Apuan Alps: the Atlas of Stone

The Apuan Alps (Fig. 4), the High Versilia and the Garfagnana are part of the Apuan Alps Park, rich in petroglyphs and archaeological finds, many of which are unknown and undeclared. These areas have been inhabited since Neolithic times, but the significance and reason for stone engravings remains unclear. The Apuan Alps were chosen as dwellings by people who left many ancestral and religious signs of their testimony, including sacred altars, thrones and artefacts sculpted from stone [1]. It can be considered a *stone atlas* revealing our past and our roots.

Fig. 4 – Map of Apuan Alps, Italy

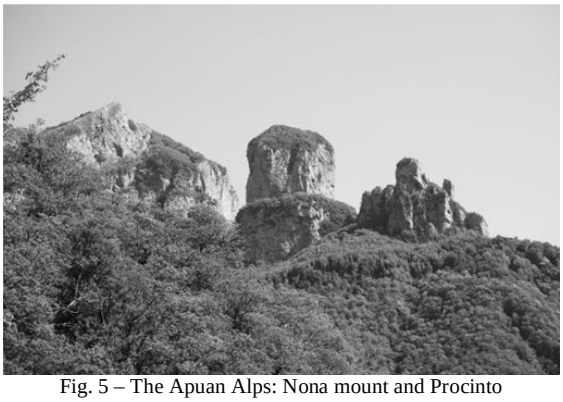
Fig. 5 – The Apuan Alps: Nona mount and Procinto

The Site of Curiceta, Seravezza, Tuscany

The Curiceta site is located in a dense chestnut forest, in an area where dry and perfectly preserved stone terraces are found. The first stone building on the path, is the so-called *"fireplace"* (Fig. 6). It is a large flat stone set in the ground with a series of aligned stones where probably, a fire was lit. Behind the big stone, is a cavity where the smoke came out. In the lower part, there is a "handle" carved in the rock, its function is still unknown.


Fig. 6 – The *fireplace* in Curiceta, Seravezza, Tuscany.

Along a short stretch of the path on the hill, lies the sacred stone *altar* (Fig. 7), the second building. This enigmatic structure, has revealed many surprises when tests were performed with electronic instruments. The altar is carved from a single stone block and consists of a backrest and a horizontal supporting surface. From the left side, there are inclined planes which go down. Below which there is a vertical groove. On the altar we find a "carved handle" in the first structure of the so-called "fireplace". Rocky altars are common found throughout the world in sites such as, in Basilicata, Apulia, and Sicily in the South of Italy, the ancient site of Petra in the Middle East. However in High Versilia this is the only one.


Fig. 7 – The altar in Curiceta (Seravezza – Tuscany)

Fig. 8 – Fireplace, detail of the handle (above); altar, detail of the handle (below).

Fig. 9 – Sound recording equipment & set-up at the altar

Fig. 10 – Spectran NF-3010 from German factory Aaronia AG

Fig. 11 – The TRV camera test to value the emotional state of volunteers sitting on the altar.

Materials and Methods

Equipment for the sound recordings consisted of two types of dynamic high-end microphones extended in the ultrasound frequency range, with a digital portable recorder (Tascam DR-680 of TEAC Group, with a maximum sampling rate of 192KHz). Professional studio microphones with a wide dynamic range and a flat response at different frequencies (Sennheiser MKH 8020, response Frequency 10Hz - 60.000Hz) with shielded cables (Mogami Gold Edition XLR) and gold-plated connectors (Fig. 10) were also used.

Before recording a spectrum analyzer (Spectran NF-3010 (Fig. 10) from the German factory Aaronia AG) was used to detect the presence of any electromagnetic phenomena which could influence the results.

Praat program version 4.2.1 from the University of Toronto and Audacity open-source program version 2.1.2 for Windows and Linux were used to analyise the audio recordings.

Thermography was used to analyse the temperature characteristics of the structure by use of a thermal imaging camera (model ThermaCAM SC640 IR Camera by Flir Systems Inc).

A TRV camera (Variable Resonance Imaging camera, known as a Merlin camera in Italy or Defend X system in Japan for industrial use) was used to test the emotional state of 8 volunteers situated on the sacred altar area (anthropologic analysis), a system used in previous research. TRV camera works by valuing the balance of the head and the micro-mobility of the body which is controlled by the vestibular system (inner ear). This system is influenced by the emotional state of the subject (quiet or anxious) and it is possible for a computer camera to perceive

these as micro vibrations. By using dedicated software (Vibraimage Pro 8.3) the shape of examined subjects can be coloured to understand their state of mind. This system is used by secret services as a "lie detector" in the field of terrorism. TRV camera has a common CCD backlit, with a three MegaPixel sensor. Its protective anti-aliasing filter was removed to extend its ability to capture light from the infrared (IR) and ultraviolet (UV) bands (the lens has a 25 mm quartz-fluorite optics with a pass band from 200nm to 1800nm).

