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# Special Issue: 100 years of scientific excavations at UNESCO World Heritage Site Monte San Giorgio and global research on Triassic marine Lagerstätten

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## Abstract

Only a few Swiss fossil localities are known globally and of which, the UNESCO World Heritage Site Monte San Giorgio, which extends from Switzerland into Italy, is the most important one. Following the discovery of the occurrence of articulated skeletons of marine reptiles in the local mines, large excavations were organized by Bernhard Peyer from the University of Zurich starting 1924. With this collection of articles, we commemorate the successful excavations and research, which initiated the publication of a series of monographies, mostly on the vertebrates but also on the invertebrates of this locality. Especially with the discovery of several remarkably similar Konservat-Lagerstätten in China, the discoveries from Monte San Giorgio gained global relevance. New methodologies such as computed tomography produced a wealth of new data, particularly on endocranial anatomy of several tetrapods.

**Keywords** Marine reptiles, Fishes, Exceptional preservation, Konservat-Lagerstätten, Taphonomy, Triassic, Permian–Triassic mass extinction

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## Introduction

The Triassic period has received a lot of attention recently because many researchers became interested in key aspects of the rediversification after the Permian–Triassic Mass Extinction (PTME; e.g., Benton et al., 2004; Payne & Clapham, 2012; Scheyer et al., 2014a; Hautmann et al., 2015; but see Nowak et al., 2019 for land plants). Following a phase with widespread anoxia, a disaster fauna established where molluscs such as the bivalve *Claraia* and some ammonoids spread quickly (Airaghi, 1911; Brayard et al., 2006, 2009, 2017; Villier & Korn, 2004). Many Early Triassic faunas accordingly displayed a great dominance (e.g., Friesenbichler et al., 2021). Maybe these peculiar new ecosystems created the conditions enabling the evolution of diverse marine reptiles as well as new groups of osteichthyan fishes, often with dietary specialisations (e.g., Kelley & Pyenson, 2015; Klug et al., 2024a; Scheyer et al., 2014a).



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During the Middle Triassic, the recovery of marine ecosystems had advanced and quite diverse marine reptiles and fishes populated the epicontinental seas globally (e.g. Klug et al., 2024b). For this context, the mines and excavations of Monte San Giorgio (southern Switzerland) and the adjoining Monte Pravello—Monte Orsa (northern Italy), began to deliver key fossils as early as about 150 years ago, but at first on the Italian territory with the first series of publications on Triassic fossils appearing in the mid and second half of the nineteenth century (Bassani, 1886; Cornalia, 1854; Curioni, 1847, 1863; Stoppani & Bellotti, 1857). In 1919, several decades later, the fossil treasures of Monte San Giorgio were recognized by Bernhard Peyer, who became professor in palaeontology at the University of Zurich in 1943 (Furrer, 2003; Sues, 2024). In 1924, he began with the first excavations at the mine Cava Tre Fontane near Serpiano on the Swiss side (Fig. 1b). This volume is dedicated to the commemoration of the centennial of the beginning of Peyer's excavations and the according research (e.g., Peyer, 1927, 1930, 1931a, 1931b, 1931c, 1931d, 1931e, 1932, 1934, 1935, 1936a, 1936b; for a more exhaustive and constantly updated list see Albi-setti & Furrer, 2023). He later continued very successfully in the same beds of the *Grenzbitumenzone* (today Besano Formation) at the mine Val Porina (Lanz & Felber, 2020), and started the first systematic excavations in fossiliferous beds of the overlying Meride Limestone (Furrer, 1995, 2003, 2024; Kuhn-Schnyder, 1974; Peyer, 1944). His academic offspring and successor Emil Kuhn-Schnyder continued both the excavations and the research, mainly in the *Grenzbitumenzone* (Kuhn-Schnyder, 1974). The great international recognition led the University of Zurich to the foundation of the Paläontologisches Institut und Museum in 1956. Kuhn-Schnyder continued excavations at Cassina (Lower Meride Limestone) until his retirement in 1976 and shortly before published his overview over the research at Monte San Giorgio (Kuhn-Schnyder, 1974). His successor Hans Rieber focused on invertebrates, particularly molluscs (Rieber, 1965, 1968, 1969, 1973a, 1973b). After his retirement, researchers from Zurich, Milano and Lugano contributed significantly to the modernisation of research on Monte San Giorgio fossils, particularly vertebrates, employing state-of-the-art methods such as computed tomography, laminography etc. (e.g., Argyriou et al., 2016; Bastiaans et al., 2023a, 2023b; Beardmore & Furrer, 2015, 2016a, 2016b, 2017, 2019; Beardmore et al., 2012; Bindellini et al., 2021; Ferrante & Cavin, 2023; Ferrante et al., 2023; Hugi, 2011; Hugi & Scheyer, 2012; Hugi et al., 2011; Klein et al., 2023; Kolb et al., 2011; Lautenschlager & Desojo, 2011; Lombardo, 2013; Lombardo & Tintori, 2004; Lombardo et al., 2012; López-Arbarello et al., 2014, 2016, 2019; Maxwell et al., 2013, 2015, 2018; Miedema et al., 2023a, 2023b;

