



# Gylden Magick

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## April 2025

PRACTICAL MAGICK & UNIVERSAL ENERGY FOR EVERYDAY LIFE

## Editor's notes

by Gylden Fellowship

Welcome to **GYLDEN MAGICK** – the spiritual magazine from [Gylden Fellowship](#) that spans both traditional and newer pagan beliefs and practice.

Dear readers of **GYLDEN MAGICK**,

It's April (the **Seed Moon**) – I've been reflecting on seeds and new projects. Since Ostara, the hours of daylight have been growing steadily. As we look around, all of nature is flowering after the winter: buds are on the trees, seeds start to germinate and spring flowers appear everywhere. The power of the sun increases each day as the nights get shorter.

**Dates for your diaries** – not least **Hanamatsuri** (the Buddha's birthday) on 8 April, **First Cuckoo**

**Day** on 14 April, **Rama's Day** on 17 April and **Earth Day 2025** on 22 April (this year's theme is **It's Our Power, It's Our Planet**). Erica has more to say about cuckoos and, also, match girls. And we look forward to **Beltaine** (at the end of the month).

This edition has a definite emphasis on spring - the altar colours for this period leading to **Beltaine** are green, purple and yellow. But no ads – after all, we're like a pagan public library and all the information is free.

We continue with our regular series about celestial forecasts, sacred art, Bosnian pyramids, folklore, Beltaine and environmental issues. Our crystal piece features Roman emeralds. Our science writer, Mark, looks at time in the quantum

universe; other texts include plant music and the collection of fog.

In past years, we would be frantic with preparations for the Wandering Witches' Fayre, but not so in 2025. We will go along to catch-up with friends and look forward to the return of all the festivals, camps, fayres and markets in a post-covid world.

Thank you for all your feedback and many blessings.

**Gylden Fellowship admins**

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# Oplontis emeralds

By Carlo Aurisicchio

This text presents the abridged results of gemmological and geo-chemical analyses carried out on emeralds that were part of a gold necklace found during excavations undertaken on a Roman villa in Oplontis, which coincides with the modern city of Torre Annunziata (originally published in October 2005). The emerald and gold necklace from Oplontis dated from the first century CE. It was analysed by non-destructive methodologies such as EPMA and microFTIR. Reference samples, from mines known to be active in the Roman Imperial period, were collected and analysed using the same techniques. Experimental data were also statistically treated in order to classify the emeralds' mines. The comparison of archaeological and reference data led to a hypothesis (with high probability) that there was an Egyptian origin for the Oplontis emeralds.

A society's degree of development can be determined through careful study of its artefacts. Information so gleaned can provide a comprehensive picture of daily life, including the cultural level reached in various social classes. Studies of objects fashioned from precious metals, ornamental stones, gemstones and technologies employed in creating and decorating jewellery provide a wealth of information on Imperial Rome's use of raw materials, its artistic tastes and decorative values, and how jewellery was used as an indicator of social status. The origin of gemstones from archaeological finds has always been a particular challenge for researchers. Scientists and archaeologists have combined efforts in an attempt to determine the possible commercial exchange routes that brought goods to Rome. Of all gemstones, according to *Pliny the Elder*, emeralds were the most popular. In his *Naturalis Historia* (Book 37, 62) he wrote, "no colour is more attractive than their (green) colour. Furthermore, it is the only gem that satisfies without tiring the eyes."

During systematic excavations that started in 1964, two suburban villas buried by the eruption of Mount Vesuvius in 79 CE came to light. According to archaeologists the first one, sumptuous in size and decoration, belonged to Poppea, wife of the Emperor Nero. The second one, more modest, but still quite large, was probably oriented toward farming and trade. A signet ring found on the premises of this villa bears the name of *Lucius Crassus Tertius*, possibly the owner. Numerous amphorae for storing wine, pomegranate and other goods were found. In Room 10 of the villa, 54 skeletons were gathered. Many of them were wearing or holding gold or silver coins, as well as jewellery items, in a desperate and futile attempt to flee to safety with precious belongings. Judging by the quantity of objects and coins next to it, skeleton no. 27 was probably a person of importance. Nineteen prismatic beads of emerald, the subject of this study, and 24 golden beads likely belonging to a necklace whose thread was missing, were among these objects.



The necklace is 58 cm long and is made of an alternate succession of 24 oval plain gold beads (1.3 x 0.7 mm average) and 19 hexagonal prisms of emerald crystals. The missing clasp was probably a loop and hook, as was the style in Imperial Rome. This piece is unique for its peculiar look, showing a succession of emeralds mounted on a gold chain. If the pieces found represent the entire necklace, then it is probable that there was a series of gold pieces toward the clasp. The chromatic succession of yellow and deep green of gold and emerald and the simplicity of the design give the piece a rare and stunning elegance.

Optical and physical gemmological tests were performed on the 19 hexagonal emerald prisms, using standard equipment. Their average dimensions fell between 9.8 x 8.9 mm (minimum) and 14.7 x 9.8 mm (maximum). All had been drilled lengthwise to form the necklace. To the unaided eye, all crystals appeared greasy and transparent to semi-transparent/ opaque under natural light and bluish to deep green in colour, with etching, scratches and accidental breakage. The determined average density was 2.64 and pleochroism showed yellowish green for the ordinary ray and light blue green for the extraordinary ray. Some surfaces of the crystals were sufficiently polished to permit spot reading.

Microscopic observation showed characteristic fine tubules, two-phase liquid/gas inclusions, mica flakes and limonite solid inclusions and cavities parallel to the optic axes of the prismatic crystals. Absorption spectra exhibited a typical emerald trend, with slight changes in the strength of the main observed lines: 683.5 and 680.6 nm. All specimens examined gave gemmological parameters in a narrow range, suggesting that all are likely of the same origin. Electron Probe Micro Analysis (EPMA) equipped with Wavelength Dispersive Spectrometers (WDS) and microFTIR (Fourier Transform InfraRed) Spectroscopy, among other non-destructive analytical methods, were used to determine the chemical composition and structure of the emeralds. Proton induced X- and gamma-ray emissions (PIXE/PIGE) seem to give promising results even if they require software improvements for use in data processing. Ion-microprobe analysis of  $^{18}\text{O}/^{16}\text{O}$  isotopic ratio, which is related to the crystallization environment, can differentiate emeralds originating in various deposits. As an invasive technique, it cannot always be used even if the damage is very limited.

Data collected on the Oplontis gems were compared with results obtained on reference samples of known provenance, such as the Eppler Collection, Italian Museums, private collection or purchased in laboratories of Idar Oberstein coming from mines known or likely to have been in use during the Roman Empire. According to Pliny the Elder's *Naturalis Historia*, these were presumably the emerald mining localities within the Sikaite-Zabara region in the south eastern desert of Egypt, Ekaterinburg and the Urals in Russia, Pakistan, Afghanistan and India. Samples from the Habachtal mine (Austria) were also examined. This deposit (not mentioned by Pliny) seems to have been known to the Celts and probably was exploited by the Romans. Based on chemical data of reference emeralds, statistical processing was used to classify them as to their origin and data on archaeological emeralds were similarly processed.