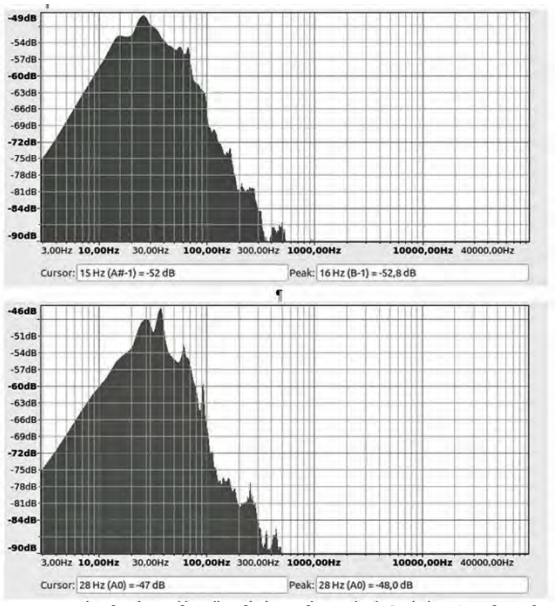

Fig. 12 – The graphic audio analysis at Curiceta's altar by Audacity 2.1.2

Results

Analysis of the microphone recordings revealed a dominant frequency of 25–28Hz that is powerful in volume (-47 to -50db). Another lower peak of 15-16Hz was revealed in the graphic analysis (Fig. 12). To avoid recording mistakes, some analysis was made directly on site by computer (Fig. 16). Near the altar in the fireplace the same vibrations were found, but at a much lower sound level. The source of the sound is directly under the altar with the sound decreasing when walking away from it. The site was full of water and listening by headphones during the recordings the sound of falling water was heard, so the most likely explanation for the source of these low frequency (infrasound) vibrations was from the flow of underground water. Infrasounds have a physiological effect on the body, for example those individuals who consider themselves to be sensitive state they often sense such vibrations as unspecified energy emanating from underfoot,. Infrasound frequencies can also enter the brain without passing through the hearing organ, entraining the brainwave rythm into an Alpha-Theta state.

Some clarification of the characteristics of these results in respect of the measured volume should be mentioned: in that there is a distinction between using decibels to measure sound pressure levels as opposed to signal levels. Sound Pressure Levels are a measurement of air pressure which is caused by sound or noise, this results in physical forces moving against the diaphragm of a microphone and in the acoustic environment this translates to volume. Measurements of this nature are usually expressed as decibels of sound pressure level (dB SPL) and are measured in positive numbers. For example a rock concert can reach 110db or a jackhammer 100db, moreover a person whispering is around 20-30db.

When dealing with signal levels, decibels are used differently. In this case, 0 dB is the highest signal level achievable without any distortion; all signal levels below this are represented as negative numbers. A volume fader may be labeled with a "0", part way up to mark the point at which that fader is neither boosting nor attenuating the signal. The measurements taken at Curiceta altar show a level of -47db which is a medium volume.

Using the thermal imaging camera, we discovered, the altar stone is colder to the rear when compared to the horizontal stone

in the foreground, with more than 4 C° of temperature difference (Fig. 13), which is interesting given that this stone is carved from only one piece of rock. It is clear that only a cold flow coming from behind can cause this difference of temperature, so we concluded some sort of cave was located behind the altar.

The results of the eight volunteers tested by TRV camera, revealed that seven out of eight of them experienced a non relaxed state of mind. After few minutes of exposition to the vibrations, we previously measured on the altar, they became anxious and agitated and almost all volunteers felt emotionally uncomfortable, experiencing a sense of fear or feeling like a strange or supernatural event was taking place. The data by TRV camera, which is able to recognize the state of mind of subjects, were really clear in this sense (Fig 14).