Mutter, 2004; Mutter & Herzog, 2004; Neenan et al., 2014; Nosotti, 2007; Nosotti & Rieppel, 2003; Renesto, 2005; Renesto & Avanzini, 2002; Renesto & Stockar, 2018; Renesto et al., 2020; Romano & Brinkmann, 2009; Romano et al., 2016; Scheyer, 2010; Scheyer & Desojo, 2011; Scheyer et al., 2014a, 2014b, 2017; Spiekman & Mujal, 2023; Spiekman et al., 2020a, 2020b, 2021; Stockar, 2010; Stockar & Garassino, 2013; Stockar & Kustatscher, 2010; Stockar & Renesto, 2011; Stockar et al., 2012a, 2012b, 2013; and the papers in this article collection, which are shortly discussed in the next chapter).

21 respectively 14 years ago, the Monte San Giorgio region, first the Swiss and later the Italian side (Figs. 1, 2), were recognized as UNESCO World Heritage Site (Felber et al., 2004; <https://whc.unesco.org/uploads/nominations/1090.pdf>; see also Furrer, 2003; Felber, 2006; Rieppel, 2019). It is not surprising that the following two decades saw this surge of publications listed in the preceding paragraph. In 2012, the Museo dei fossili del Monte San Giorgio at Meride was opened (see chapter below), which features numerous fossils, illustrations and models. Each year, new state-of-the-art digital installations are being added.

With this editorial chapter, we present this article collection on recent research on Monte San Giorgio to remember the beginning of the excavations on the Swiss side of the mountain 100 years ago. We also want to provide a short overview of the history of palaeontological research on Monte San Giorgio with an emphasis on the Swiss aspects without neglecting the important Italian contributions and fruitful collaborations.

### New palaeontological research on Monte San Giorgio type Lagerstätten

About 170 years after the discovery of the first articulated skeletons in the Monte San Giorgio region and 100 years after the start of the excavations organized by the Palaeontological Institute of the University of Zurich, the digital revolution in combination with new excavations fosters new research on the palaeontology of the region from both the Italian and the Swiss side. In this article collection, we present a series of articles, which cover a broad range of palaeontological topics, reflecting the prolificness and richness of this conservation deposit.

In the article “The marine conservation deposits of Monte San Giorgio (Switzerland, Italy)—the prototype of Triassic black shale Lagerstätten” (Klug et al., 2024b), the pioneering role of Monte San Giorgio and its fossiliferous units is highlighted. The term “Monte San Giorgio type Lagerstätten” is introduced according to the widely used term Burgess type. For many black shales, “Holzmaden type” is proposed and for platy limestones “Solnhofen type”.



