I - EXECUTIVE SUMMARY

This synthesis, initiated during the meeting, was consolidated thereafter by inputs received from the participants.

1. INTRODUCTION

The workshop took place from 22 to 25 October 2003 on the Greek island of Santorini, one of the best Mediterranean examples of a major geological/catastrophic event in recent times, often regarded as the birthplace of a persistent legend of universal appeal - the myth of Atlantis.

Sixteen scientists from eight countries (see list at end of volume) attended the seminar convened at the invitation of CIESM. They were warmly welcomed by Frederic Briand and Jean Mascle who recalled the main objectives and background of the meeting and expressed their appreciation for the valuable logistic assistance provided by the two Greek participants.

Workshop's objectives and outlines

The geological record reflects complex interplays between long, medium and shorter gradual trends on the one hand (for example tectonics, subsidence, erosion, sea level variations, climatic fluctuations) and instantaneous, or catastrophic, events on the other. Determining a precise chronology, assessing the spatial impacts of such events, quite often present unrealistic challenges in the absence of unambiguous correlations with reliable time records.

This Workshop was precisely designed to address such challenges, by taking advantage of the specific geological environment and rich historical and cultural heritages of the Mediterranean/Black Sea region. Indeed few places in the world offer the possibility to correlate recent geological/environmental evolution with such a rich palette of human records. The participants therefore were largely concerned with the period broadly covering the last 20,000 years in the Mediterranean area and immediate surrounding: this period coincides with human prehistory and recorded history – a time when the expression of crustal (tectonics, isostasy), sedimentary and palaeoclimatic processes, as well as of short-term events, such as earthquakes, volcanic eruptions, tsunamis and floods, is rather well documented, thanks to continuous human settlements and to the testimony left by a large variety of cultures.

Considering the general tectonic setting, one must bear in mind that the western Mediterranean and the Black Seas are tectonically somewhat passive basins, while the eastern Mediterranean has continuously been tectonically active, even during the Quaternary, in response to global plate tectonic readjustments and particularly the subduction/convergence between the European and African plates. This difference will be reflected in the archaeological and historical records.
Unfortunately, large spatial and regional heterogeneities blur the relevant available data. As a result, theories and controversies about spatial extent, magnitude, frequency and impact of such events abound. A major aim of the seminar was to review – on the basis of the latest scientific findings and available tools – the degree and reliability with which major geological processes and trends have been recorded by man during the past millennia.

Presentations linking catastrophic events such as floods, volcanic eruptions, tsunamis, with current hypotheses concerning Noah’s flood, the loss of mythical Atlantis, the collapse of the Minoan civilization, or more generally with the birth of myths/legends, were, as expected, the subject of vivid debate. Other natural events receiving attention were those short events with damaging or devastating consequences (from a human perspective) on a more regional scale, e.g. neotectonic sub-vertical movements affecting certain coasts, or inland deformations connected with earthquakes (co-seismic deformations). The participants also considered and discussed the rates and impacts of more or less continuous geological phenomena – e.g. delta progradation, progressive land subsidence or uplift, and of global sea level and climatic fluctuations – and their interrelation with the relatively brief period of human history.

In all cases the coincidence – or lack of it – between available human records and geological chronological evidence was the object of scrutiny. Man has documented past environmental history in two ways: casually or deliberately. The first type, casual records, deals with archaeological remains that can be used in order to refine the precision of relative sea-level changes and shifts in the shoreline (e.g. migration of harbour sites, progradation of deltas, submerged cities) or of catastrophes. The causes may be changes in sedimentary budget, tidal dynamics and tectonics, as well as earthquakes or volcanic activities. The second type, deliberate documents, deals with historical data, such as literary evidence, paintings, ancient photographs and instrumental records. The applicability of these indicators is not as easy as it seems at first sight, as written sources often leave room for translation and interpretation. Evaluating the precision and applicability of these indicators is an important challenge.

2. Time - Space Scales

In order to properly assess, and ultimately understand, the complex interactions between the many parameters affecting geological/environmental evolution during the last 20,000 years, one must first carefully consider the issue of time/space scales (see Petit-Maire, this volume). Three distinct time-space scales, tentatively illustrated on the diagram of Figure 1, may be recognized:

- **A short scale (days and years)**
  Weather variability (including anomalies such as hurricanes, storms, floods and droughts) induces short but strong *local* effects upon the environment and man. Earthquakes, volcanism, tsunamis, landslides, belong to this category of events which, although relatively local in space and short in duration, may induce severe problems to human settlements, habitats, or health.

