of substantially larger quantities of obsidian from Melos as a material in the local chipped stone industry. These two developments imply that, apart from sea trade, deep-sea fishing may have been done for the first time, revealing a flourishing Aegean network during the Neolithic.

But a plethora of modern research, both archaeological and geochemical (for an extended bibliographical d-base, see the *Eurasian Source References by The International Association for Obsidian Studies* : http://www.obsidianlab.com/sourcecatalog/easia_refs.html), now highlights obsidian of non-Melian origin, such as that from the Carpathians (e.g. Kilikoglou et al., 1996: 343 - 349), central Anatolia, Antiparos and, particularly, Yali of Nissyros (Georgiades, 2008: 101 - 117). The map of prehistoric obsidian exchange (Perles, 1992 : 115 – 164; Torrence, 1981) includes trade centres of Central & W. Mediterranean, e.g. the Middle Neolithic obsidian trade in the North was dominated by the Lipari source. Other island sources came from Palmarola, Pantelleria, and Sardinia. The spatial and chronological patterns of obsidian distribution helped scientists to address archaeological issues as the colonization of the islands, the introduction of Neolithic economies, and the increasing social complexity of Neolithic and Bronze Age societies in the central Mediterranean (i.e. Farr, 2006: 85 – 99; Malone, 2003: 235 – 312; Tykot, 2002: 618 - 625).

Fig. 8. The Bear Rocks of the shore of Melos Island.
The Aegean islands with volcanic activity had geopolitical significance since Mesolithic, with the obsidian trade, and, later on, with amber trade. Image source: http://en.wikipedia.org/wiki/Melos

But, it is unknown yet, to what degree these Early Neolithic patterns of connectivity across the Mediterranean were temporarily transformed into more stable exchange structures between Italy, the Balkans and the Aegean. Signs for a cross-linking of these separate exchange networks, such as the important Neolithic and Copper Age interregional zones of maritime interaction, for instance for the distribution of Liparian and Sardinian obsidian varieties in the Central and Western Mediterranean and for Melian obsidian in the Aegean, are not well established. The largest number of wrecks have been found in the west Mediterranean - off Provence in France, Tuscany in Italy, Bonifacio in Corsica, the Balearic islands, the Aeolian islands, and south-east Sicily - all places where sport diving and archaeological research have been intensive. Elsewhere, exploration has been more sporadic, as in the Adriatic, or very limited, as off north Africa. The distribution of these wrecks speak about patterns of ancient shipping. Mediterranean seafaring for colonization and trade was widespread before Bronze Age onset.

The economic aspect of volcanic landscapes' exploitation is far more complex than previously thought. Apart from the technological skills of detection and extraction (procurement), the adaptedness to local conditions, the resources' management, seafaring breakthroughs, and social patterns of trading exchanges, there is a variety of perspectives from the form of 'raw material', to 'preforms' or 'end products'. "One might consider also the socially meaningful gifting of skilled and valuable objects, such as necrolithic blades and cores (either alone or as part of a 'toilet kit'), while 'obsidian' in the form of raw material or preformed cores was exchanged in more mundane settings, aside from the 'main event' of a wedding, funeral, giftgiving ceremony or some other exclusive forum" (Carter, 2008b & 2007). Such processes (from the perception of a volcanic landscape to its final modification) forged the identity of these areas and the communities that interacted with them in many ways (eg mining, redistribution, consumption, burial practices, zonation of influence, formation of mythological cycles), through engaging in different sets of overseas relations.

2.4. Creation – healing – transformation (the Hephaestus' Pelasgic cycle)

Hephaestos belongs to the guardian-gods or 'creators' of the Universe and functions as a pivotal force among the 'proto-hellenic' deities, presenting a strong relationship between Hephaestos and the Pelasgian substratum of circum-Mediterranean region (Laoupi, 2006). This god of volcanic and thermal activity, of wild and destructive fires, the patron of smiths and metalworkers, builders, architects; stonemasons , carpenters and wood-workers, seems to represent not only the earthen / subterranean fires but this of extra-terrestrial origin, ever awful and uncontrollable. Divine smiths are peacemakers, too, for they are connected with celestial and subterranean fields, by acting as mediators between them. Lemnos, the island that was sacred to Hephaestus, as well as the name Aethaleia, sometimes applied to it, points to its volcanic character. It is said that fire occasionally blazed forth from Mosychlos, one of its mountains; and Pausanias (8.33) narrates that a small island called Chryse, off the Lemnian coast, was swallowed up by the sea. All volcanic action is now extinct.