**Fig. 1** The Swiss side of the UNESCO World Heritage Site of Monte San Giorgio. **a** Monte San Giorgio (surrounded by the Lago di Lugano on its right) seen from the Monte Generoso ridge (summit on the left). **b** Lowermost mine entry at Cava Tre Fontane. **c** Heinz Furrer, the former curator of the Palaeontological Museum of the University of Zurich, guiding a field trip of the Swiss Palaeontological Association in 2020, at the site Acqua del Ghiuffo. **d** The natural outcrop of the Kalkschieferzone (uppermost Meride Limestone) at Val Mara, where a rich fish and insect fauna was discovered



**Fig. 2** The Italian side of the UNESCO World Heritage Site of Monte San Giorgio. **a** View on Porto Ceresio and its lake), after which *Ceresiosaurus* was named. **b** Entrance of the mine Selvabella Piodelle 3. **c** Plate explaining the conglomerates of the Triassic Bellano Formation. **d** Entrance of the mine Selvabella Piodelle 2. **e** Yard of the Museo Civico dei Fossili di Besano with a model of the ichthyosaur *Besanosaurus* and palaeoart depicting *Tanystropheus* on the wall

In view of the approximately 150 years of research on the Italian side of Monte San Giorgio and 100 years of research on the Swiss side, three articles adequately provided historical overviews of research and excavations (Furrer, 2024), research on fish (Bürgin, 2024) and Bernhard Peyer's pioneering research (Sues, 2024).

While many Lagerstätten of the Monte San Giorgio type are dominated by vertebrates, an increasing number of invertebrates are discovered, which is reflected in six contributions in this article collection. Two of which describe cephalopods that can be moderately abundant especially in the more carbonatic strata. Despite their dolomitization, they display key characters. Accordingly, Pieroni (2022) described Triassic nautilids and Pohle and Klug (2024) revised the remains of orthoconic cephalopods. Coleoids from other Triassic Lagerstätten were portrayed by Lukeneder et al. (2024) from Austria and Košťák et al. (2024) from Slovakia. Montagna et al. (2024) describe a part of a rich, newly excavated insect fauna; insects were poorly documented from Monte San Giorgio before (Bechly & Stockar, 2011; Krzeminski & Lombardo, 2001; Montagna et al., 2017, 2018, 2019; Strada, 2015; Strada et al., 2014). Echinoderms are exceedingly rare and since Jeannet (1933), no further remains have been described. Pieroni (2023) described Cyclida from the Triassic of Italy, although not from Monte San Giorgio.

Fishes played an important role in the Middle Triassic ecosystems of Monte San Giorgio but have been in the shadow of the reptiles for a long time (Bürgin, 2024). The chondrichthyans were described by Kuhn (1946a), Rieppel (1981, 1982) and Mutter (1998). The numerous osteichthyans were studied in detail after the first publications by Brough (1939) and Schwarz (1970): e.g. Rieppel (1985b, 1992); Bürgin et al. (1989); Bürgin (1990a, 1990b, 1992, 1995, 1999a, 1999b, 2024); Lombardo and Tintori (2004); Tintori and Lombardo (2007); Romano and Brinkmann (2009); Lombardo et al. (2012); Lombardo (2013); Maxwell et al., (2013, 2015, 2018); López-Arbarello et al., (2016, 2019); Argyriou et al. (2016); Romano et al. (2016); Renesto et al. (2021a). Arratia et al. (2024) described a new species of the teleostomorph *Marcopoloichthys*.

Recently, the large diversity of sarcopterygians in the Middle Triassic of central Europe was recognized. Following the first publications on sarcopterygians from the Besano Formation (Rieppel, 1980, 1985a) and the description of new coelacanth material from the Meride Limestone (Renesto & Stockar, 2018; Renesto et al., 2021b), Ferrante et al. (2023) revised the moderately common coelacanth *Ticinepomis* and described a new genus and species (*Rieppelia heinzfurreri* Ferrante & Cavin, 2023).