This study of the emeralds from the Oplontis necklace was undertaken with two objectives: to determine their mineralogy and chemical composition and to identify their probable origin. Gemmological tests and spectroscopic analyses demonstrated the homogeneity of the Oplontis gemstones, suggesting their common origin, but did not suffice as to their provenance. Chemical analyses show closely similar compositions and support the hypotheses of homogeneity and a common origin of the gems. Any peculiar differences between prismatic and basal faces have been noted.

Emeralds from the eight reference mines fall into two groups, depending upon their average chemical balances (namely aluminium oxide, magnesium oxide and iron oxide) Al content. The first group were samples from the Egyptian emeralds mine region, Pakistan (Swat Valley), Russia (Urals) and one of the reported analyses for the Habachtal (Austria). The origin of these mines is mainly determined by tectonic structures, such as thrust faults

and shear zones. The circulating fluids, interacting with mafic rocks of volcano-sedimentary series, gave rise to the emeralds' mineralization. Emeralds occur in pockets and lenses localized in the contact area between gneissic biotite granite and overlying mica schists (Egyptian and Pakistani deposits). Emeralds from Ural mines originate from a metasomatic reaction by interaction of fluid rock pegmatite and mafic rocks, whereas those from the Habachtal are formed by mica-schist protolith and ultramafic rocks interaction.

The second group includes samples from Afghanistan, India, Russia (Ekaterinburg) and the Habachtal. The samples richer in aluminium and sodium, from Afghanistan and India, occur in albite-quartz veins cutting host metamorphosed limestones, phyllites and mica schists. The emeralds are of hydrothermal origin and should be the product of the interaction between volatile-rich melt (forming veins) and host rocks. To surmise the provenance of the Oplontis gemstones, frequency values of their skeletal vibrations were compared with those of stones coming from deposits known to have been mined in early times. Data are limited to spectra of prismatic faces, which yield more information for the number of bands detected and their behaviour under polarization.



A statistical analysis was developed to discriminate the origin of archaeological emeralds. In this way, it was possible to organise the compositions of the different crystals into groups with similar atomic contents (per unity of formula) of analysed elements and then extract variation patterns between groups. Ekaterinburg and Afghanistan.

The Oplontis emeralds were examined using non-destructive and non-invasive techniques to classify them and narrow their origin down to one out of several historic mines. Each technique suggested a limited number of possible provenances. The gemstones behaved slightly differently when subjected to EPMA measurements, suggesting a possible El Sikait, Habachtal or Urals mines provenance, whereas. FTIR spectra indicated either El Sikait or Habachtal. Statistical analysis shows that Oplontis emeralds best match the El Sikait samples, even if some of them fall in an area not covered by reference gemstones. All reported data and analyses support the hypothesis that the emeralds on the Oplontis necklace were traded to Rome from the El Sikait deposit, one of several famous Egyptian mines, although an Austrian source cannot be excluded, assuming that the mine was active at that time. Compositional and spectroscopic data suggest both Habachtal and El Sikait as plausible origins for the Oplontis gemstones. However, statistical treatment and gemmological observation of inclusions indicate that the second provenance is more likely.

Gylden  
Magick  
April 2025

## Sacred art: St Patrick's Festival: Dublin (15-17 March)

Collated by Gylden Fellowship







# Environment: Fog collection

By Tim Schauenberg

Sitting on the fringes of the Moroccan desert, the mountainous region of Ait Baamrane receives little rainfall, but what it does get in abundance, and for six months of the year, is dense fog sweeping in from the nearby Atlantic Ocean. While it might restrict visibility, this misty mass also provides a solution to water shortages – by using the world's largest fog collection system. Wind pushes water vapour in the air through vertical nets, where it condenses into small droplets that trickle down the netting to be gathered in large containers. The nets collect around 35,000 litres (about 9200 gallons) of water every day, which covers the needs of more than 1000 people and is also used to water crops.



*These nets in Morocco help supply locals with fresh water. Image: WasserStiftung/WaterFoundation*

Fog is not only collected in Morocco, but also in Ghana, Eritrea, Ethiopia, Chile, California, Cape Verde and South Africa. The global potential is huge with suitable locations almost everywhere, especially along coastlines. Depending on the location, a 40-square-metre (450-square-mile) fog net provides around 200 litres per day. Each one costs around \$1500 (€1628).

Until now, fog collection has mainly been seen as a solution for remote rural areas where people are barely connected to the public water network or infrastructure. However, a study (published in *Frontiers in Environmental Science*) showed that the technology could also benefit cities. With less than 1mm of rainfall per year, the **Atacama Desert in northern Chile** is one of the driest places in the world. Cities in the region rely heavily on water from deep underground aquifers that were last replenished between 10,000 and 17,000 years ago. As these ancient supplies are not inexhaustible and because refreshing them takes a very long time, alternative sources are vital, but even here, water can be collected from the air.

In the town of **Alto Hospicio**, which lies on the edge of the desert, many of the approximately 10,000 inhabitants live in poverty. Unconnected to the public water network, they rely on trucks to bring supplies to the slums. In search of a solution to the city's water shortage problems, researchers tested fog nets both in the urban area and on surrounding hills. On some days, they were able to collect as much as 10 litres per square metre, which they say is enough to cover the human consumption and irrigation needs of populations lacking access to public source water. According to researchers, an average of 2.5 litres of water could be harvested per day and square metre. Using 17,000 square metres of netting, it be possible to cover the entire water needs of the slums of Alto Hospicio. Around 110 square metres of netting would be enough to irrigate the city's entire green spaces all year round. Water harvested in this way could be transported further via pipes or by truck. As the fog only supplies water for a few months of the year, residents would have to rely on other sources in the summer months.

# Celestial notes

By Joanna Bristow-Watkins, Harmony Healing

As we progress into April, a theme emerges which venerates spring, renewal and fertility as well as nourishment. Known for April Fool's Day and April Showers, the month often hosts Easter, as it does this year. In the forest, we start to see (and smell) the beautiful bluebells, a marker of ancient woodland, which generally reach their full splendour in May.

The month of April was supposedly named after the Roman Goddess, Venus, (leading to Her Veneralia festival on 1 April), originally named Aphrilis after her equivalent Greek Goddess Aphrodite (Aphros) or the Etruscan version Apru. To the Anglo-Saxons, April was called Easter-mōnaþ (Easter Month or Month of the Goddess Ēostre). No prizes for guessing which Christian Festival took its name from this annual festival.

