Monte San Giorgio

2017 Conservation Outlook Assessment

SITE INFORMATION

Country: Italy, Switzerland
Inscribed in: 2003
Criteria: (viii)

Site description:

The pyramid-shaped, wooded mountain of Monte San Giorgio beside Lake Lugano is regarded as the best fossil record of marine life from the Triassic Period (245–230 million years ago). The sequence records life in a tropical lagoon environment, sheltered and partially separated from the open sea by an offshore reef. Diverse marine life flourished within this lagoon, including reptiles, fish, bivalves, ammonites, echinoderms and crustaceans. Because the lagoon was near land, the remains also include land-based fossils of reptiles, insects and plants, resulting in an extremely rich source of fossils.

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SUMMARY

2017 Conservation Outlook

Finalised on 09 Nov 2017

GOOD

Monte San Giorgio, which encompasses the best known record of Middle Triassic marine life, has a good conservation outlook. This reflects the highly effective protection and management system, which manages collecting through permits focused on coordinated research excavations and associated programmes. Currently there is no evidence of unauthorised collecting or negative impact from visitors on this relatively remote wooded mountain area. Development of a monitoring system for the site will help to better understand and identify long-term changes to the site. The requested Transnational Management Plan is necessary to achieve a more effective transnational organisation and collaboration.

Current state and trend of VALUES

Good

Trend: Stable

Monte San Giorgio continues to provide an exceptional resource for understanding the geological history and the evolution of life through the Middle Triassic Period. There is currently no evidence of damage to the site’s fossil resource. Collecting is carefully and appropriately managed through a permit system. Over the last five years there has been a considerable research output as a result of coordinated research excavations and there is an ongoing programme of site investigation and the development of interpretative facilities and initiatives. The site is, therefore, considered in a good state and stable.

Overall THREATS

Very Low Threat

Current threats throughout are considered very low and there is no evidence of damage. The need to carefully manage visitors is recognised within the
management plan. The site is relatively isolated reducing overall threat from collecting and is appropriately managed through a permit system. Strong local awareness of the importance of Monte San Giorgio helps the overall monitoring of the site, and the presence of volunteers and local museums deters unauthorised collecting.

**Overall PROTECTION and MANAGEMENT**

*Mostly Effective*

The protection and management of Monte San Giorgio is effective overall. There is cooperation between the Swiss and Italian components of the site at national, regional and local levels in both countries. There is overall commitment from local and regional government to the successful delivery of the management plan and awareness that it has to be reviewed. The Transnational Board encountered some difficulties in operating in a regular and effective way. The funding regime for the Italian component, however, does not always seem clearly established, particularly as far as the development of long-term sustained financial resources is concerned. Facilitation of site excavations has supported a considerable research output, the ongoing research programme adding to the overall universal value of the site.
FULL ASSESSMENT

Description of values

Values

World Heritage values

► Exceptional record of marine life from the Triassic Period and important remains of life on land
Criterion:(viii)

Monte San Giorgio is the single best known record of marine life in the Triassic Period, and records important remains of life on land as well. The property has produced diverse and numerous fossils, many of which show exceptional completeness and detailed preservation. The long history of study of the property and the disciplined management of the resource have produced a well-documented and catalogued body of specimens of exceptional quality, and are the basis for a rich associated geological literature. As a result, Monte San Giorgio provides the principal point of reference, relevant to future discoveries of marine Triassic remains throughout the world (World Heritage Committee, 2010).

Other important biodiversity values

► Sub-Mediterranean type ecosystem supporting both alkaline and acidic woodland and associated fauna and flora.