Marine reptiles likely received the greatest attention among the fossils from Monte San Giorgio, mainly because of the abundant ichthyosaurs (e.g., Besmer, 1947; Sander, 1989a; Brinkmann, 1996, 1997, 1998a, 1998b, 1999, 2004; Dal Sasso & Pinna, 1996; Maisch & Matzke, 1997, 1998; Kolb et al., 2011; Pardo-Pérez et al., 2020; Renesto et al., 2020; Bindellini et al., 2021, 2024; Miedema et al., 2023a, 2023b; Klug et al., 2024a) and eosauroptrygians (Carroll & Gaskill, 1985; Cornalia, 1854; Hänni, 2004; Hugi, 2011; Hugi & Scheyer, 2012; Hugi et al., 2011; Kuhn-Schnyder, 1962, 1966, 1967, 1987; Nosotti & Rieppel, 2003; Renesto, 1993; Rieppel, 1989, 1994; Sander, 1988, 1989b). In this field, the pioneer Bernhard Peyer contributed a lot to the knowledge of Triassic reptiles (e.g., Peyer, 1927, 1930, 1931a, 1931b, 1931c, 1931d, 1931e, 1932, 1934, 1935, 1936a, 1936b). Even after over a century of research, new aspects about reptiles from Monte San Giorgio are being discovered. For example, Miedema et al. (2023a) examined ontogenetic change in the skull of *Mixosaurus*, whereas Bindellini et al. (2024) provided an in-depth description of the postcranial anatomy of the up to eight meter long *Besanosaurus leptorhynchus*.

Additional reptile groups occur at Monte San Giorgio but much more rarely and yet highly interesting. Particularly noteworthy are the placodonts, thalattosaurs and the iconic long-necked tanystropheids. Thalattosaurs had a global distribution and yet still are understudied (Bastiaans et al., 2023b; Kuhn, 1946b; Kuhn-Schnyder, 1988; Müller, 2005; Nopcsa, 1925; Peyer, 1936a, 1936b; Rieppel, 1987; Rieppel et al., 2005). Klein et al. (2023) studied the bone histology of thalattosaurs for the first time, including sections of *Askeptosaurus italicus* and Bastiaans (2024) provides an overview over thalattosaurs through space and time.

Placodonts were also studied repeatedly (Kuhn, 1942; Kuhn-Schnyder, 1960; Neenan et al., 2014; Peyer, 1931c, 1931e; Pinna, 1992; Scheyer, 2010). Recently, Gere et al. (2024) discovered new aspects in the dietary shift in placodonts.

To put the reptiles from Monte San Giorgio into a broader context, we also included the redescription of *Trachelosaurus* by Spiekman et al. (2024), because it is of relevance for the comparison with other long-necked forms such as *Tanystropheus* (Peyer, 1931b; Wild, 1973, 1980). Gu et al. (2024) provided new information on the dentition of the early branching Chinese ichthyosaur *Chaohusaurus zhangjiawanensis*, while López-Arbarello and Brocke (2024) discussed and revised a small ray-finned fish from the Perledo-Varenna Formation, Perledo, Italy and compared it with members of the fish fauna from the Besano Formation. Finally, Klein et al. (2022) introduced the new pachypleurosaur *Prosantosaurus scheffoldi* from Eastern Switzerland and Hu et al. (2024) described a new pachypleurosaur from southwestern China; both studies thus

provide comparative material to the Monte San Giorgio pachypleurosaur.

### The Museum of Fossils from Monte San Giorgio in Meride

The first local Museum of Fossils from Monte San Giorgio was installed by the municipality of Meride with the help of Emil Kuhn-Schwyler and the Palaeontological Institute and Museum, University of Zurich (now the Natural History Museum of UZH), in the heart of the picturesque village, listed in the Federal Inventory of Heritage Sites (ISOS 4002), in 1973 (Kuhn-Schwyler, 1979).