April begins with April Fool's Day plus the Roman Festivals of Veneralia & Fortuna Virilis, as well as Easter Monday also on 1 April. In the Roman calendar, April also hosted Magna Mater on the 4th & Floralia on 28th, widely believed to be connected to Beltane. April is also a month for some international awareness days including Autism Awareness Day on 2nd, World Health Day on the 7th and Earth Day on 22nd. In the UK, we celebrate St George's Day and Shakespeare's birthday on 23 April.

For those who celebrate the chance to get outdoors, we have a **Full Moon**, which is a Micro Moon on the night of Saturday 12/early on Sunday 13 April, (hence our **Full Moon Meditation** is evening of Saturday 12th), the **Lyrids Meteor Shower** peaking, as usual 21 April, and a New Moon, which is a Supermoon on Sunday 27th peaking at 20:31. We have our Forest Bathing public session at Harry Edwards Healing Sanctuary's private woodland (near Shere, Surrey) on Sunday 27 April (also a New Moon) when there should definitely be bluebells, of which there are thousands at Harry Edwards.



**Tuesday 1 April is April Fool's day.** A day for practical jokes, April Fool's Day may originate from the move from the Julian calendar to the Gregorian calendar. This moved the start of the year almost three months, from the Spring Equinox to the start of January! Those who refused to recognise the new calendar and still saw April as the start of the year were labelled April Fools.

**Tuesdays 1, 15 & 29 April is the Harmony Healing Virtual Module: Khemitology** (£88), 7.30pm - 9.45pm (UK time/GMT = UK & USA friendly evening hours), 2¼ hours for 3 x fortnightly Tuesdays ending 29 April, worth 1 unit towards **RSE Level 1**. Held remotely on Zoom. Khemitology is for anyone fascinated by Egypt, outlining the lesser-known Ancient Egyptian philosophies and demonstrating how they can be applied in everyday life. This is a stand-alone unit but also comprises 1 unit towards **Egyptian Alchemy Healing RSE Level 1**.

**Tuesday 1 April, in addition to being April Fool's Day, is also the Roman celebration of Veneralia and Fortuna Virilis.** Both celebrations seem loosely connected with Venus who is honoured on this day and whose advice is sought on matters of love.

**Wednesday 2 April is World Autism Awareness Day**, taking place annually on 2 April since 2008. It was set up to encourage UN Member States to raise awareness about autistic individuals throughout the world. Whilst the United Kingdom celebrates Autism Awareness Week around World Autism Day, other countries, including the United States, celebrate World Autism Month throughout April. A suggested way to demonstrate that you support people on the autism spectrum is to wear blue. This could be a special blue shirt you can purchase from a non-profit like [Autism Speaks](#) or simply a blue ribbon or some blue clothing.



**Friday 4 April is Magna Mater in the Roman calendar.** This is the festival of Cybele, Phrygian Great Earth Mother. Her priests took on female clothes and identities to commemorate her lover (or, in some sources, her son) Attis, who was castrated and died of the wounds, but was later resurrected.

**Monday 7 April is World Health Day.** The message of World Health Day is simple: giving people access to healthcare without the prospect of financial hardship. The theme for 2025 is **Global Action for Universal Health**, which focusses on achieving universal health coverage, addressing health access and outcome inequalities, encouraging healthy behaviours and strengthening health systems.

**Saturday 12 April, 7.30-9.30pm UK time (GMT+1) is our [Full Moon Unity Consciousness Meditation](#)**, as the Full Moon is happening in the early hours of Wednesday. During this session, we connect with other like-minded people and together we work through a mindful chakra balancing process using colours and etheric crystals, with the aim that all participants will experience a degree of unity consciousness. Participants all receive a deeply healing experience. Cost to participate is £20 by online BACS payment (£1 admin fee added for PayPal, concessions to RSE/VFoA graduates), book at the [Harmony Shop](#).

*This activity serves as a good taster of Joanna's work in general and the virtual format of our Zoom based programme. And, most importantly, it's a step towards making a difference to the global predicament. To find out how working on your own spiritual consciousness can help humanity and the planet by raising the overall human consciousness levels, see Joanna's [You Tube explanation](#).*

**Sunday 13 April @ 01:22 UK time (GMT+1) is Pink Full Moon**, which is a Micro Moon. We are holding our Full Moon Meditation the night before, see entry above. Between Full Moon and the next New Moon is considered as a good time energetically for detoxing the body.



**Friday 18 April, this year, is the Christian Festival of Good Friday**, which is a Bank Holiday in the UK as part of the Easter break. This commemorates the day when Jesus was crucified. It was not called Good Friday until the fourth century and may be a corruption of God's Friday.

**Saturday 19 April is Easter Saturday in the Christian Calendar**. It commemorates the day that Jesus was buried in a tomb following his crucifixion.

**Sunday 20 April is Easter Sunday, which is generally taken to celebrate the resurrection of Jesus three days after his crucifixion**. Intriguingly, Easter Sunday is not a set date, but is calculated according to the lunar cycle, so it can move around between 22 March and 25 April. It's fixed as the Sunday following the first Full Moon after the Vernal (Spring) Equinox. Coptic Easter, celebrated by the Orthodox Church is usually a week later.

This points to the celebration being linked to earlier pagan celebrations, which were all associated with seasons and moon cycles. The name, **Easter**, itself is derived from the pagan deity, Eostre. The Easter Egg is reminiscent of the pagan egg to symbolise fertility. And the Easter Bunny, a strange addition to a crucifixion story, makes a lot more sense when viewed as a sign of spring and, possibly, even as a hare. The hare is another ancient symbol of fertility, with a 28-day gestation period, very linked to the lunar cycle. In Ancient Egypt, the hare was a hieroglyph, meaning existence.



**Sunday 20 (late) until dawn Monday 21 April (also Monday 22/ Tuesday 23) is the Lyrids Meteor Shower**. The Lyrids are an average shower, usually producing about 20 meteors per hour at their peak. These meteors can produce bright dust trails that last for several seconds. This year, the shower peaks on the night of 21/22 April and 22/23 April, although some meteors can be visible from 16-25 April. Look for meteors radiating from the constellation of Lyra after midnight; the later you view in the morning of 22 April, less meteors will be below the horizon and therefore more will be visible; as sunrise approaches light pollution will hamper viewing. See [earthsky.com](http://earthsky.com) for more information.

**Monday 21 April, in 2025, is also Easter Monday**, this is Bank holiday in the UK. As mentioned in an earlier Blog, whereas the Easter celebration in the UK is based on the Gregorian Calendar, the Orthodox Easter celebrations are based on the Julian Calendar. The Orthodox Church uses the Julian calendar to determine their holy days. Easter for the Orthodox Church will always fall sometime between 4 April and 8 May each year; this year, it's really late: Friday 3-Monday 6 May.



**Tuesday 22 April is Earth Day**, which is heralded as a pivotal opportunity for people, corporations and governments to join together to create a global green economy. The theme for 2025 is **Our Power Our Planet**. This calls for a commitment to harness renewable energy to build a healthy, sustainable, equitable and prosperous future for us all, by committing to renewable energy. It is hoped that coordinated efforts now will be recognised by future generations as a turning point; see [earthday.org](http://earthday.org) for more info.