The 'flame of Hephaistos' or his 'red breath' (characterized as purest flame) was a leit motif among ancients (Orphic Hymn 66 to Hephaestus; Homer Iliad, II.426, IX.467, XVII.88 & XXIII.33 and Odyssey xiv.71; Hesiod Theogony, 864; Aristophanes Birds, 436; Quintus Smyrnaeus, 13.170,13. 367 & 4.160; Suidas, s.v. 'Hephaistos'). Although ancient writers mention it together with Keian, Cappadocian

and Sinopic earths, all four being identified as red earths, Pliny's comment makes the difference. This earth (terra lemnia, rubricata or sigillata) resembles cinnabar (35.14), it had a pleasant taste, too, while Galen (13.246b) adds that "it differs from miltos because it doesn't leave a stain when handled". The same writer, during his visit to Hephaestias , analyzes the myth of Hephaistos and his relationship with Lemnos, saying that "the mythical hill, also known as Mosychlos, appeared to be burnt due to its color and from the fact that nothing grows on it". Belon, during his journey in the 16th cent., refers also to the yellow/white colors of the earth, equally explained by the presence of hydrothermally altered rocks. The ritual of its extraction highlights its peculiarity (Hall & Photos-Jones, 2008: 1034 - 1049). On the other hand, the god was reknown as an ' aithaloeis theos', meaning the sooty god (Suidas , s.v. 'Aithaloeis theos') and in Lemnos, Hephaestus was worshipped as a god of healing, his priests possessing antidotes to poisons. Later on, the priestesses of Artemis had the right to use this earth (http://www.gla.ac.uk/archaeology/projects/indminerals/LemnianEarth).

2.5. Descend into the Underworld

A final implication of volcanic Mediterranean geomythology is the descend of ancient heroes into the Underworld (Ades) as a journey into human subconscious. Besides Heracles, the only other living people who ventured to the Underworld were all heroes: Odysseus, Aeneas (accompanied by the Sibyl), Orpheus, Theseus, Pirithous, and Psyche, but the first three are connected to the volcanic area of Cumae. The myth of Heracles is mainly related to two episodes at Campi Flegrei: the Gigantomachy and the construction of the coast road between lake Lucrinus and the sea. In ancient times, the boar's tusks were said to be preserved in a sanctuary of Apollo at Cumae in Campania (Pausanias, viii.24.5). The capture of this wild boar had been one of the twelve labours performed by the hero. Moreover, the hero, returning homeward from Spain, spent a night beside the Tiber (Dionysius of Halicarnassus, i.39 – 40; Livy, i.vii).

Baia includes the vast area between the promontory of Miseno and the Lake of Lucrino. Its name derives from the place where Baios, a helmsman of Ulysses got buried. In the Campi Flegrei the ground is subsiding and the ancient Roman ruins are disappearing below the waves. There the homeric hero descended into Hades and spoke with the deads (Homer, Odyssey v, x & xi).

Fig. 9. Ruined temple of Apollo. Avernus, near Cumae (Cuma),
Italy in the Region of Campania west of Naples. Image source: http://en.wikipedia.org/wiki/Avernus

The mythical Cumaean Sibyl was consulted by Aeneas when he was fleeing Troy (according to Virgil) to give him instructions to descend to the underworld. The

entry to the underworld (Hades) was at the nearby volcanic crater of Avernus. The Cumaean Sibyl was the priestess presiding over the Apollonian oracle at Cumae, a Greek colony located near Naples, Italy (Cicero, *Tusculan Disputations* iii.27; Dionysius of Halicarnassus, vii.3; Livy, ii.21, iv.44, viii.22, xxiii.35-37; Pausanias, vii.22.6; Strabo, v.4 et al.). The word Sibyl comes (via Latin) from the ancient Greek word Sibylla, meaning prophetess. There were many Sibyls in the ancient world, but because of the importance of the Cumaean Sibyl in the legends of early Rome, she became one of the most noted and famous, often simply referred to as The Sibyl. She was said to inhabit a cave with one hundred mouths. The Cave of the Sibyl was rediscovered in May 1932 by Amedeo Maiuri.