- **A middle scale (one to a few centuries)**
  Variations in the activities of the sun, reflected by the frequency of sunspots and auroras, and by $^{14}$C production, may induce significant *regional* effects (a few tenths of degrees C in temperature) upon the Earth’s climate. Until recently, these processes were mainly recorded in Europe but nowadays data from both hemispheres point to the role of solar energy variations. The early Middle-Age Optimum, when Vikings raised cattle along Greenland coasts and when wine grew in Britain, and the Little Ice Age, responsible for the 16th/17th centuries’ cold spells and bad crops, are good examples of these mid-scale climatic events which have direct impacts on socio-economic and political structures. A number of historians have suggested that the European revolutions in the 18th century were partly induced by the severe life conditions due to such mid-scale cooling.

- **A longer time scale (millenia)**
  It is well established that the Milankovich orbital changes induce major environmental *global* changes. The ocean surface temperatures, recorded in oceanic and ice cores, may vary by about 7°C between glacial and interglacial peaks. Sea level changes of several meters to tens of meters, extension or reduction of permafrost areas, islands, or tropical deserts, interconnections between
emerged continental areas, delta progradation, ... all relate to this time scale of events. Mankind is clearly very sensitive to such changes, especially those related to sea level (at times quite rapid although rarely catastrophic), permafrost (or ice) cover and deserts. Glacial conditions, for instance, allowed human migrations from Siberia to Northern America and, possibly, the early settlement of Australia during a Mid-Pleistocene glacial period. Around the Mediterranean Sea, the societal and political impacts of such large-scale climatic changes have been considerable, in particular during the Holocene. Throughout the Old World, the Neolithic revolution was associated with global warming and the onset of more favourable humid conditions after the precessional maximum around 11,000 BP. In contrast the arid period starting around 4,000 BP is associated with the collapse of several civilisations (Mesopotamia, Anatolia, Egypt, Indus, ...) through droughts, invasions and subsequent political changes.

3. PROGRESSIVE GEOLOGICAL TRENDS

3.1. A need for a precise methodology

To analyze these classes of events precise methodologies must be used, or developed. As an example, a general sketch of the methods applied in geoarchaeological research, and of their connections, is shown in Table 1.

In relation to this section, the following issues received particular attention during the workshop discussions:

3.2. Dating methods

Three types of dating techniques are usually applied: radiometric, archaeological and historical. Each of them has its own applicability (material, dating range), resolution and limits.

(a) For the Holocene the usual radiometric dating method is the radiocarbon technique ($^{14}$C). It was agreed that the $^{14}$C method yields the best results when applied to organic macro remains such as grape seeds or olive stones. As far as marine carbonates (e. g. marine shells) are concerned, there are still problems with the reservoir effect, all the more so since little is known about its local variations or temporal changes during the last 20,000 years. A solution might be a cross-checking with TIMS-U and multicollector ICPMS-U series dating.
Table 1. Methods of geoarchaeology and palaeogeography (adapted from Brückner).
In an archaeological context, in situ ceramics and other artifacts can provide relative dating as well, but with a degree of precision open to debate.

Historical sources and literary evidence are numerous; they are however heterogeneously available for time and space in the Mediterranean and Black Sea regions. In addition, they face several problems: proper translation, interpretation (e.g. of timing and site location), epigraphy and exegesis, as well as subjective interpretation of sources. Written sources have the additional problem of dating (type of calendar used). Iconographic representations are not always objective, except in the few cases where a “camera obscura” close to photographic precision was used (see Camuffo, this volume). Therefore, a multidisciplinary approach is needed to assess the reliability and interpretation of the data.

3.3. Sea level indicators

In general, several types of sea level indicators, each of different quality and accuracy, can be considered: sedimentological, geomorphological, biological, pre-historical, archaeological, historical and instrumental.

Proxy sea level indicators provide information about pre-instrumental sea level positions. Biological indicators have proven to be best in microtidal environments like the Mediterranean Sea (Laborel and Laborel-Deguen, 1994). For the northwestern Mediterranean Sea mid-littoral for example Lithophyllum rims are well adapted. In warmer waters, along the eastern and the southern shores Dendropoma bioconstructions are the most precise indicators. In protected environments, such as ancient harbours, the upper limit of marine organisms (e.g. Balanus incrustations and Lithophaga perforations of archaeological structures) may provide precise biological sea levels down to a few centimetres (for details see Morhange, this volume).