There is a strong and notable relationship between the underlying geology and morphology of the area and habitat type. Acidic soils (rhyolites) on northern slopes support stands of sweet chestnut (Castanea sativa), oak (Quercus petraea) and ash (Fraxinus excelsior). The lime-rich soils (dolomites
and limestones) on the more southerly slopes support mixed broadleaf woodlands reflecting variation in aspect and micro-climate, most notably thickets of warm-loving sub-Mediterranean trees (UNEP-WCMC, 2011). In the Ticino Canton, the dry limestone sub-soils also support a number of dry meadows with associated plant populations unique to the Italian southern-Alpine zone. Monte San Giorgio (including the surrounding lakes) has 109 recorded vertebrate species including 37 Red List species (UNEP-WCMC, 2011). Monte San Giorgio is the only known habitat for Savi’s pine vole (Microtus savii) in Switzerland and the lesser horseshoe bat (Rhinolophus hipposideros) has also been recorded. The area is especially important for breeding reptiles and amphibians with six listed sites of national importance. Invertebrates are less well documented and include 53 mollusc species (including 18 Red Data listed) and 63 species of day-flying butterflies and moths (1/3 of species recorded in Switzerland). The dry south facing slopes of the Ticino meadows have a diverse ground beetle, cricket and grasshopper and spider fauna, a number of which are found only within this region of Switzerland. The area also exhibits a number of karst features in the Triassic limestones and dolomites including some 30 caves, often deep, where cave dwelling populations of crustaceans and millipedes are found. A large crayfish (Astacus pallipes) population living in the Gaggiolo are unique (State Party of Italy, 2010). Lastly, the Monte San Giorgio area is considered as a ‘mycological sanctuary’; 554 species (in 2002) have been noted, 130 of which are limited to this area of Ticino and five are limited in Switzerland to Meride (in 2008 this list was enlarged to comprise 1,051 species; Riva et al., 2008). This summary is based on data available as part of the Swiss nomination (State Party of Switzerland, 2002). Similar information was not available for the Italian extension.

Assessment information

Threats
**Current Threats**

**Very Low Threat**

Current threats throughout are considered very low and there is no evidence of damage. The need to carefully manage visitors is recognised within the management plan.

▶ **Temperature changes**

**Low Threat**
- **Inside site, throughout (>50%)**
- **Outside site**

High mountain environments are potentially susceptible to climate change. It is anticipated that the near complete forest cover of Monte San Giorgio should provide resilience in relation to environmental changes (IUCN, 2010).

▶ **Tourism/ visitors/ recreation**

**Very Low Threat**
- **Inside site, localised (<5%)**
- **Outside site**

Monte San Giorgio receives approximately 80-100,000 visitors per annum which is likely to increase as the site is further promoted. Potential impact could include increased erosion and pressure from visitor facilities. The need to carefully manage visitors is recognised within the management plan. For example, the Fossil Museum in Meride has been redeveloped and similar plans were implemented for the museums in Besano and Clivio (Italy). Also roads/access ways and clearly marked trails targeted at walkers and cyclists (mountain bikers) will help manage visitor impact. Risks are, therefore, considered very low (State Party of Italy, 2010; State Parties of Italy and Switzerland, 2013).

▶ **Avalanches/ Landslides**

**Very Low Threat**
- **Inside site, scattered (5-15%)**
- **Outside site**

Occasional landslides/instability are noted on the Italian side, however, only of marginal concern to the inscribed property and do not pose a threat to the
inscribed values (State Party of Italy, 2010; IUCN, 2010).

Potential Threats

Very Low Threat

Unmanaged collecting is recognised as a potential threat. However, currently there is no evidence of damage from unauthorised collecting. There is good local awareness of the importance of Monte San Giorgio which also helps the overall monitoring of the site. The presence of trained/professional guides and some volunteers and local museums are also considered a deterrent to unauthorised collecting.

Other Activities

Very Low Threat

Inside site, localised(<5%)

Currently there is no evidence of damage from unauthorised collecting though it is recognised as a potential threat. There is a permit system in operation restricting collecting to research excavations. The remote nature of the site and the complexity and expertise required to collect specimens will also limit unauthorised collecting. Strong local awareness of the importance of Monte San Giorgio helps the overall monitoring of the site, and the presence of volunteers and local museums deters unauthorised collecting. The threat is considered to be very low.

Fire/ Fire Suppression

Very Low Threat

Inside site, scattered(5-15%)

Forest fire is a potential risk, but it is recognised and addressed in the forest management strategies that are in place.