3. Volcanic Disasters. Curse or blessing? A non -existent dilemma

Our ancestors lived in highly active volcanic environments, since Lower Pleistocene. Generally speaking, there are more than 60 ancient hominid track sites ranging in age from 3.7 million to less than 500 B. P., recorded from all continents except Antarctica, but no ichnotaxonomic names have ever been formally proposed for hominid tracks. Unfortunately, the hominid track site sample includes only about a dozen sites where footprint preservation is good enough to show details of diagnostic foot morphology and typical trackway morphology (Kim et al, 2008).

Three and a half million years ago (geologic dating) in a location now known as Tanzania, the Sadiman palaeovolcano erupted surrounding the area with ash (Zaitsev et all, 2011). The rain that followed the event, created a natural type of cement which fossilized the footprints of any species that may have walked over the wet ash (Agnew, Demas & Leakey, 1996). One of these species happened to be a hominid. The Laetoli trackway was discovered in volcanic ash sediments. This fossilized footprint pattern indicated the animal was a bipedal animal, turning this evidence into a tremendous discovery which uncovered when in hominid history our ancestors began walking on two legs. Fossils of the hominid Australopithecus afarensis dating to 3.8 to 3.6 mya, were found in the surrounding areas, so the scientists identified these tracks. Scientists have also found even more evidence for bipedalism in A. afarensis , because he had special anatomy of the shin bone that indicated an upright posture. Unfortunately, these footprints are in danger of being destroyed, although they represent the earliest direct evidence of kinematically hominin bipedalism, showing that extended limb bipedalism evolved long before the appearance of the genus Homo. Since extended-limb bipedalism is more energetically economical than ape-like bipedalism, energy expenditure was likely an important selection pressure on hominin bipeds by 3.6 Ma (Raichlen et al, 2010).

Humans left, also, tracks (20 cm) in the volcanic ash of the Roccamonfina volcano Southern Italy (41.3 N, 14.9 E), firstly dated between 385 – 325 kya, but with a (refined 40 Ar / 39 Ar technique dated at 348–340 kya. Just to the north of Naples, in the province of Caserta, is the Roccamonfina Regional Park, the most prominent part of which is the Roccamonfina volcano, the oldest volcanic complex in the Campania region of Italy. It had three main eruptive periods: (1) 630,000 - 400,000 years ago; (2) 385,000 and 230,000 years ago); (3) a period that ended 50,000 years ago, just as the better known eruptions to the south, i.e. the Archiflegrean caldera and, later, Mt. Vesuvius were about to start. There are 56 such impressions on the slopes of the volcano—footprints made during its second eruptive period. The prints display raised arches and ball and heel impressions; they were left by a small band of individuals, from 3-6 persons. The prints and length of stride indicate that they were under five-feet tall. The scientists measured the dimensions of the tracks and

estimated that the individuals who made them were no taller than 1.5 meters in height. These footprints were made awfully close to the Climatic Termination IV, a time at which the global ecosystem was making transition between a glacial maximum and the sudden establishment of warmer conditions.

Initially, scientists believed that the individuals belonged to a pre-human species, probably to the hominid ancestor, *Homo heidelbergensis,* the direct ancestor of both *Homo neanderthalensis* and *Homo sapiens*. If these assessments are correct, they are the oldest prints of the *Homo* genus ever found. But, if the estimates of the size of the individuals is correct, they were somewhat shorter than the typical adult *Homo heidelbergensis.* Paolo Mietto, of the University of Padua, and his colleagues, think the Campanian tracks were made by early *neanderthalensis,* maybe a group of children. Remains of this species have been found in several places in Italy, including Circe's grotto, a site north of Campania where the legendary witch of that name is supposed to have lived (Mietto et all, 2003). Although the prints were first reported reliably and scientifically just a few years ago in 2003, the prints have been known to locals for centuries and have earned the name in folklore as the 'Ciampate del Diavolo' (the Devil's footprints). Whoever they were, they were scrambling downhill (there are also hand prints to indicate that they reached down to steady themselves on the steep terrain), running through molten lava. Most likely they were fleeing an eruption, as they descended the treacherous side of the volcano.. We don't know if they finally made it.