Coastal archaeological structures (fish pond, quay, jetties, pits) can also be useful sea level indicators. The precision of sea level reconstructions based on shipsheds and slipways is not as accurate because the practical relation between sea level and naval architecture/structure is not well known. Such indicators should therefore be combined with others. In general, it is always better to cross-check the produced data with another method in order to assess whether palaeo-sea level is precisely indicated. Depending on the method and the available data, the temporal precision can be decennial or even better.

Bio-erosion notches and mid-littoral abrasion platforms are very sensitive indicators (see Fouache, this volume); however, their link to sea level is still being debated as the retreat point of a notch corresponds to a locally dynamic high energy environment. As erosional features they cannot be dated directly. From a sedimentological point of view, littoral facies are typical, if not very precise, sea level indicators. From a geomorphological perspective the same is true for all kinds of coastal features such as sand spits and beach ridges.

Based on the quality and number of sea level indicators available, local palaeo-sea level curves can be reconstructed for a given region (see Sivan, this volume). There is however no single Holocene sea level curve for the whole Mediterranean or Black Sea since too many local and regional factors are involved and interfering (Moerner, 1996). Local curves may however – with restrictions, and presented as ‘envelope curves’ – be transferred to regionally valid scales.

As a very general trend, and as supported by evidence from prehistoric submerged caves from the northwestern Mediterranean Sea (Collina-Girard, this volume), it can be stated that sea level rose from -135 m around 19,000 BP (last glacial maximum) to around 1 meter below its present position around 3,000 BP.

Sedimentary input increased when sea level rise decelerated at about this time (Stanley and Warne, 1994). Then the impact of Neolithic deforestation, as well as longshore sediment transport, led to massive and rapid changes of coastal landscapes. The implications for mankind are obvious, for example in the shifting of coastal settlements, or with harbour migration (see Brückner, Vött, this volume).

Palaeo-environmental proxies

While bio-sedimentological evidence of palaeo-sea level is easily detectable, it does not provide very accurate estimates at those levels. It is a useful tool for palaeo-climatological and palaeo-
geographical reconstructions which aim to outline the location of former shorelines. Palynological studies, for example, can help to determine marine transgressive facies with marshland development parallel to the shoreline (Beckenbauer, 1962; Galili and Weinstein-Evron, 1985).

When reconstructing delta progradation, microfaunal studies (e.g. ostracod or foraminifer analyses) help establishing the direction and rhythm of sedimentation as well as the different environments of deposition (marine, lagoonal, littoral, lacustrine, fluvial). Archaeo-zoological remains (e.g. animal bones) may also provide important data for deciphering coastal evolution, especially if they can be dated.

As detailed by H. Brückner in this volume, extensive archaeological survey can be fruitful in revealing interactions between landscape evolution and human settlements. Since archaeological sites are often buried under thick layers of deposits in coastal sedimentary basins, field surveys must be refined by geophysical methods and coring.

4. SHORT-TERM / CATASTROPHIC EVENTS

4.1. Time-space scaling

Human records of short-term/ catastrophic geological processes and phenomena in historic and prehistoric times have to be considered as functions of event intensities and of impacts (and damages) caused on ancient human settlements and lives. Here also the time-space interaction is a major problem to take into consideration. A sketch of time-space relations between catastrophic events and their relative intensities is shown in Figure 2.

Fig. 2. Interaction of time and space scale with intensity of catastrophic geo-processes.

Usually damage increases with the intensity of an event (earthquake, tsunami, etc …) but the physical damage (e.g., the degree of city destruction) does not equate with the extent of the permanent change printed on the landscape. Indeed slow tectonic processes working on larger timescales (e.g., surface uplift and/or subsidence) can be more effective as landscape changers than catastrophic events. These processes can induce dramatic geomorphological (and environmental) consequences when they interfere with fluvial systems and alter the fresh water budgets of large areas such as wetlands. Sometimes episodic uplift-subsidence (of seismic origin), not necessarily strong, can act as a trigger, with vertical tectonics gradually moving a fluvial system to conditions close to non-equilibrium and/or disequilibrium. Cases illustrated by P. G. Silva in this volume deal with the fluvial capture and desiccation, between 4,000 and 2,500 yr BP, of ancient Holocene wetlands presumably providing fresh water for Late Neolithic/Early Copper Age populations in the Iberian Peninsula. Such changes coincided with the post-flandrian sea level fall on the Spanish littoral and with a major climatic crisis (aridity) recorded throughout the Mediterranean region (see Petit-Maire, this volume).
Another attempt to illustrate the scale dimension of short-term natural events and their interactions with Mankind over the last 20,000 years is shown below in Table 2.