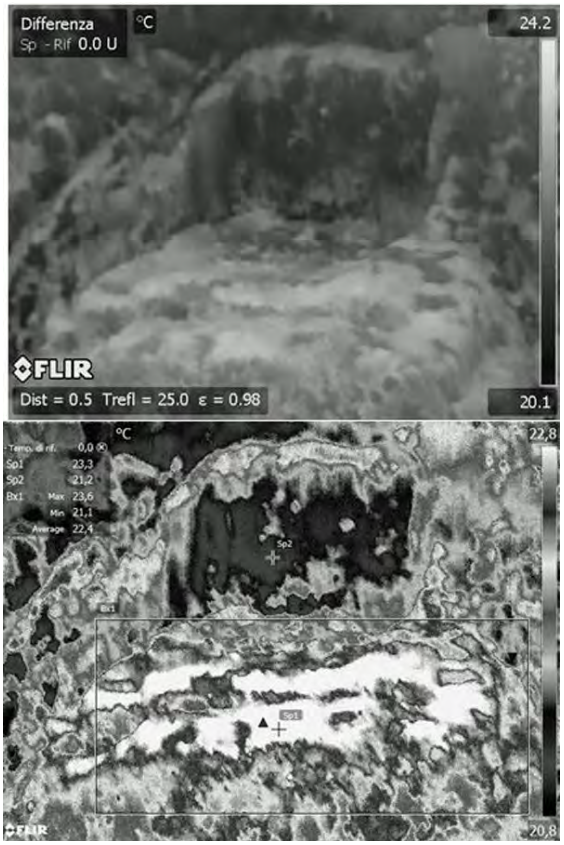

Fig. 13 – Thermographyc analysis showing a 4 C° temperature difference between the horizontal stone in the foreground and the stone behind.


Fig. 14 – Some volunteers having their emotional state recorded by TRV camera.


Fig. 15 – To avoid recording mistakes, some analysis was made directly on site by computer.

Discussion

The archaeoacoustic study at this site was carried out without any prior archaeological excavations having been undertaken, which actually raised more questions than answered. In both locations where the microphones were placed (about 30 meters apart), the same low vibration frequency signature was detected as a continuous sound. There were no factories or man made activity capable of generating such a frequency in the neighbouring vicinity that we were aware of. The pre-recording clapping tests conducted found the microphones were positioned deep enough as to be scarcely affected by the external noise environment. No sources of electromagnetic fields were found. Those frequencies recorded therefore should be considered as being an accurate representation for this site. According to an anthropologic analysis, we could suppose the two stone structures are connected (altar and fireplace).

The results on our volunteers are repeatable, but also incontrovertible as the accuracy of the TRV method has been established in the security field. Why then did almost all volunteers experience a sense of fear? Was there something in the environment affecting their state of mind? Infrasounds can induce feelings of awe or fear and given they are not consciously perceived, it may make people feel like strange or supernatural events are taking place [25]. It is therefore possible to hypothesize that where a concentration of natural low vibrations are present, ancient populations considered these sites to be supernatural or sacred [3].

A similar situation exists at Xaghra Hypogeum, on Gozo Island, Malta, where extremely powerful natural frequencies were found [21]. These are comparable to what was found at Tarxien temples on Malta, but with a slightly longer high frequency range and a small amount of oscillation.

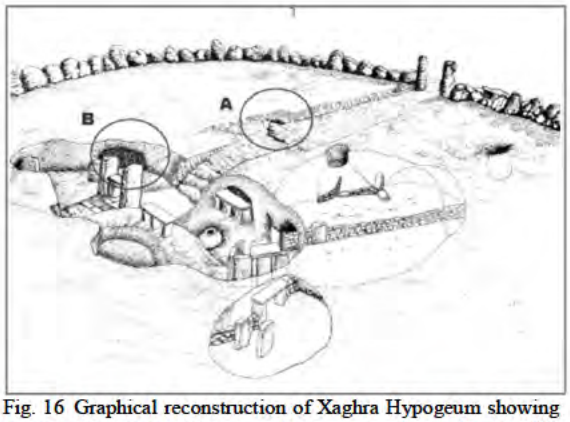

Fig. 16 Graphical reconstruction of Xaghra Hypogeum showing the locations where the microphones were placed (A & B)[21]. Drawing by Natalia Tarabella.

They have a broad peak around 25Hz at -24db. Consideration needs to be given to the fact that Xaghra Hypogeum was carved from the soil making the volume more powerful than at Curiceta altar. However the effect on the mind was totally different, because never discomfort/fear was reported by the people who visited this hypogeum. This raises the following questions: (1) is it possible that the *combination* of frequencies (15-16Hz & 25-28Hz) at the Curiceta site creates a sense of fear? (2) If infrasound does in fact cause feelings of awe or fear as described by other authors, is it possible that this was known about and used in certain rites or ceremonies? These form the basis for stimulating hypothetical questions in which to approach further research.

The study by thermographic camera threw up an interesting result, finding a temperature difference of 4 degrees, that led us to conclude some sort of cave or cavity was located behind the altar. This being the case, why block the cave or cavity with such an altar in front of it? Could this rock actually be acting as some sort of transducer? Is it possible that even stronger vibrations could be found within the cave that might for example be closer to the volume found at Xaghra hypogeum? For now we have no answers, but in future it could be interesting to go on in our research more deeply for having them.