Fig. 10. Ciampate del Diavolo - Roccamonfina, IT.
Image source: http://en.wikipedia.org/wiki/Ciampate_del_Diavolo

During another Palaeolithic eruption, ca at 38 .000 BC, the fallen ash (type of volcanic tuff is known as the Xalnene) trapped and fossilized the human footprints. In 2003, British scientists found them, in central Mexico , in an abandoned quarry close to the subaqueous, monogenetic Cerro Toluquilla volcano (near Puebla, Mexico City). The "Toluquilla footprint layer" contains both human and animal footprint traces preserved on the upper bedding planes of the ash, which was deposited in the shallow Pleistocene Lake Valsequillo. The footprints were made and preserved during the latest stages of deposition of the ash and are present in several layers in the top 20 cm of the ash succession, where they are interbedded with lake sediments (Gonzalez et al., 2006 a & b; Gonzalez et al, 2003). The Xalnene Ash was exposed on lake shorelines during low stands in the water level, associated with either water-displacement during the volcanic eruption, or due to climatically-driven fluctuations in the water balance. This date indicates humans were in the Americas 25 ky before

the coalescence dates from the most recent genetic studies, and 27 ky before the Clovis culture.

Fig. 11. Right human footprint, showing figure of eight shape, Toluquilla quarry, Mexico.
Image source**:** http://www.physorg.com/news4937.html

Not surprisingly, volcanic environments, even being highly risky, they have a lot to offer to humans. The slopes of volcanoes and the surrounding regions are covered with rich, volcanic soil that gives lush vegetation and blooming ecosystems. Volcanoes also create brand new islands. Over hundreds of thousands of years, these volcanoes breached the surface of the ocean /sea becoming habitable islands, and rest stops during long sea journeys. Unique species of plants and animals evolved into new forms on these islands, creating balanced ecosystems. Another volcano benefit are the many precious gems and building materials that can only come from volcanoes. Opals and obsidian are produced in volcanoes. Volcanic eruptions produce pumice stones, which people have used to remove excess skin. Hardened volcanic ash, called tuff makes a strong, lightweight building material. The ancient Romans used tuff to make a strong, lightweight concrete for walls, and buildings. The roof of the Pantheon in Rome is made of pumice concrete because it's so lightweight. Evenmore, regions of volcanic activity are enormous sources of geothermal energy with its healing properties, appreciated thousand years before modern era. Hominids and humans by instinct weighed the negative impacts against the positive impacts and repeatedly chose to live under the shadows of volcanoes.

The physical traits of Obsidian (fire element) are associated with the relief of pain and its energies enhance vigor, strength, stamina, constancy, permanence, tenacity, courage and self-control; it is considered as the stone of entrepreneurs and inventors. It prevents the flow of negative energy, humans perceived obsidian as a stone of protection and honesty, bringing out the warrior spirit. In Chakra healing, Obsidian reflects the base chakra that controls our "grounding" to the Earth, being associated with all our survival instincts and self-preservation; relating also to the physical body, individuality, stability and security.

Chakra(< Sanskrit "wheel") is like a vortex, a constantly revolving wheel of energy. These vortexes connect the subtle bodies and act as transducers for life-force energy. chakras distribute the life force through the physical and subtle bodies. They are the source of physical, emotional, mental and spiritual energy. Traditionally, there are nine major chakras associated with the physical body, counting two above the head within the etheric field, which are not normally referred to. They are aligned with the spine and located in the base of the spine, the lower abdomen (sacral), the solar plexus, the heart, the throat, the centre of the forehead (third eye), and the crown of the head. When our chakras are blocked, or not in balance, the free flow of energy

is impeded, leading to physical, emotional, mental or spiritual disease. When the chakras are unblocked and free-flowing, however, we enjoy optimum health. Each chakra is associated with specific colours and crystals and governs different aspects of human emotion and behaviour. Using crystals with the chakras can have a great healing effect.