Protection and management

Assessing Protection and Management
Relationships with local people

Mostly Effective

Key stakeholders are involved in the site and its management. Governing authorities at local, cantonal (CH) and regional (I) levels are part of the management structures for the site (Monte San Giorgio, 2018) and contribute financially to the delivery of the management plan. The local museum of Besano and the Visitor Centre of Clivio as well as the Museum of Fossils of Monte San Giorgio in Meride are central to the presentation of the site and provide an important connection between local communities, visitors and the site. On the Swiss side, the Museo Cantonale di Storia Naturale of Lugano plays a fundamental role, since it is also responsible for the excavation campaigns. Trained guides and some volunteers are involved in the management of the site (State Parties of Italy and Switzerland, 2013; State Party of Italy, 2010). An awareness of the OUV of the site among the local people, as well as local businesses and organisations, could be improved.

Legal framework and enforcement

Highly Effective

This is a transnational site with a legal framework operating in both the Swiss and Italian components of the property.

Switzerland – the landscape of Monte San Giorgio is identified on the ‘Federal Inventory of Landscapes, Sites and Natural Monuments’ which encompasses the core property and buffer zone.
The palaeontological heritage is the property of the State and regulated by cantonal law requiring permits for collecting.

Italy – the property and its buffer zone lie within a Landscape Protection Zone recognised within national law. The palaeontological heritage (considered to be the equivalent to cultural heritage) is the property of the state and regulated by national law requiring permits for collecting.

Enforcement

Highly Effective

The legal framework on inscription and extension was considered appropriate. It is supported and enforced through local plans, local staff, guides and volunteers and supported, where necessary, at the federal level.
Integration into regional and national planning systems
Highly Effective

The site is well integrated into the local planning system. Switzerland – Monte San Giorgio is identified within the Canton Development Plan as a Landscape Protection Zone and is similarly recognised in relevant Development Plans as a Nature Reserve. The fossil remains are specifically protected by the ‘Cantonal law on nature protection (2001)’ of Ticino Canton which requires a permit for any collecting (IUCN, 2002; State Party of Italy, 2010).

Italy – regional, provincial and local legislative frameworks are in place to protect the integrity of Monte San Giorgio and were considered effective at the time of inscription. It is also noted that the municipalities of Besano, Porto Ceresio and Viggiù applied for additional palaeontological ‘restraint’ in 2007 (IUCN, 2010; State Party of Italy, 2010; Monte San Giorgio, 2018).

Management system
Mostly Effective

Following the addition of the Italian extension in 2010, a Transnational Management Plan was developed (its development being funded as an EU INTERREG III Project) and is governed by a Strategic Transnational Board. It identifies the values and objectives for the site and is used to guide the decisions made in managing, developing and promoting Monte San Giorgio. A Transnational Scientific Commission was formed at the beginning of 2014. In Switzerland, management of the property is coordinated by both the Foundation of Monte San Giorgio and the Ticino Canton, at a local, cantonal and federal level. In Italy, the signing of the Convention of Monte San Giorgio (in 2008 and renewed in 2012) brought together relevant Italian parties (from a national to local level) to undertake the objectives of the Transnational Management Plan. The Convention is managed by the ‘Commission for Planning and Management of the Monte San Giorgio UNESCO Site’ with the Mountain Community of Piambello taking on a co-ordination role (State Party of Italy, 2010; IUCN, 2002, 2010; State Parties of Italy and Switzerland, 2013). A revision of the transnational management plan is foreseen in the Accordo programmatico tra Confederazione CH e
Management effectiveness

Highly Effective

No formal management effectiveness assessment has been conducted for the site. The management approach was considered effective on inscription (WHC, 2003) and extension (WHC, 2010) with the request to develop a cooperative transnational approach.

Implementation of Committee decisions and recommendations

Mostly Effective

In response to 34 COM 8B.6, the State of Conservation report (State Parties of Italy and Switzerland, 2013) confirmed the establishment of appropriate management commitment on the Italian side, the establishment of a Transnational Board, the development of sustained financial resources and measures to achieve consistent transnational management and identity.