<table>
<thead>
<tr>
<th>Typical time scale</th>
<th>Space scale</th>
<th>Climate</th>
<th>Events</th>
<th>Geomorphologic changes</th>
<th>Impact and effect on mankind</th>
</tr>
</thead>
<tbody>
<tr>
<td>months &lt; long &lt; years</td>
<td>regional</td>
<td>astronomical global changes</td>
<td>flood</td>
<td>marine transgressions collapse of periglacial lakes</td>
<td>shifting of coastal settlements; landward migration</td>
</tr>
<tr>
<td>days &lt; mid months &lt;</td>
<td>regional to local</td>
<td>???????</td>
<td>volcanic eruption</td>
<td>caldera creation; filling up of lowlands with volcanic deposits</td>
<td>migration; socio-economic and political changes; air pollution; global warming?</td>
</tr>
<tr>
<td>hours &lt; short &lt; days</td>
<td>local to regional</td>
<td>extreme meteorological events, high precipitation, volcanic effects; meteorites</td>
<td>earthquakes landslide, tsunami, flash floods,</td>
<td>coastal erosion; slope retreat; abrupt silting up of lowlands and valleys; coseismic uplift or collapse</td>
<td>silting up of human installations, i.e., harbour sites.</td>
</tr>
</tbody>
</table>

During the workshop various short-term/ catastrophic events (in other words the catastrophes resulting from and producing geological processes) were discussed. We now review the main examples and concepts covered.

4.2. Earthquakes

Ancient accounts (from Herodotus, Pausanias, Strabo, and others) provide valuable descriptions of the impact of major earthquakes and earthquake-related phenomena on human settlements in historical times. Those scripts, no matter how precise, are only of descriptive value and clearly depend on the author’s perception, or on the accuracy of the information provided to him. Their use is consequently of informative value only, as descriptions and data should be checked carefully with modern methods. Thus our knowledge of catastrophic earthquakes and of their effects on ancient cities has greatly benefited in recent years from archaeological findings (see Altunel; Silva, this volume), although much care is required when interpreting archaeological records which may indicate vertical tectonic movements.

Quaternary seismic events can be archived within the geological record (i.e. by seismites), but abrupt landscape changes, triggered by tectonic activity during the last 20,000 years, can also be preserved in the geomorphological record. For more recent time periods (i.e. last 8,000-9,000 years) large earthquakes commonly interfered with human activity and are thus incorporated into archaeological and/or historical records. Therefore, to understand the impact of tectonic events on the environmental history of ancient populated areas, the geo-archives (geology/geomorphology and human record – i.e., archaeology and history) should be considered together. This will help assessing the real contribution of tectonic events to environmental change.

Most of our knowledge about “long term” seismic behaviours of formerly populated regions proceeds from “historical sources” (seismic catalogues; e.g., Papazachos & Papazachos, 1989, Guidoboni et al., 1994; Ambraseys and White, 1997). Only recently, during the last decade, has archaeological evidence of reported (or unreported) historical events been taken into account. In most cases evidence of major events is weak in the geo-archives, although these events can leave strong signals in the human records of localised areas. Only “extreme events” affecting larger areas can generate clear signals in the geo-archives and be perceived by ancient populations as global catastrophes, eventually incorporated into history as “Myths” (see section 5 below).