So, Obsidian aids the digestion and detoxifies. It reduces arthritis pain, joint problems and cramps. Moreover, it brings clarity to the mind and clears confusion, by dissolving emotional blockages and ancient traumas. Worth mentioning that Obsidian is a very powerful stone, one which reminds us that birth and death are simultaneously and constantly present, one with the other, always as one, an experience lived by our remote ancestors in volcanic landscapes, both fertile and deadly. This is a stone that has always been associated with guardian spirits that watch over us, and is connected to protection on all levels. Although most people are familiar with the regular black obsidian, there are several other types including: Apache Tear, Blue, Blue/Green, Gold Sheen, Mahogany, Rainbow, Red, Silver Sheen and Snowflake. Obsidian can be found almost anywhere there has been volcanic activity in the past, but not all the sources are currently being mined. Most mining is done in Armenia, Greece, Hungary, Iceland, Italy, Japan, Java, Kenya, Mexico, New Zealand, Scotland, Turkey, and United States (Arizona, California, Colorado, Hawaii, Idaho, Indiana, Montana, New Mexico, Oregon, Texas & Utah). Mayan Priests used scrying mirrors made of obsidian for foretell the future. They called the mirrors, “smoking mirrors”, as black Obsidian , is a diviner's stone (Stein, 1996; Melody, 1995; Gardner, 1988; Brennen, 1987; Stein, 1987).

In parallel, vortices are high energy spots on the Earth, due to its electromagnetic field. NASA research has proved that the human energy field is tuned in to certain ‘Earth Waves’. These ‘hot spots’ are linked by Ley lines (energy lines). Earth vortices are analogous to the chakras in the human body. Ley lines are alleged alignments of a number of places of geographical interest, such as ancient monuments and megaliths that are thought by certain adherents to dowsing and New Age beliefs to have spiritual power. Plato recognized grids and their patterns, devising a theory that the Earth's basic structure evolved from a simple geometric shapes to more complex ones. These shapes became known as platonic solids: cube (4), tetrahedron (3), octahedron (8), dodecahedron (12), icosahedron (20). In *Timeaus*, Plato associated each shape with one of the elements, Earth, Fire, Air, Ether, and Water. The Earth's energy grids, from the beginnings of its evolutionary course, has evolved through each of these shapes to what it is today. Each shape, superimposed, one upon the other to create a kind of all encompassing energy field that is the very basis of Earth holding it all together. Volcanic environments are highly energy conductors symbolizing the female power of Earth which gives birth and death to its creatures (see the Obsidian Neolithic religion).

These highly active geotectonic areas were also connected to sacred places of divination. A famous example is Delphi Oracle (Central Greece). Recent studies have speculated that the prophetic powers of Pythia at the Temple of Apollo, were induced by hydrocarbon vapours, specifically ethylene, rising from bedrock fissures at the intersection of the E-W Delphi fault with the NNW-SSE Kerna fault, and producing neurotoxic effects, including trance and delirium. New surveys including gas flux from soil, gas in groundwater, and isotopic analyses of spring scales, provide the experimental confirmation of the gas release in the Delphi area (Etiope et al, 2006; De Boer et al., 2001).

Fig. 12. Temple of Apollo at Delphi. Image source: http://en.wikipedia.org/wiki/Delphi

The geothermal waters have medical properties too, as they benefited diseases of the skin and blood, nervous affections, rheumatism and kindred diseases, and the "various diseases of women". Scientists have proven that bathing in the lagoons has positive effects on rheumatics, psoriasis, acne, dermatitis and eczema, Pimples, Blackheads, Whiteheads, Blemishes, Large Pores and Rosacea. Sulfur naturally occurs in volcanoes, surfacing upwards daily from underground steam vents and is also found in hot mineral springs. Natural Volcanic Sulfur is well documented in medicine for its Anti-Bacterial, Anti-Fungal, Anti-Inflammatory and Natural Antiseptic properties make it an excellent active ingredient.