In 2013, the World Heritage Centre and the Advisory Bodies took note of the collaboration between the State Parties of Italy and Switzerland to ensure effective management of the transboundary property, and recommended them to urgently ensure that the Transnational Board become operational as soon as possible (World Heritage Committee, 2013). The Transnational Board (TNB) met infrequently in 2014 and 2015. As such, joint projects advanced slowly and with difficulties. In 2014, a new transboundary agreement was presented based on the ‘Accordo quadro tra la Confederazione Svizzera e la Repubblica italiana per la cooperazione transfrontaliera delle collettività ed autorità regionali e locali’’ (The Swiss Federal Council & the Government of Italy, 1993). As of July 2017, the agreement had not yet been signed.

Boundaries

Highly Effective

The boundaries were considered effective at the time of inscription and extension. The core site follows the outcrop of Middle Triassic rocks on both the Swiss and Italian sides. In Switzerland, the buffer zone is coincident with the Landscape Protection Zone. In Italy, the buffer zone relates to
geomorphological and man-made features around the base of the mountain (IUCN, 2002, 2010; State Party of Switzerland, 2002; State Party of Italy, 2010). In its Decision 34 COM 8B.6, the World Heritage Committee encouraged the State Party of Switzerland to bring forward a minor boundary modification proposal to accommodate the anticipated minor changes to the boundaries of the property and its buffer zone (World Heritage Committee, 2010). No minor boundary modification proposal has been submitted to date.

**Sustainable finance**

**Some Concern**

Switzerland – sustained funding has been secured from several sources including the Swiss Confederation, the Ticino Canton, the Foundation of Monte San Giorgio, the Fonds Paleontologique Bernhard Peyer, contributions from townships as well as income from tickets, tours and sales from the Fossil Museum of Monte San Giorgio. Some minor contributions have been made by local businesses. Since January 2016, there has been more substantial financial commitment, including a total of CHF 1,217,020 in funding from the Federal Office for the Environment (FOEN) for 2017-2019. In addition, the Ticino Canton finances the Foundation with CHF 60,000 per year for the museum activities. The municipalities of Mendrisio, Brusino, Riva San Vitale and Stabio contribute CHF 63,000 per year. Italy – funding sources include the Commission for Planning and Management of the Monte San Giorgio UNESCO site (a €60,000 endowment) and the support of approved bodies, assistance of third parties and wider sponsorship. There is less data available on the short and longer term funding. Projects, ongoing and delivered, supporting the key targets of the management plan have secured an important figure from a mix of national, regional and local sources. There is no clear analysis of whether funding is meeting anticipated needs as set out in the Transnational Management Plan (State Parties of Italy and Switzerland, 2013; State Party of Italy, 2010).

**Staff training and development**

**Highly Effective**

Switzerland – the Foundation of Monte San Giorgio employs a site manager responsible for coordinating management projects and promoting and disseminating information about the site. A museum director, two assistants
and two substitutes on call are responsible for the development and management of the museum (Convention 2016-2019 Ticino Canton – Monte San Giorgio Foundation). Further support is provided by the Cantonal Museum of Natural History (State Parties of Italy and Switzerland, 2013), which coordinates scientific research activities and carries out excavations.

Italy – a site manager has been established to coordinate the goals of the management plan. Further support is provided by the community of Piambello (State Parties of Italy and Switzerland, 2013). There are also trained official guides associated with the site and some volunteers. The Visitor Centre of Clivio is not regularly open.

▶ Sustainable use

Highly Effective

There is no overall assessment of resource sustainability. Site management, however, adopts a sustainable approach to collecting. Permit controlled collecting ensures the fossil resource (which is finite in extent) is excavated in controlled circumstances providing maximum scientific and educational gain from any collecting activity. Permits are issued to recognised research institutes only (IUCN, 2002; 2010; State Party of Switzerland, 2002; State Party of Italy, 2010).

No excavations could take place on the Swiss side in 2015 and 2016 due to financial restrictions. On the Italian side, excavations have not taken place for many years for several reasons.

▶ Education and interpretation programs

Mostly Effective

There is an established and growing educational, interpretation and awareness raising programme.