**Wednesday 23 April is St George's Day in England**, celebrating England's patron saint, St George. England's National Day is celebrated on the anniversary of his death, which is on 23 April. According to legend, St George was a soldier in the Roman army who killed a dragon and saved a princess. The English flag is the red Cross of St. George, which is widely displayed as a symbol of national identity.

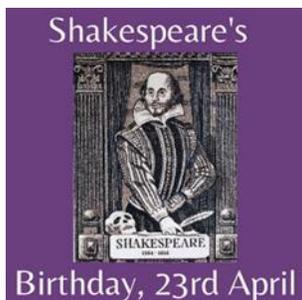
It's also supposedly **Shakespeare's birthday and death day**. However, 23 April is not a Bank Holiday.

**Sunday 27 April @ 01:22 (UK) is the Willow New Supermoon.**

*The **New Moon Abundance Ritual** should be carried out within 24 hours after the New Moon. It needs to be after the New Moon, because the moon should be waxing (getting bigger again) to carry the manifestation energy. There are video instructions on my Facebook and YouTube pages. New Moon is a good time to work on your Vision Board for the rest of 2025.*

**Sunday 27 April, 11am - 2pm, public Forest Bathing** session in the grounds of Harry Edward's Foundation, £39.77. Immerse yourself in the healing elements of nature and connect deeply with all your senses. Spend 3 hours in the woods mindfully connecting to your surroundings and living fully in the present moment. Join us for a leisurely amble through charming private woodland; observe and connect with nature, smell the bluebells, stroke the bark, listen to the birds. The session culminates with a treelaxation, our unique nature meditation under the canopy of trees. A deeply relaxing and rejuvenating experience which, despite the title forest bathing, does not involve any swimming! Some of the scientifically proven benefits of spending time in woodland include reduced stress levels, stronger immune system response, and a stabilised cortisol cycle.

*This 3-hour session which will take place in all weathers except high winds or electrical storms. Book by 2pm the day before via the **Harmony Healing shop**.*



**Monday 28 April is the Roman fertility festival of flowers and crops called Floralia**, that later developed into celebration of sexuality, and may have influenced the subsequent celebrations for Beltane and May Day. Bright coloured clothes are worn (if any!), races and shows are performed.

**Wednesday 30 April, is the pagan Eve of Beltane**; celebrations begin with people dancing around the fire clockwise, singing. Sometimes, two fires are set and cattle are driven between the fires to purify them.

Dew gathered from the grass at dawn is used in potions for luck and it is believed to be lucky to roll naked in the dew!!! On Beltane, it is traditional to drink from a well before sunrise. Wash in the morning dew and adorn yourself with greenery. Watch the sun come up, dance round the Maypole, and otherwise abandon yourself to the season. Round Full Moon Cakes are eaten and blackberry, elderberry, dandelion wine or cider is drunk. Sacred springs are visited and healing water is drunk.



### **Experience the Ancient Wisdom of Khemitology – A Journey into the Mystical Traditions of Egypt**

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**Dates & Timings:** Three Tuesday evenings – **1st, 15 & 29 April. Time:** 7:30 PM – 9:45 PM (UK time, GMT+1)

**International Availability:** Accessible globally, though these timings are most convenient for participants in the UK, Europe, USA, and Canada. If you require different scheduling, please reach out.

**Investment:** £111 (including attunement) + £5.50 PayPal fee. **Accreditation:** This module counts as **1 unit** towards **Reyad Sekh Em® (RSE) Level 1 Egyptian Alchemy Healing** (3 units required for certification). Book at **Harmony Shop**

**Booking & Access:** Upon registration, you'll receive an email with the Zoom link for live participation. Please check your spam folder if you don't receive this confirmation.

# Time in the quantum universe

By Mark Sharpen

OK then, anybody who follows the MCU films will be familiar with the start of the *Endgame* story, but have you ever stopped to question the rationale of the plot? Would five years really only take five hours in the quantum realm? Let's consider the factual basis for this theory.

If a cup of water spills on the floor, would each water molecule would exactly reverse its course to slip back into the cup? To do so would be to turn back time, something that, as far as we know, can't be done. The water either spills or it doesn't, but if it does, it'll stay that way. Time (as we experience it) can be described as **asymmetric**. We have memories of the past rather than the future and spilled water doesn't flow back to its cup. In our everyday lives, the march of time is in one direction: forward.

"We know [this] is something that's part of our common experience," says **Andrea Rocco**, a theoretical physicist at the University of Surrey. The nature of time is less clear in physics, because time can move forwards or backwards in mathematical terms. To put it another way, the idea of time disappears without change. For instance, if the cup of water was held in stasis in a perfectly insulated and physically impervious box floating in deep space, it would not matter whether it was examined five years ago or five millennia from now. So which way is time's moving within the stasis box? For such isolated systems, time is thus considered to be symmetric; only when it is open to influence from the external environment when this symmetry is broken, perhaps by water evaporating or the cup tipping over to spill its contents.

And yet open and isolated systems are inherently linked. Even if our cup of water was isolated from the external world, its molecules would still be randomly jostled by microscopic effects - changes that potentially break time's symmetry, like the ticking of the cosmic clock. So why does this discrepancy exist, and what does it imply about the validity of the models physicists use to study the role of time in the reality we experience? Different researchers have used different approaches, but Rocco and his colleagues revisited some of the maths behind the inconsistency to see if an alternative approach could resolve the apparent asymmetry. Their conclusions were published in *Scientific Reports* (January 2025) and identify the existence of not one, but two opposing arrows of time within open quantum systems.



This is akin to the cup of water being balanced on a knife-edge: it could topple to spill down either side, each side being an opposite-facing arrow of time. But the cup falling one way versus the other doesn't make the water spill differently. Either way, mathematically speaking, the end result is exactly the same - it preserves the symmetry

for both possible instances. Rocco explains, *"In a sense, we are stuck in this universe in which time actually goes in one direction, but the equations of motion that we are considering would have allowed the universe to go in the other direction"*. This way, the existence of both instances is a reflection of time symmetry, in contrast to the conventional understanding that the environment is imposing or defining an arrow of time. In other words, the researchers' work suggests that two times arrows, rather than one, are a spontaneous feature of an open quantum system.

The new work raises new questions about what physicists deem relevant in their studies of time. **Michele Campisi**, a theoretical physicist at the Italian National Research Council's Nanoscience Institute, who was not involved in the study, commends the paper for its bold take but notes that it also implies a strange, subjective malleability to the origins of time's arrow. The "hows" and "whys" of the way time moves are *"a reflection of an approximation,"* he says, *"dependent on a physicist's preferred interpretation of quantum mechanics itself - of which there are several. One's view of a quantum system is set to some degree by one's expectations"*. For instance, a more global view of events could also see a purported open system as just another part of a much larger, isolated one in which complications with time asymmetry wouldn't occur at all.