The most crucial parameter, though, are the environmental stimuli that made our remote ancestors to choose repeatedly the volcanic environments, where they survived, lived, reproduced and evolved. The geochemistry of such environments include among other valuable elements, the naturally occurring Halogens (fluorine, chlorine, bromine, iodine). Especially, chlorine, bromine and iodine are strongly enriched in the sea while iodine and to a lesser extent bromine are further concentrated in the marine algae. Minerals, sediments, clays and bedrocks in igneous environments are rich in such elements, and are influenced by proximity to the sea. Iodine and chlorine are essential elements for mammals and fluorine has been shown to have beneficial effects on bone and tooth formation. However, excess quantities of dietary fluorine can be harmful. It is possible, in view of its ubiquitous occurrence in the biosphere, that bromine has a hitherto unknown function in human and animal health (Fuge, 1988). Furthermore, apart from the degassing of bromine and iodine from volcanoes, volcanic landscapes contain a lot of other rare elements (lithium, rubidium, arsenic, boron, strontium, antimony, germanium, etc), iron, copper, zinc, and selenium, being the other brain selective minerals.

But no other species, including primates, exhibits symptoms of iodine deficiency. The inability of humans to conserve iodine seems to reflect hominids' way of life on highly active tectonic areas and shorelines, with a diet rich in iodine absorption (Venturi et al, 2000; Brown-Grant, 1961). In 2008, this ancestral antioxidant action of iodides has been experimentally confirmed by Küpper et al. Since 700 million years ago thyroxine is present in fibrous exoskeletal scleroproteins of the lowest invertebrates (Porifera and Anthozoa), without showing any hormonal action. When some primitive marine chordates started to emerge from the iodine-rich sea and transferred to iodine-deficient fresh water and finally land, their diet became iodine deficient. Therefore, during progressive slow adaptation to terrestrial life, the primitive vertebrates learned to use the primitive thyroxine in order to transport antioxidant iodide into the cells, for a better adaptation of the organisms to terrestrial environment (fresh water, atmosphere, gravity, temperature and diet). Recent research has proven that , "Iodides have many non-endocrine biologic effects, including a role

they play in the physiology of the inflammatory response. They improve the phagocytosis of bacteria by granulocytes and the ability of granulocytes to kill bacteria. They concentrate around tumors and granulomas in man and animals. They also move into areas of tissue injury" (Dobson, 1998; Stone, 1988).

The circumstances of human brain evolution are of central importance to accounting for human origins, too, yet still poorly understood, and they can be focused to three main points: (1) The human brain cannot develop normally without a reliable supply of several nutrients, notably docosahexaenoic acid (DHA), iodine and iron, (2) The human foetus has about 13 % of body weight as fat, a key form of energy insurance supporting brain development that is not found in other primates (survival of the fattest babies was the key to human brain evolution), and (3) The genome of humans and chimpanzees is <1 % different, fact that shows differentiation in habitats, during the last 5-6 million years of hominid evolution. Shellfish, fish and shore-based animals and plants are the richest dietary sources of the key nutrients needed by the brain. The consumption of most shore-based foods requires no specialized skills or tools, whether on the shores of lakes, marshes, rivers or the sea. So, the presence of body fat in human babies appears to be the product of a long period of sedentary, shore-based existence by the line of hominids destined to become humans (Cunnane & Stewart, 2010; Cunnane, 2006 & 2005; Cunnane & Crawford, 2003; Broadhurst et al, 2002 & 1998).

Consequently, some of the most numerous and extensive finds of fossil and archaeological material relating to the earliest phases of human evolution (eg Rift Valley, Jordan Rift, S. Caucasus, Sangiran Dome in Indonesia) are no coincidence, indicating a relationship between distinctive, topographically complex volcanic landscapes (fault-bounded basins, uplifted terrain, ubiquitous volcanoes, lava fields) and water bodies, that deserves closer investigation. Hominins' dispersal followed also the same patterns (King & Bailey, 2006).