There is a network of local museums associated with the site on both the Swiss and Italian sides including museums at Meride, Besano and Clivio. The redeveloped Meride Fossil Museum of Monte San Giorgio opened in 2012 providing a permanent exhibition space and a focus for visitors to the site. Tours and open days have been hosted for the general public and educational activities involving schools in excavations. Since the re-opening, the exhibition has been enriched with different multimedia materials (e.g.
audio guides, 3D animation, etc.) (Furrer & Vandelli, 2014). A multilingual website (Monte San Giorgio, 2018) has been established (and is being further developed) setting out the background to the site, management, research and current information about activities and events (IUCN, 2002; 2010; State Party of Italy, 2010).

Several projects were undertaken in the last 5 years (Monte San Giorgio, 2018).

The Transnational Hiking Trail was inaugurated in 2013. The trail could, however, be improved. Efforts to align the information on the information panels between the Swiss and Italian side were made under the supervision of the Transnational Scientific Commission.

**Tourism and interpretation**

**Highly Effective**

Visitor numbers of 80-100,000 per annum are estimated and there is a clear awareness of the tourism value of the site with a growing provision for visitors. Since the opening of the Fossil Museum in Meride, statistics have been systematically recorded. There is no specific tourism management plan; however, the Transnational Management Plan has a number of identified projects specifically aimed at supporting and managing visitors. At a local level, Mendrisio Tourism is represented on the Monte San Giorgio Foundation and there has been increasing local, regional, national and international media coverage of the activities within the site. Visitor impacts are managed to minimise harm through provision of visitor facilities, information and managed access such as guided tours (State Party of Italy, 2010; WCMC, 2011; State Parties of Italy and Switzerland, 2013).

Currently, there is no information available about systematic data collecting.

**Monitoring**

**Mostly Effective**

The necessity for a formal condition monitoring programme is recognised (IUCN, 2010), which will be considered in the review of the Transnational Management Plan. However, local museums and guides do provide constant monitoring, making unauthorised excavations difficult. Ongoing monitoring of compliance with national regulations in relation to palaeontological heritage
is assured through the relevant national authorities. The successful ongoing research effort associated with the site, and lack of evidence of unauthorised excavation, indicate that the management system is appropriate and maintaining the OUV.

Research
Highly Effective

There has been a long history of research excavation associated with the site which continues today. It is fully supported by the management plan and established management structures. Since 1994, excavations have re-examined classic fossiliferous levels (Cava Inferiore, Cava Superiore, Kalkschieferzone, Cassina beds) and investigated the Sceltrich new fossil horizon (Stockar & Garassino, 2013). Excavations and associated research continue to widen understanding of vertebrate palaeontology (in particular fish, e.g. Lombardo et al., 2012), refined dating (Stockar et al., 2012a) and modelling of basin evolution (Stockar et al., 2013) and the study of new fossil groups, including insects (e.g. Bechly & Stockar, 2011) and radiolaria (Stockar et al., 2012b).

There is ongoing research on fossil material of Monte San Giorgio (MSG) in the collection of the Paleontological Institute and Museum, University of Zurich (PIMUZ) and of the Museo Cantonale di Storia Natural di Lugano. Overall, research is collaborative, linking universities and museums from across Switzerland and Italy and more widely, on specific projects, with institutions from around the world (e.g. Jadoul & Tintori, 2012). Undergraduate and postgraduate study of vertebrate palaeontology has also been possible (State Parties of Italy and Switzerland, 2013; State Party of Switzerland, 2002; State Party of Italy, 2010). A Transnational Scientific Commission was formed at the beginning of 2014. An updated list of scientific publications can be found online (Museo Cantonale di Storia Naturale, 2017).

Overall assessment of protection and management
Mostly Effective

The protection and management of Monte San Giorgio is effective overall. There is cooperation between the Swiss and Italian components of the site at
national, regional and local levels in both countries. There is overall commitment from local and regional government to the successful delivery of the management plan and awareness that it has to be reviewed. The Transnational Board encountered some difficulties in operating in a regular and effective way. The funding regime for the Italian component, however, does not always seem clearly established, particularly as far as the development of long-term sustained financial resources is concerned. Facilitation of site excavations has supported a considerable research output, the ongoing research programme adding to the overall universal value of the site.