Nevertheless, this paper demonstrates how our quest to understand the quantum realm is still far from complete. According to **Dr James Cresser**, a retired professor of physics at Glasgow University, *"this [helps] shake up a commonly held idea that certain equations describing dissipative behaviour are not time-reversal invariant and are therefore a theoretical indicator of a particular physical state of affairs"*

For instance, the way water acts when it spills is akin to a type of dissipative behaviour in quantum mechanics and thermodynamics called **decoherence**, in which a system progressively spreads out, or decoheres, and loses information. In this example, the information is the particular arrangement of water molecules previously inside the cup. Dissipative processes are considered asymmetric with regard to time, because the initial configuration ends up irrelevant to the final state of affairs, explains the National Institute of Standards and Technology (NIST), who were not a part of the new study.

But even this kind of interpretation necessarily depends on our expectations of how a system must evolve as energy flows through it. For example, if we were to see two movies, one in which the water spills and another in which the water preternaturally returns to the cup, we'd be inclined to say that the second movie is illusory and impossible and that it is merely the first played backward. Thus, an asymmetric arrow of time is, in some ways, an emergent phenomenon, according to NIST, "we can all recognise it in our daily experiences".

All that said, perhaps the concept of time is just scaffolding for the human brain to grasp. *"We try to label all the events that take place in the world around us, but the events themselves don't rely on the scaffolding. And what we're doing with these equations is applying one kind of temporal scaffolding as compared to another possible temporal scaffolding,"* (James Cresser).

I'm not sure that this answers the original question about the MCU. What is certain is that the plausibility of zipping around in time as in *Endgame* is not realistic, even at the subatomic level. Quantum physicists might concede that time evolution is possible in a quantum region called **Hilbert Space**. We will just have to wait for more research.

*The Wonderful*



*World Famous*

**WANDERING WITCHES**  
**2025**

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# Folklore: Bleeding hearts

By the Storyteller

Here's a tale from the 18<sup>th</sup> century now, first quoted in "*Gentleman's Magazine*" for 1827. There was a pretty young woman who was the daughter of a yeoman farmer in Buckland. She was so pretty that she caught the eye of the son of the local lord of the manor. Her father tried to warn her, but she thought that she was in love and they would be married. At first, the young man was flattered and played along, even though he knew they could never marry. The couple kept their meetings secret from both their families and met by a large stone on the brook at Buckland.

The young man continued to make all sorts of promises to the girl about their marriage, right up to the day when they met by the brook as usual and he didn't ask for her hand in marriage, but demanded a more physical expression of her love. The girl refused at once, but her shock at being betrayed by the man she thought loved her was too much and she instantly dropped dead by the stream.

Suddenly the young man realised that he did love her and was truly sorry for his behaviour. He took his knife and plunged it into his heart, watching his blood trickle over the large stone where they used to meet. Next morning, that is where both the bodies were found – by the brook with the stone all covered in blood. Both young people were given Christian burials and the stone was washed clean by the next rain.

However, the traumatised spirit of the young lady continued to haunt the spot for many years and the stone seemed to be bleeding always into the brook. It was a popular tale and many people saw her spirit, known as the White Lady, including numerous farmers whose horses refused to pass the spot.

In 1900, the then lord of the manor removed the bleeding stone to his garden, had a bridge built over the brook and the White Lady's ghost was not seen again. Today, the brook runs under the A25 at Buckland and a garden centre is located just where the bleeding stone used to lie.



# Customs: First Cuckoo Day

By Erica Zann

The First Cuckoo Day was a traditional marker to herald the Spring. Anyone who heard the first cuckoo was destined to enjoy good luck and one of the traditional celebrations was held in Downton in Wiltshire. This year, we're looking at **3 May 2025** (in 2022, **Downton Cuckoo Fair** returned after a 3-year covid break). The fair in 2019 was the fortieth anniversary with a cavalcade of Downton minis and opening by the mayor of Salisbury. In 2018, the fair welcomed over 20,000 visitors, with more than 250 craft, gift, homeware and food and drink stalls on the greens and in marquees along The Borough.

The Downton Cuckoo Fair offers fun for all the family including rural craft demos, Punch and Judy, clowns and fairground attractions in the Memorial Gardens. Local produce is sold in the market. Other highlights include maypole dancing, Morris & traditional dancers, street entertainers, Downton Brass Band, and a host of live music being performed at key venues throughout the Fair. There is also a wide selection of food and refreshments, along with facilities for the disabled.



I had to visit the dentist in March (I don't have too many teeth left) and he was telling me about the illness known as **phossy jaw** in the early 19<sup>th</sup> century. This was an industrial disease that affected match girls, such as those working for Bryant & May. It was discovered that adding yellow/ white phosphorous to matchstick heads made them easier to ignite. The huge demand for the new strike-anywhere matches created a profitable international industry. It also led to a new industrial disease that lasted until roughly 1906, when the production of phosphorous matches was outlawed by the International Berne Convention.

It sounds horrible, but workers suffered from phossy jaw, which was a type of bone cancer. It began with pain and swelling in the teeth and jaw, foul-smelling pus - the jaw turned green and black as the bone rotted away and, without surgery, death could be the result. Phosphorus necrosis of the jaw was a disease of the poor; workers in match factories developed unbearable abscesses in their mouths, leading to facial disfigurement and, sometimes, fatal brain damage.

## Environment: Spring photos

By Sussex Wildlife Trust

Chalk reefs in Sussex are under threat from activities such as the dumping of dredged material at Beachy Head West Marine Conservation Zone (MCZ). Sussex Wildlife Trust is calling for this practice to stop – here are some chalk reef residents.



**Blue mussels by Paul Naylor**



**Selsey blue lobster by Paul Parsons**



**Common piddocks by Nigel Phillips**



**Tompot blenny by Paul Naylor**



**Serrated wrack by Ella Garrud**

# Plant music and healing

By Helen Anahita Wilson

(Editor's note: last year, Mark Sharpen sent us a science piece on plants that scream. Here's a follow-up that reminded me of Mark's words.)

We are all bioelectrical beings. My work (*Linea naturalis*) was created by taking unique, natural bioelectricity readings from petals, leaves, trunks and branches of plants in the oncology section of the Chelsea Physic Garden, London. These plant signals were then converted into musical data.

Each of the 28 plant recordings express their own special patterns of pitch and rhythm: the petal recordings are very active with a variety of different notes and rhythms whilst the branch and trunk recordings are slow moving, with drone-like textures. Once the bioelectricity recordings were converted into separate musical data tracks, I assigned an instrument to each of these 28 parts. For example, the petals of the Madagascan Periwinkle (*Catharanthus roseus - pink form*) are played by the harp and the bark of the English Yew tree (*Taxus baccata*) is played by the viola. The birdsong and rainstorm are field recordings triggered by signals from a small Sisal (*Agave sisalana*) and an Opium poppy (*Papaver somniferum*), respectively.