Fig. 17 – Infrared image of Curiceta altar. This image deletes lichens enabling the original structure and the wall behind covering a cave to be more visible.

The altar is carved in a single block of stone and is formed by a backrest and a horizontal supporting surface. From the left side, there

are inclined planes which climb down. Below these sits a vertical groove, a perfect channel in which sacrificial blood can flow. The rock altars are very common around the world as, for example, in the South of Italy, in the Middle East but, in High Versilia this is the only example.

Conclusions

The study by thermographic camera threw up an interesting result, finding a temperature difference of 4 degrees. That led us to conclude some sort of cave was located behind the altar. Indeed closer examination revealed a wall of little stones around the altar that look like they were placed there to cover the entrance of the cave. The underground water found at the Curiceta's site is significant because the combination of low frequencies can create an altered state of mind especially during any rituals. We established that where a concentration of natural low vibrations are present, ancient populations considered these sites to be supernatural or sacred and certainly considered as "places of power". We can also suppose, the combination of frequencies is the most likely cause for the discomfort/fear felt by the volunteers. Perhaps Curiceta was used for a number of different ceremonial purposes over the centuries. The shape of the altar draws one to conclude they may well have been used to celebrate sacrifices. The fact that almost all the volunteers, seven on eight, felt emotionally uncomfortable, experiencing a sense of fear or trepidation, lends weight to the argument that the natural frequencies present at this site created the perfect environment in which to conduct sacrificial ceremonies.

ACNOWLEDGEMENTS

The authors are very grateful for the support received by non-profit scientific organization Super Brain Research Group institute (SBRG) for the development of this archaeoacoustic research. The authors are also grateful to Department of Medical Sciences at the University of Trieste (Italy) for supporting this research and in particular to the Director, Professor Roberto Di Lenarda. A sincere thank you to Nina Earl for her support in editing this text.

REFERENCES

[1] E. Calzolari: "Il dolmen del Monte Freddone" in "Il Cielo in Terra ovvero della giusta distanza", 1st edition, Padova University Press, University of Padova, Italy, 2015: pp. 53-62.

[2] P. Debertolis, H.A. Savolainen: "The phenomenon of resonance in the Labyrinth of Ravne (Bosnia-Herzegovina). Resultsof testing" Proceedings of ARSA Conference (Advanced Research in Scientific Areas), Bratislava (Slovakia), December, 3 – 7, 2012: pp. 1133-36.

[3] P. Debertolis, N. Bisconti: "Archaeoacoustics in ancient sites" Proceedings of the "1st International Virtual Conference on Advanced Scientific Results" (SCIECONF 2013), Zilina (Slovakia) June, 10 - 14, 2013: pp. 306-310.

[4] P. Debertolis, N. Bisconti: "Archaeoacoustics analysis and ceremonial customs in an ancient hypogeum", Sociology Study, Vol.3 no.10, October 2013: pp. 803-814.

[5] P. Debertolis, S. Mizdrak, H. Savolainen: "The Research for an Archaeoacoustics Standard", Proceedings of 2nd ARSA Conference (Advanced Research in Scientific Areas), Bratislava (Slovakia), December, 3 – 7, 2013: pp. 305-310.

[6] P. Debertolis, N. Bisconti: "Archaeoacoustics analysis of an ancient hypogeum in Italy", Proceedings of Conference "Archaeacoustics: The Archaeology of Sound", Malta, February 19 - 22, 2014: pp. 131-139.

[7] P. Debertolis, G. Tirelli, F. Monti: "Systems of acoustic resonance in ancient sites and related brain activity". Proceedings of Conference "Archaeoacoustics: The Archaeology of Sound", Malta, February 19 – 22, 2014: pp. 59-65.

[8] P. Debertolis, A. Tentov, D. Nicolić, G. Marianović, H. Savolainen, N. Earl: "Archaeoacoustic analysis of the ancient site of Kanda (Macedonia)". Proceedings of 3rd ARSA Conference (Advanced Research in Scientific Areas), Zilina (Slovakia), December, 1 – 5, 2014: pp. 237-251.

[9] P. Debertolis, D. Gullà, Richeldi F.: "Archaeoacoustic analysis of an ancient hypogeum using new TRV camera (Variable Resonance Camera) technology", Proceedings of the "2nd International Virtual Conference on Advanced Scientific Results" (SCIECONF 2014), Žilina (Slovakia) June, 9 - 13, 2014: pp. 323-329.