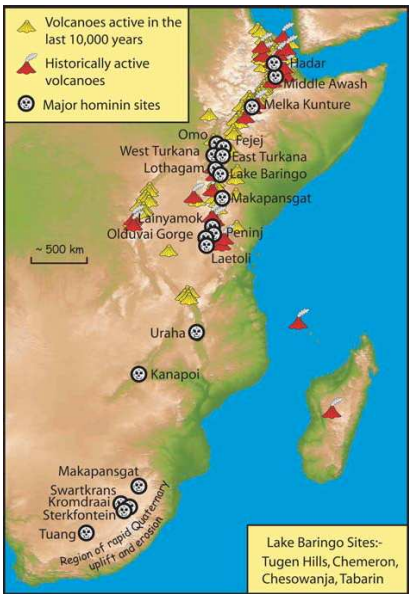

Fig. 13. General indication of hominin sites in the African Rift and areas of volcanic activity. After King & Bailey, 2006:267

The same patterns seemed to exist during later times. Springfed water sources provided potable water, adequate iodine and other micronutrients as cobaltium and selenium, along with bedrocks & sediments containing iodine. The ideal spots to find big game in Pleistocene, were soils underlain or surrounded by volcanic sediments (Haynes, 2002). Massif Central (France) is also one of the prominent Paleolithic examples. Later on, during the last five millennia, the Neolithic era gives rise to five historical civilizations principal hearths (regarded as the greatest societal units, by Toynbee), more or less correlated with volcanic areas: (1) The Mediterranean-Middle-East - Zagros & Aegean Sea recent faults, Miocene/Current Cyclades archipelago volcanicity, (2) India - Indus hollow fracture, (3) China Tancheng-Lujiang and Xingan-Taihang Earth's crust fractures zone and Quaternary major faults, Taihang mountains risings and quaternary cracks , (4) Mexico - volcanic Top-Plates, and (5) Peru - Andes Cordilleras volcanic High-Grounds.

Conclusions

Disasters and hazardous phenomena / landscapes not only impacted on natural-resource dependent communities, acting as important accelerators in economic and socio-cultural crises, but also transformed the spiritual environment and the community life of past societies. The volcanic landscapes of circum-Mediterranean area had, since Palaeolithic times, through visual contact or information flow patterns (tales, legends or data from trade experiences), created a complex, symbolic geomythological framework with a basic dual concept. The traditions of local communities and the journeys across those volcanic environments created social alliances, identities, relationships and practices that are now revealed as mentifacts, reflecting past activities (knowledge, skills) and temporalities.

After the Toba event that seems to have changed the human evolution, from Caucasus to Canary Islands, and from Massif Central to sub-Saharan Africa, volcanoes inspired admiration and fear, as they could be simultaneously creators and destructors. Evil and divine, the power of fire and earth was one of the most risking challenges that humans had to face.

But, beyond Neolithic Mediterranean, the influence of environmental chemical elements on the processes of hominization & encephalisation had been started long before. For the past fifteen million years, the East African Rift Valley has been a unique geological environment which contained volcanic activity and many enormous freshwater lakes. Paleoanthropological evidence clearly indicates that hominids evolved in East Africa, and that early Homo inhabited the Rift Valley lake shores. Although earlier hominid species migrated to Eurasia, modern Homo sapiens is believed to have originated in Africa between and subsequently migrated throughout the world. The nutrient-rich volcanic landscapes had a crucial impact on shift in the hominid resource base; this was accompanied by an increase in relative brain size and a shift towards modern patterns of foetal and infant development.

Just like calcium & oxygen, iodine contained in the Earth's crust and the oceans. Iodine follows a cycle to the sphere surface. The morphological and physiological iodine role in the organisms is significant. Iodine influence on the caudal or cerebral tissues development or regression is well-known. The thyroid hormone acts about on all tissues but with more effectiveness on bone and nervous tissues. Brain development claims higher amounts. So the rich in brain selective

minerals, volcanic and shore (near bodies of water) environments were always highly attractive to humans, all over the world, counterbalancing any danger and disaster.

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