I combined these instrumental lines and applied compositional processes of editing and development to create a unique piece of plant-derived music. At times, such as the opening minute of the piece, all the plant recordings are sounded together as an ensemble. At other points in the piece, particular plants take the role of a soloist with just a couple of plants accompanying quietly in the background. Plants featured in *linea naturalis* are:

Japanese Plum Yew (*Cephalotaxus harringtonia 'fastigiata'*)  
 Chinese Happy Tree (*Camptotheca acuminata*) and English Yew (*Taxus baccata*)  
 Pacific Yew (*Taxus brevifolia*)  
 Madagascan Periwinkle (*Catharanthus roseus – white and pink forms*)  
 Opium Poppy (*Papaver somniferum*)  
 Sisal (*Agave sisalana*)  
 Sweet Wormwood (*Artemisia annua*)  
 Mayapple (*Podophyllum peltatum*)  
 Myrtle / Lesser Periwinkle (*Vinca minor*)

*Linea naturalis* can be listened to by anyone, anywhere, but is dedicated to people undergoing treatment for cancer. Many chemotherapy and other anti-cancer treatments are derived from plants: exactly the same plants recorded in this piece of music. *Linea naturalis* offers a means for people to connect back to nature whilst receiving treatment in the sterile, unnatural environment of a hospital or cancer centre. This music aims to demystify cancer treatment through highlighting the natural derivation of many drugs. In doing so, I hope to make the experience of treatment a little less daunting by offering this calming and reassuring music to listen to. *Linea naturalis* is 45mins long: this is the average time it takes for the contents of a chemotherapy drip bag to enter the body so ideal to listen to when receiving treatment in hospital. The music is inspired by my own challenging but successful treatment for cancer; I wanted to create something positive and practical from my experience and I very much hope others will find this music helpful. It should ideally be listened to with headphones.

# Looking towards Beltaine

By Nic the Witch

This is a Celtic fire festival, celebrated this year on 1 May, which is symbolic of the start of summer. It is known as Beltaine, but also as Calen Mai or Bealtaine. For the Saxons, Beltaine was the time to move the sheep to the upland pastures. The Calen Mai is a Welsh term that refers to the calends of May, traditionally marked by the flowering of hawthorn blossoms. In Ireland, the fires of Tara were the first ones lit every year at Beltaine and all other fires were lit with a flame from Tara.

The festival of Beltaine has a tradition of maypoles, dances, bonfires and offerings to the gods. In rural areas, cattle were driven through the smoke of the balefires, blessed with health and fertility for the coming year. For many Celts in England and Wales, Beltaine was a time of handfasting for the god, Cernunnos, and his bride, Ceridwyn (or Cernunnos and Brighid in Ireland). While the Irish-Gaelic word for May is Bealtaine, the literal translation is *bright or brilliant fire*, derived from the bonfires lit in honour of Bel, the god of light, fire, and healing.

Some Wiccan pathways support a symbolic battle between the May Queen and the Queen of Winter at Beltaine. Other pagans include maypoles, decorated with green and yellow ribbons, in their Beltaine rituals and they dance around the pole in ever-complex patterns. Other pagan practices at Beltaine include spring flower magick, planting of seeds, færy magick and spirit communication. As at Samhain, Beltaine is seen as a time when the veil between worlds is thinner and you could plant a tree or shrub as remembrance for an ancestor.



Here are some ideas for **celebrating Beltaine**, either at home or in an online group.

- Build a sacred fire outside, e.g. in a fire pit.
- Chant or sing Beltaine songs.
- Make a spring crown of flowers.
- Make a basket of spring flowers.
- Weave or braid natural plants like willow, long grass or ivy into pentacles.
- Contact spirits of those who have passed over.
- Creative visualisation of your soul and its dreams, blooming like colourful flowers.

*We have come together this day as our ancestors did before us, to celebrate the festival of Beltaine, to welcome in the summer and to ask that it be once again a fruitful time in which to grow our harvest for the year. For the Saxons, this was the Feast of Summer when flocks were moved to the upland pastures and people made ready for the growth of crops. April was a time of fertility for new life in the earth and its people. For many Celts in England and Wales, Beltaine was a time of handfasting for Cernunnos and Ceridwen.*

## Incense for Beltaine

As we're just approaching Beltaine (1 May 2025), perhaps it would be a nice idea to have some altar incense, regardless of whether it's just for you or for a small group ritual. You can make your own quite easily, using a blend of herbs, flowers, fruit, resins, etc. The first step is to gather your ingredients, together with jars, lids, mortar, pestle, mixing and measuring spoons. Any guide to incense lists the parts and a part is simply 1 unit of measurement, e.g. a cup or 1tsp.

Start with the essential oils or resins, mashing them up with the mortar and pestle. Or, you could use a blender or coffee grinder. Then add fruit, flowers, dry herbs last. Traditional incense for Beltaine includes:

- Jasmine
- Patchouli
- Frankincense
- Rose
- Peach
- Vanilla
- Ylang ylang

## Am Beannachadh Bealltain (The Beltane Blessing)

*Bless, O threefold true and bountiful,  
Myself, my spouse, my children.  
Bless everything within my dwelling and in my possession,  
Bless the kine and crops, the flocks and corn,  
From Samhain Eve to Beltane Eve,  
With goodly progress and gentle blessing,  
From sea to sea, and every river mouth,  
From wave to wave, and base of waterfall.*

*Be the Maiden, Mother, and Crone,  
Taking possession of all to me belonging.  
Be the Horned God, the Wild Spirit of the Forest,  
Protecting me in truth and honour.  
Satisfy my soul and shield my loved ones,  
Blessing everything and everyone,  
All my land and my surroundings.  
Great gods who create and bring life to all,  
I ask for your blessings on this day of fire.*

Beltaine marked the end of winter farming and heralded the start of summer, so that sheep or goats could be moved to upland pastures. Stocks of dried meat from the winter would have been low and the start of May was a chance to use fresh vegetables, oatmeal or cheese. Goat cheese was known to be a traditional food for the mid-European Celts and here is a vegetarian recipe for Beltaine.

## Ingredients

12oz field mushrooms  
1 garlic clove, chopped  
2oz soft goat cheese, cut into 4 circles  
2 tbsp fresh parsley, chopped  
2 tbsp fresh tarragon, chopped  
2 tbsp fresh marjoram, chopped  
2 tbsp fresh chives, chopped  
Salt and pepper  
2 tbsp white wine (optional)

## Method

1. Clean and slice mushrooms.
2. Heat 2tbsp oil in a pan
3. Cook garlic, mushrooms and chives on a medium heat until tender, adding salt and pepper.
4. Lift mushrooms out of the pan onto a baking tray in 4 heaps.
5. Put a goat cheese circle in the centre of each.
6. Cook at 200°C until the cheese melts and browns slightly.
7. Wash and dry the herbs and divide into 4 equal portions on plates.
8. Warm the white wine and add any pan juices.
9. Put the mushrooms and cheese onto each plate and pour on the wine.