Modern geological, geo-morphological and palaeo-seismological methods are now being used to investigate the parameters of ancient seismic events and to reconstruct seismic scenarios and associated phenomena. Reconstructions of past seismic climax, with data gained from recent approach and methods, increasingly provide valuable guides to estimate the seismic potential of faults, assess seismic recurrence risk, or earthquake planning and protection. For example the destruction and subsequent submergence of ancient Helike (southern shore of the Gulf of Corinth) as a result of a strong earthquake in 373 BC, followed by coastal collapse and tsunami invasion, provide an excellent case study. They may contribute significantly to the evaluation of seismic risk in an area where similar phenomena, but of lower magnitude, are reported to have taken place repeatedly since Antiquity (see Sakellariou, this volume).
4.3. Volcanic eruptions

In contrast with earthquakes, volcanic events leave very strong signals in both geological and human records, even in their lowest energetic manifestations. Ongoing geodynamic processes at convergent plate tectonic margins are responsible for the active volcanism in the Aegean and Southern Tyrhrenian Seas. Volcanic eruptions have repeatedly taken place during recorded history and have been responsible for some local but enormous catastrophic events.

The Minoan eruption of Santorini in the 2nd millennium BC was probably the greatest volcanic eruption to have taken place on Earth during the Holocene (see Nomikou, this volume). Closer to us in time, Pompeii is the best known example of a historic city, suddenly erased after the eruption of Vesuvius in early Christian times. Both events are extensively recorded in archaeological, geological, sedimentological and geomorphological records.

Large scale excavations have brought to light both ancient Pompeii and parts of the Minoan city of Akrotiri on Santorini Island. The archaeological data provided significant information on the various processes which took place prior to, and during, the eruptions. Geological field mapping and laboratory analyses completed the archaeological records, allowing detailed interpretations of volcanic processes (see Nomikou, this volume). Nevertheless, direct geo-chronology of volcanic material remains a challenging task and the radiometric ages obtained must be treated cautiously.

Volcanic activity and processes associated with the mobilization of magma are also responsible for vertical movements in areas adjacent to volcanic centers. Pozzuoli, in the Phlaegrean Field near Napoli provides a good example of alternating rapid uplift and collapse (see Morhange, this volume) with an important geomorphological and human impact.

4.4. Tsunamis

Records provide information on a large number of tsunamis (which can be triggered by earthquakes, volcanic eruptions and slope destabilizations) throughout historic and more recent time. Independently of the triggering mechanisms, the effects of tsunamis on the coasts and the damage to human settlements may be very significant. Tsunami deposits may, or may not, be preserved on the drowned land and, if present, may well be misinterpreted. Trenching, as a method to investigate possible tsunami deposits, allows fairly detailed reconstruction of the affected area if such deposits are preserved. Detailed palaeo-environmental studies are required to distinguish the violent and abrupt landward deposition of loose and mixed material coming from the seafloor/coastal zone from high-energy fluvial deposits.

Historical records and archaeological data are valuable for the dating of past tsunami events. Direct geo-chronological methods ($^{14}$C, U-Th, etc.) may contribute. Available information on past tsunamis and their consequences during historic time can be considered as valuable additional data towards the assessment of tsunami hazard of coastal Mediterranean areas. It is interesting to note that certain similarities can be found across time and regions between tsunami-linked coastal collapse events. For example, coastal failure and subsequent mass sliding occurred in 1979 at the airport of Nice, causing serious damage and human casualties. This catastrophic event seems to have developed in similar ways to those which led to the submergence of ancient Helike in 373 BC.

As for other short-term “energetic” geological processes, human damage caused by tsunamis may be far greater than the signal left in the geo-archives by the triggering earthquake. Thus the 1755 Lisbon earthquake (Ms 8.5 – 9) led to extensive tsunami damage along the Atlantic Iberian coast, but left only a weak geological record: modest washover fans breaking the more recent spit-bar systems (see Silva, this volume).

4.5. Flood(s)

The famous Noah’s flood was the subject of much debate during the meeting. Although few participants doubt that it happened, there remains much controversy about the way it actually took place (see Lericolais, this volume).
Floods are common elements in the testimonies/mythologies of all Eastern Mediterranean and Near Eastern civilizations (see Wyatt, this volume). To some extent it appears therefore plausible to infer that such a spatially extensive myth may be related to the Holocene global sea level rise, with particular morphological characteristics possibly controlling the timing as well as the magnitude of the flood in the various regions. But it is also possible that the flood myth may not reflect a single flood event. Chronologically and spatially successive flooding of various regions may well have led to the creation of similar myths in the testimonies of the different civilizations.