The international recognition of the classic Middle Triassic vertebrate Fossilagerstätte of Monte San Giorgio (Switzerland), already included in the Federal Inventory of Protected Landscapes, Sites and Natural Monuments (BLN 1804), and the adjacent Monte Pravello—Monte Orsa (Italy) was strengthened by its inscription to the UNESCO WHL (World Heritage List; 2003, extended in 2010; see also Furrer, 2003; Felber et al., 2004). Monte San Giorgio yielded the currently best-known record of marine life in the Middle Triassic period (e.g., Klug et al., 2024b), and records important remains of life on land as well (plants: Sordelli, 1879; Peyer, 1944; Wirz, 1945; Stockar & Kustatscher, 2010; terrestrial animals besides insects: e.g., Krebs, 1963, 1965; Nosotti & Rieppel, 2003; Lautenschlager & Desojo, 2011; Jaquier et al., 2017; Miedema et al., 2020; Magnani et al., 2022; Viaretti et al., 2023). The property has produced diverse and numerous fossils, many of which show exceptional completeness and detailed preservation (e.g., Beardmore & Furrer, 2015, 2016a, 2016b, 2017, 2019; Beardmore et al., 2012). The long history of study of the property (Bürgin, 2024; Furrer, 2024; Sues, 2024) and the disciplined management of the resource have created a well-documented and catalogued body of specimens of exceptional quality and are the basis for a rich associated geological literature (World Heritage Committee, 2003, 2010).

The international recognition demanded a new onsite visitor centre and presentation services. In 2012, the new Museo dei fossili del Monte San Giorgio (Fig. 3) opened in a historical lombard-style courtyard house, redesigned by the star architect Mario Botta (Furrer & Vandelli, 2014). The exhibition, initially curated by Heinz Furrer (PIMUZ) and Alberto Bianda (theredbox, Lugano), presents a large variety of fossils spread on four floors, following the stratigraphy from the Middle Triassic to Early Jurassic, mainly originals and a few casts of unique fossils from the PIMUZ, together with attractive life reconstructions and illustrations by Beat Scheffold (Winterthur).