[10] P. Debertolis, F. Coimbra, L. Eneix: "Archaeoacoustic Analysis of the Ħal Saflieni Hypogeum in Malta", Journal of Anthropology and Archaeology, Vol. 3 (1), 2015: pp. 59-79.

[11] P. Debertolis, D. Gullà: "Archaeoacoustic analysis of the ancient town of Alatri in Italy", British Journal of Interdisciplinary Sciece, September, Vol. 2, (3), 2015: pp. 1-29.

[12] P. Debertolis, M. Zivić: "Archaeoacoustic analysis of Cybele's temple, Imperial Roman Palace of Felix Romuliana, Serbia", Journal of Anthropology and Archaeology, Vol. 3 (2), 2015: pp. 1-19.

[13] P. Debertolis, D. Nicolić, G. Marianović, H. Savolainen, N. Earl, N. Ristevski: “Archaeoacoustic analysis of Kanda Hill in Macedonia. Study of the peculiar EM phenomena and audio frequency vibrations”, Proceedings of 4th ARSA Conference (Advanced Research in Scientific Areas), Zilina (Slovakia), November 9 – 13, 2015: pp. 169-177.
[14] P. Debertolis, D. Gullà, “Anthropological analysis of human body emissions using new photographic technologies”, Proceedings in Scientific Conference “The 3rd International Virtual Conference on Advanced Scientific Results (SCIECONF-2015)”, Slovakia, Žilina, May 25-29, 2015; Volume 3, Issue 1: pp. 162-168.
[15] P. Debertolis, L. Eneix, D. Gullà: " Preliminary Archaeoacoustic Analysis of a Temple in the Ancient Site of Sogmatar in South-East Turkey", Proceedings of Conference "Archaeacoustics II: Second International Multi-Disciplinary Conference and workshop on the Archaeology of Sound", Istanbul Technical University, Taşkışla Building, Istanbul, Turkey, 30, 31 October and 1 November, 2015: pp. 137-148.
[16] P. Debertolis, D. Gullà: “New Technologies of Analysis in Archaeoacoustics”, Proceedings of Conference ‘Archaeoacoustics II: The Archaeology of Sound’, Istanbul (Turkey), Oct 30-31 Nov 1, 2016, pp. 33-50.
[17] P. Debertolis, D. Gullà: “Preliminary Archaeoacoustic Analysis of a Temple in the Ancient Site of Sogmatar in South-East Turkey. Proceedings of Conference ‘Archaeoacoustics II: The Archaeology of Sound’, Istanbul (Turkey), Oct 30-31 Nov 1, 2016, pp. 137-148.
[18] P. Debertolis, N. Earl, M. Zivic: "Archaeoacoustic Analysis of Tarxien Temples in Malta", Journal of Anthropology and Archaeology, Vol. 4 (1), June 2016, pp. 7-27.
[19] P. Debertolis, D. Gullà: “Healing aspects identified by archaeoacoustic techniques in Slovenia”, Proceedings of the ‘3rd International Virtual Conference on Advanced Scientific Results’ (SCIECONF 2016), Žilina (Slovakia), June 6-10, 2016, pp. 147-155.
[20] P. Debertolis, D. Gullà, F. Piovesana: “Archaeoacoustic research in the ancient castle of Gropparello in Italy”, Proceedings in the Congress “The 5th Virtual International Conference on Advanced Research in Scientific Areas” (ARSA-2016) Slovakia, November 9 - 11, 2016: pp. 98-104.
[21] P. Debertolis, N. Earl, N. Tarabella: “Archaeoacoustic analysis of Xaghra Hypogeum, Gozo, Malta”, Journal of Anthropology and Archaeology, vol.1 no. 5, June 30, 2017: pp. 1-15.
[22] P. Debertolis, D. Gullà: “Archaeoacoustic Exploration of Montebello Castle (Rimini, Italy)”, Art Human Open Acc J 1(1): 00003, DOI: 10.15406/ahoaj.2017.01.00003.
[23] P. Debertolis, D. Gullà, H. Savolainen: “Archaeoacoustic Analysis in Enclosure D at Göbekli Tepe in South Anatolia, Turkey”, Proceedings in Scientific Conference “5th HASSACC 2017 - Human And Social Sciences at the Common Conference", Slovakia, Žilina, September 25-29, 2017: pp. 107-114.
[24] P. Laureano: “Giardini di pietra, i Sassi di Matera e la civiltà mediterranea”, Bollati Boringhieri, 1993, Torino.
[25] V. Tandy, T. Lawrence: “The ghost in the machine”, Journal of the Society for Psychical Research, 62 (851), 1998: pp. 360–364.