For example, as detailed by G. Lericolais in this volume, although the Global ocean sea level has risen since the end of the Last Glacial Maximum (i.e. 18,000 years ago), significant fluctuations of Black Sea water-level occurred before and since its final drowning. These Black Sea regressions and transgressions appear to be modulated by climate and directly linked to the fresh water input from the Northern ice cap during its melting. It appears that the Black Sea, when not connected to the Mediterranean Sea, behaved as a giant enclosed basin akin to the Caspian Sea, i.e., as a major receptacle for the earliest melt waters, highly sensitive to regional climate fluctuations (see Kvasov, 1975; Svitoch et al., 2000). Thus, as the ice cap reached as far south as Poland at its moment of maximum extent 20,000 years ago, major rivers flowed southwards. The first important melting of the northern ice cap (Melt Water Pulse 1A; ca 14,000 years BP) provided important masses of water to the receiving enclosed basin that was the Black Sea at that time. In consequence the level of the Black Sea rose from about -120 m to an average water level of -40 m around 12,000 years BP. The arid period encountered through the Younger Dryas event and the cessation of melting water caused a drop in Black Sea water level estimated to -100 m (geophysical results obtained during Ifremer cruises), although the global ocean was “standing still” during this time. Such large-scale Upper-Pleistocene/Holocene fluctuations are evidenced in the sedimentological record and the palaeo-morphology of the Black Sea shelf. Could they have contributed, during the last rapid transgression, to the origin of a flood myth?

Recent data from the Aegean/Ionian Sea region support the idea of successive, regionally and locally distributed flood events. Present-day semi-enclosed basins and gulfs, like the Gulf of Corinth or Saronikos Gulf for example, are only separated from the open sea by very shallow straits. For some of them it has already been shown, on the basis of stratigraphic sequences, palaeo-environmental and geochemical analyses, that they were isolated from the rest of the Mediterranean during the last glacial maximum. Thus, the timing of their drowning by the Mediterranean water is directly related to the depth of the straits (see Sakellariou, this volume).

5. LEGENDS AND MYTHS

The reliability of ancient sources (literary, archaeological, artistic, ...), as well as their accuracy was thoroughly discussed and debated, through examples such as the myth of the lost Atlantis. Much has been written about Atlantis, a great deal of it aiming to demonstrate the reality of the myth and attempting to locate the lost city. But to what extent does the myth of Atlantis reflect reality? Or is its real value to inspire us to keep searching for alternative explanations and hypotheses and in this way to produce new knowledge? Noah’s flood (see above) is another good example of a strongly debated myth or legend.

The reliability of information gained from ancient sources is, in general, to be related to the ages of the sources and their origins (archaeological data, historical records, memory/mythology): ancient sources tend to be generally less and less accurate/reliable as they originate from older times. Thus written reports on events from the Middle Age or Byzantine time are generally more accurate than those originating from Roman or Classical times, themselves more accurate than those from earlier times. Nevertheless excellent descriptions of ancient catastrophic events do exist, either constituting exceptions to the rule, or owing their accuracy to the high magnitude of the impact.

Retracing further back into the past, the accuracy of witnesses/descriptions diminishes to very low levels, for example, to the level of accuracy of indirect information, as decoded from the mythologies of various civilizations. But even at this level, the differentiation of myths from reality requires nuances and categorization. For example, the Iliad written by Homer in the 2nd millennium BC was long considered entirely apocryphal. Yet it was its centerpiece, the “legendary”
Trojan War, which led Henrich Schliemann to his many excavations and to the stunning discovery, in 1871, of the ancient city of Troy near the mouth of the Dardanelles. More scientifically elusive – at least for the time being – Flood myths are documented in the mythology of several civilizations (as Noah’s Flood, Gilgamesh, Deukalion’s Flood, …): they therefore deserve to be treated as having higher pragmatic value than the myth of Atlantis, for which we dispose of only one remote, indirect account, that of Plato (see Collina-Girard, this volume).

Finally, the majority of mythologists (Thomas Bullfinch, Karl Jung …) consider myths to be evidence of collective memories, of old half-forgotten events, to which religious or ideological elements have usually been added. Their origins are predominantly external. This external view of myths makes the gods’ roles appear as rationalizations of experience, somewhat comparable to scientific hypotheses. If this view is accepted, then the origins of myths can be traced tentatively to the same psychological need for explanations. A difference between the two categories of explanation is that while myths tend to be pulled towards ideological poles, scientific ideas as they mature gravitate in the opposite direction, towards the epistemic. Perhaps it was the development of science and epistemology which brought an end in classical times to the great age of mythogenesis (see Wyatt, this volume).