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Highly Effective

Monte San Giorgio is relatively remote and protected within its buffer. The site is, therefore, not subjected to threats from beyond the site’s boundary and buffer zone.

▶ Best practice examples

The excavation and research programme provides an excellent example of sustainable management of a finite fossil resource in a remote area. This approach could be applied at other similar localities.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ Exceptional record of marine life from the Triassic Period and important remains of life on land

Good

Trend: Stable

There is currently no evidence of damage to the site’s fossil resource. Collecting is carefully and appropriately managed through a permit system that supports collaborative research excavations which continue to add to
our understanding of the site’s geology and palaeontology. As a result, the site’s geological values are in a good and stable state. (State Parties of Italy and Switzerland, 2013).

Summary of the Values

► Assessment of the current state and trend of World Heritage values
  Good
  Trend: Stable

  Monte San Giorgio continues to provide an exceptional resource for understanding the geological history and the evolution of life through the Middle Triassic Period. There is currently no evidence of damage to the site’s fossil resource. Collecting is carefully and appropriately managed through a permit system. Over the last five years there has been a considerable research output as a result of coordinated research excavations and there is an ongoing programme of site investigation and the development of interpretative facilities and initiatives. The site is, therefore, considered in a good state and stable.

► Assessment of the current state and trend of other important biodiversity values
  Data Deficient
  Trend: Data Deficient

  The biodiversity values of the site are inferred to be intact, however, no monitoring data is available.

Additional information

Benefits

Understanding Benefits
▶ **Water provision (importance for water quantity and quality)**

Hydrological systems are important in supporting a range of fresh water habitats and species.

▶ **Contribution to education**

There is a developing programme for public engagement. Activities for schools are organised. Undergraduate and postgraduate students are involved in excavations.

▶ **Outdoor recreation and tourism**

Main tourism relates to outdoor recreational use – walking and potentially cycling and horse riding.

▶ **History and tradition**

There is a long association with scientific study, which has a historical relevance in the development of our understanding of Middle Triassic palaeontology. There is also an association with mining (oil shales) and quarrying for stone (notably Viggù stone) with remnants of industrial development within the site.

▶ **Importance for research**

There is a long history of research associated with the site, which remains a global centre for research into the Middle Triassic.

▶ **Provision of jobs**

Local organisations have created job roles (i.e. site manager, museum director, museum employees).

▶ **Tourism-related income**

Since the opening of the new Fossil Museum in Meride in 2012, the region has attracted increasing numbers of tourists.
Summary of benefits

The geological interest underpins the key benefits of Monte San Giorgio. It is globally significant to our knowledge and understanding of Middle Triassic palaeontology and continues to contribute to global, national and local research programmes. There are significant opportunities to develop the learning/educational potential of the site as the visitor centres and museums develop over the coming years. The remote montane forests of Monte San Giorgio and its associated wildlife, all influenced by underlying geology, are also paramount among the benefits this area provides to both local communities and visitors. Both the geology and wildlife provide economic benefits to the area acting as a draw for visitors, who contribute to the local economy, and the developing infrastructure of museums and visitor centres which celebrate Monte San Giorgio.

Projects

Compilation of active conservation projects

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<td>Monte San Giorgio Foundation</td>
<td>Monte San Giorgio website – ongoing development</td>
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<td>2</td>
<td>Monte San Giorgio Foundation (Switzerland) and Commission for Planning and Management of the Monte San Giorgio UNESCO site (Italy)</td>
<td>Develop a network of walking trails</td>
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<td>3</td>
<td>Monte San Giorgio Foundation</td>
<td>Meride Fossil Museum (opened 2012) – ongoing development of new exhibition projects</td>
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<td>4</td>
<td>Municipality of Besano</td>
<td>Besano Museum- ongoing development – Italy</td>
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<td>5</td>
<td>Cantonal Museum of Natural History</td>
<td>Palaeontological excavations and geological investigations throughout the Middle Triassic sequence – ongoing – Switzerland</td>
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### Compilation of potential site needs

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<th>Site need title</th>
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<td>1</td>
<td>Monitoring – develop an approach to monitoring the condition of key elements within the World Heritage Site</td>
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