# History: Bosnian pyramids

By Colin Woodard

Sam (Semir) Osmanagich kneels down next to a low wall, part of a 6-by-10-foot rectangle of fieldstone with an earthen floor. If I'd come upon it in a farmer's backyard here on the edge of Visoko—in Bosnia and Herzegovina, 15 miles northwest of Sarajevo—I would have assumed it to be the foundation of a shed or cottage abandoned by some 19<sup>th</sup> century peasant. Osmanagich, a blond, 49-year-old Bosnian who has lived for 16 years in Houston, Texas, has a more colourful explanation. *"Maybe it's a burial site and maybe it's an entrance, but I think it's some type of ornament, because this is where the western and northern sides meet,"* he says, gesturing toward the summit of Pljesevica Hill, 350 feet above us. *"You find evidence of the stone structure everywhere. Consequently, you can conclude that the whole thing is a pyramid."*

Not just any pyramid, but what Osmanagich calls the **Pyramid of the Moon**, the world's largest (and oldest) step pyramid. Looming above the opposite side of town is the so-called **Pyramid of the Sun** (also known as Visocica Hill) which, at 720 feet, also dwarfs the Great Pyramids of Egypt. A third pyramid, he says, is in the nearby hills. All of them, he says, are some 12,000 years old. During that time much of Europe was under a mile-thick sheet of ice and most of humanity had yet to invent agriculture. As a group, Osmanagich says, these structures are part of **the greatest pyramidal complex ever built on the face of the earth**.

In a country still recovering from the 1992-95 genocidal war, in which some 100,000 people were killed and 2.2 million were driven from their homes (the majority of them Bosnian Muslims), Osmanagich's claims have found a surprisingly receptive audience. Even Bosnian officials, including a prime minister and two presidents, have embraced them, along with the Sarajevo-based news media and hundreds of thousands of ordinary Bosnians, drawn to the promise of a glorious past and a more prosperous future for their battered country. Sceptics, who say the pyramid claims are examples of pseudo-archaeology pressed into the service of nationalism, have been shouted down and called anti-Bosnian.

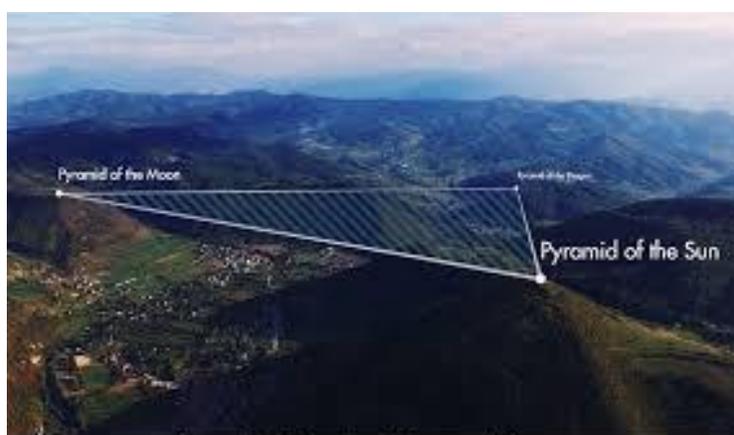
Pyramid mania has descended upon Bosnia. Over 400,000 people have visited the sites since October 2005, when Osmanagich announced his discovery. Souvenir stands peddle pyramid-themed T-shirts, wood carvings, piggy banks, clocks and flip-flops. Nearby eateries serve meals on pyramid-shaped plates and coffee comes with pyramid-emblazoned sugar packets. Foreigners by the thousands have come to see what all the fuss is about, drawn by reports by the BBC, Associated Press, Agence France-Presse and ABC's *Nightline* (which reported that thermal imaging had apparently revealed the presence of man-made, concrete blocks beneath the valley).

Osmanagich has also received official backing. His Pyramid of the Sun Foundation in Sarajevo has garnered hundreds of thousands of dollars in public donations and thousands more from state-owned companies. After Malaysia's former prime minister, Mahathir Mohamad, toured Visoko in July 2006, more contributions poured in. Christian Schwarz-Schilling, the former high representative for the international community in Bosnia and Herzegovina, visited the site in July 2007, then declared that "I was surprised with what I saw before my eyes, and the fact that such structures exist in Bosnia and Herzegovina".

Five years ago, almost no one had ever heard of him. Born in Zenica, about 20 miles north of Visoko, he earned a master's degree in international economics and politics at the University of Sarajevo. He left Bosnia before its civil war, emigrating to Houston in 1993, where he started a successful metalworking business that he still owns today. While in Texas, he got interested in the Aztec, Incan and Maya civilizations and made frequent trips to visit pyramid sites in Central and South America. He says that he's visited hundreds of pyramids worldwide.

In April 2005, while in Bosnia to promote his books, Osmanagich accepted an invitation to visit a local museum and the summit of Visocica, which is topped by the ruins of Visoki, a seat of Bosnia's medieval kings. He noted, "What really caught my eye was that the hill had the shape of a pyramid. Then I looked across the valley and I saw what we today call the Bosnian Pyramid of the Moon, with three triangular sides and a flat top". Upon consulting a compass, he concluded the sides of the pyramid were perfectly oriented toward the cardinal points (north, south, east and west). He was convinced this was not the work of Nature.

After his mountaintop epiphany, Osmanagich secured digging permits from the appropriate authorities, drilled some core samples and wrote a new book, *The Bosnian Pyramid of the Sun*, which announced to the world that "in the heart of Bosnia is a hidden stepped pyramid whose creators were ancient Europeans". He then set up a non-profit foundation called the Archaeological Park: Bosnian Pyramid of the Sun Foundation, which allowed him to seek funding for his planned excavation and preservation work.



*Pyramids of the Sun, Moon and Dragon*

Visoko lies near the southern end of a valley that runs from Sarajevo to Zenica. The valley has been quarried for centuries and its geological history is well understood. It was formed some ten million years ago as the mountains of Central Bosnia were pushing skyward and was soon flooded, forming a lake 40 miles long. As the mountains continued to rise over the next few million years, sediments washed into the lake and settled on the bottom in layers. Subsequent tectonic activity buckled sections of lakebed, creating angular hills, and shattered rock layers, leaving fractured plates of sandstone and chunky blocks of conglomerate. In 2006, Osmanagich asked a team of geologists from the nearby University of Tuzla to analyse core samples at Visocica. They found that his pyramid was composed of the same matter as other mountains in the area: alternating layers of conglomerate, clay and sandstone.

Nonetheless, Osmanagich put scores of laborers to work digging on the hills. It was just as the geologists had predicted: the excavations revealed layers of fractured conglomerate at Visocica, while those at Pljesevica uncovered cracked sandstone plates separated by layers of silt and clay. "What he's found isn't even unusual or spectacular from the geological point of view," says geologist Robert Schoch of Boston University, who spent ten days at Visoko that summer, "it's completely straightforward and mundane". "The landform [Osmanagich] is calling a pyramid is actually quite common", agrees Paul Heinrich, an archaeological geologist at Louisiana State University. "They're called flatirons in the United States and you see a lot of them out West: there are hundreds around the world, including the Russian Twin Pyramids in Vladivostok".

Apparently unperturbed by the University of Tuzla report, Osmanagich said Visocica's conglomerate blocks were made of concrete that ancient builders had poured on-site. This theory was endorsed by Joseph Davidovits, a

French materials scientist who, in 1982, advanced another controversial hypothesis that the blocks making up the Egyptian pyramids were not carved, as nearly all experts believe, but cast in limestone concrete. Osmanagich dubbed Pljesevica's sandstone plates as paved terraces and, according to Schoch, workers carved the hillside between the layers to create the impression of stepped sides on the Pyramid of the Moon. Particularly uniform blocks and tile sections were exposed for viewing by dignitaries, journalists and the many tourists who descended on the town.

Osmanagich's announcements sparked a media sensation, stoked with a steady supply of fresh observations: a 12,000-year-old burial mound (without any skeletons) in a nearby village; a stone on Visocica with alleged curative powers; a third pyramid dubbed the **Pyramid of the Dragon**; and two shaped hills that he has named the Pyramid of Love and the Temple of Earth. And Osmanagich has recruited an assortment of experts whom he says vindicate his claims. For instance, in 2007, Enver Buza, a surveyor from Sarajevo's Geodetic Institute, published a paper stating that the Pyramid of the Sun is "*oriented to the north with a perfect precision*".

Many Bosnians have embraced Osmanagich's theories, particularly those from among the country's ethnic Bosniaks (or Bosnian Muslims), who constitute about 48% of Bosnia's population. Visoko was held by Bosniak-led forces during the 1990s war, when it was choked with refugees driven out of surrounding villages by Bosnian Serb (and later, Croat) forces, who repeatedly shelled the town. Today, it is a bastion of support for the Bosniaks' nationalist party, which controls the mayor's office. A central tenet of Bosniak national mythology is that Bosniaks are descended from Bosnia's medieval nobility. Ruins of the 14<sup>th</sup> century Visoki Castle can be found on the summit of Visocica Hill, on top of the Pyramid of the Sun and, in combination, the two icons create considerable symbolic resonance for Bosniaks. The belief that Visoko was a cradle of European civilization and that the Bosniaks' ancestors were master builders who surpassed even the ancient Egyptians has become a matter of ethnic pride. "**The pyramids have been turned into a place of Bosniak identification**", says historian **Dubravko Lovrenovic** of the Bosnia and Herzegovina Commission to Preserve National Monuments.

Wellesley College anthropologist **Philip Kohl**, who has studied the political uses of archaeology, says that Osmanagich's pyramids exemplify a narrative common to the former Eastern bloc: "*When the Iron Curtain collapsed, all these land and territorial claims came up, and people had just lost their ideological moorings. There's a great attraction in being able to say we have great ancestors; we go back millennia and we can claim these special places for ourselves. In some places it's relatively benign; in others it can be malignant*".

Some Bosnian scholars have publicly opposed Osmanagich's project. In April 2006, 21 historians, geologists and archaeologists signed a letter published in several Bosnian newspapers describing the excavations as amateurish and lacking proper scientific supervision. Some went on local television to debate Osmanagich. Bosniak nationalists retaliated, denouncing pyramid opponents as corrupt and harassing them with e-mails.

In June 2006, **Sulejman Tihic**, then chairman of Bosnia's three-member presidency, endorsed the foundation's work. "*One does not need to be a big expert to see that those are the remains of three pyramids*," he told journalists at a summit of Balkan presidents. Tihic invited Koichiro Matsuura, then director-general of Unesco, to send experts to determine if the pyramids qualified as a World Heritage site.

Critics contend that the project not only sullies Bosnian science, but also soaks up scarce resources. Osmanagich says his foundation has received over \$1 million, including \$220,000 from Malaysian tycoon Vincent Tan; \$240,000 from the town of Visoko; \$40,000 from the federal government; and \$350,000 out of Osmanagich's pocket. Meanwhile, the National Museum in Sarajevo has struggled to find sufficient funds to repair wartime damage and safeguard its collection, which includes more than two million archaeological artefacts and hundreds of thousands of books.

Critics also cite the potential damage to Bosnia's archaeological heritage. *"In Bosnia, you can't dig in your back garden without finding artefacts"*, says Adnan Kaljanac, a graduate student of ancient history at the University of Sarajevo. Although Osmanagich's excavation has kept its distance from the medieval ruins on Visocica Hill, Kaljanac worries that the project may destroy undocumented Neolithic, Roman or medieval sites in the valley. Similarly, in a 2006 letter to *Science* magazine, Schoch said the hills in Visoko *"could well yield scientifically valuable terrestrial vertebrate specimens. Presently, the fossils are being ignored and destroyed during the excavations, as crews work to shape the natural hills into crude semblances of the Mayan-style step pyramids with which Osmanagich is so enamoured"*.

But if Osmanagich has begun to encounter obstacles in his homeland, he's had continuing success abroad. In June 2009, he was made a foreign member of the Russian Academy of Natural Sciences, one of whose academicians served as scientific chairman of the First International Scientific Conference of the Valley of the Pyramids, which Osmanagich convened in Sarajevo in August 2008. Conference organisers included the Russian Academy of Technical Sciences, Ain Shams University in Cairo and the Archaeological Society of Alexandria. In July 2009, officials in the village of Boljevac, Serbia, claimed that a team sent by Osmanagich had confirmed a pyramid under Rtanj, a local mountain. Osmanagich e-mailed me he had not visited Rtanj himself nor had he initiated any research at the site. However, he told the Serbian newspaper *Danas* that he endorsed future study. *"This is not the only location in Serbia, nor the region, where there is a possibility of pyramidal structures,"* he was quoted as saying.

For now Osmanagich has gone underground, literally, to excavate a series of what he says are ancient tunnels in Visoko, which he believes are part of a network that connects the three pyramids. He leads me through one of them, a cramped, three-foot-high passage through disconcertedly unconsolidated sand and pebbles (he says he is widening into a seven-foot-tall thoroughfare the tunnel's original height). The tunnel was partially filled, he says, when sea levels rose by 1,500 feet at the end of the ice age. He points out various boulders he says were transported to the site 15,000 years ago, some of which bear carvings he says date back to that time. Some 200 yards in, we reach the end of the excavated portion of the tunnel. Ahead lies a tenuous-looking crawl space through the gravelly, unconsolidated earth. Osmanagich says he plans to dig all the way to Visocica Hill, 1.4 miles away, adding that, with additional donations, he could reach it in as few as three years.



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