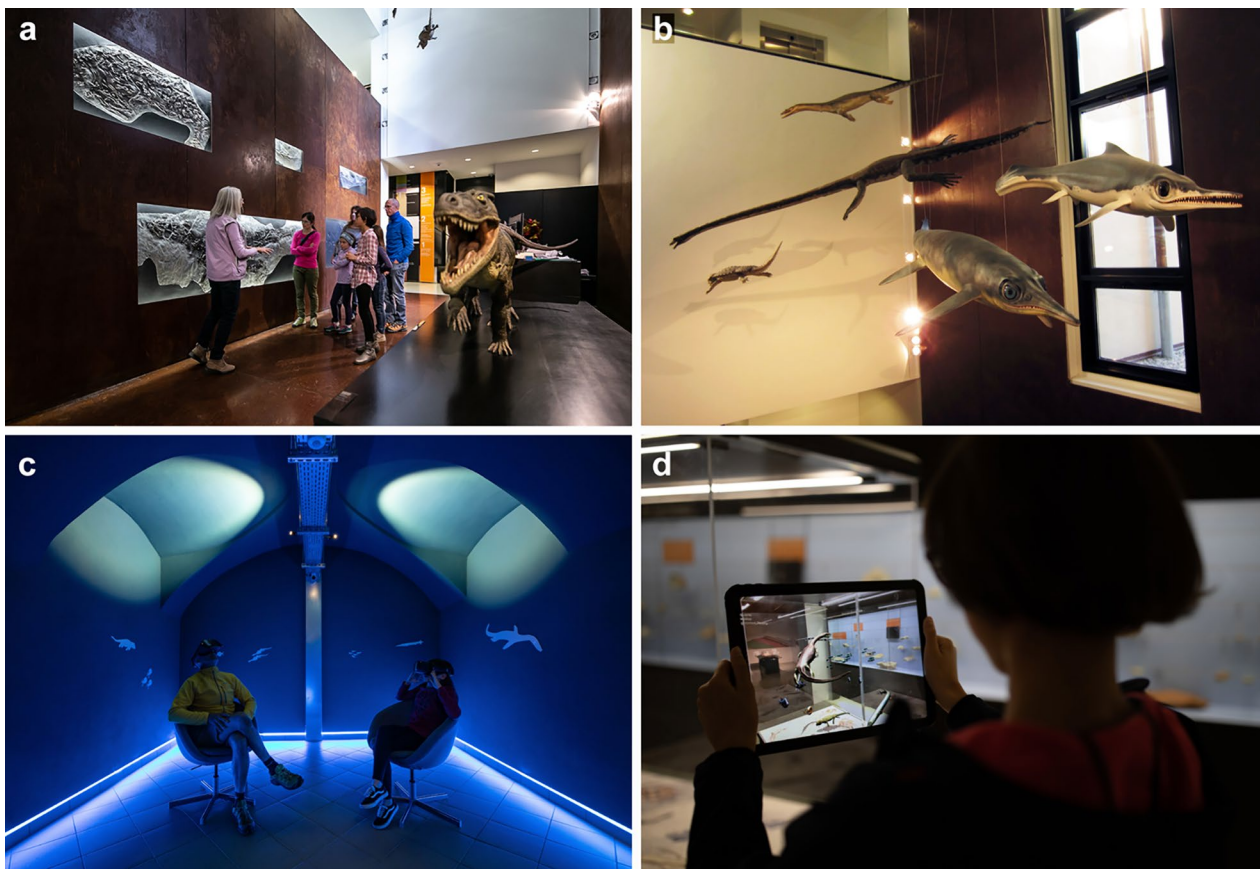
The Museo dei fossili del Monte San Giorgio at Meride under the lead of the Fondazione del Monte San Giorgio started with about 10,000 visitors a year and developed successfully to about 20,000 visitors a year, profiting from additional videos, multimedia audio guides for children and adults and innovative three-dimensional animations in augmented, virtual and mixed reality. The actual team led by the site manager Daniele Albisetti and the museum director Luca Zulliger offers various interesting didactic activities in the museum and in the area of Monte San Giorgio:

- Guided tours in the museum, workshops, and field trips (<http://www.museodeifossili.ch>)
- Educational and experiential paths (<http://www.museodeifossili.ch/tracce-fossili.html>)
- Geo-palaeontological trail around Monte San Giorgio (<http://www.montesangiorgio.org/it/Territorio/Sentiero-geo-paleontologico-transnazionale.html>)
- Educational station at the site of the former palaeontological excavations in the lower Meride Limestone (Cava inferiore and Cava superiore beds) at Acqua del Ghiffo (Fig. 4) and Carpanee near Crocefisso
- Panorama platform Val Mara (Fig. 4) at the site of former palaeontological excavations in the upper Meride Limestone (Kalkschieferzone) near Meride
- There is also a project at the entrances of the old oil shale mine at Cava Tre Fontane near Serpiano, for a better presentation of the middle Besano Formation, where from 1907 to 1947 the oil shales (“scisti bituminosi”) and many important fossils were recovered (Furrer, 2016, 2023)

### Further displays of Monte San Giorgio fossils

Monte San Giorgio fossils found their homes in various places, and it is beyond the scope of this editorial to provide a comprehensive list. Here, we file only those museums, which display numerous specimens and taxa. The local museum at Meride plays a key role since it is on sight. Concerning original fossils, however, the Naturhistorisches Museum of the University of Zurich and the Museo di Storia Naturale in Milano display the greatest number of original and important specimens. Both provide a comprehensive overview of the fossil groups of Monte San Giorgio.

*Naturhistorisches Museum der Universität Zürich* The greatest number of holotypes and taxa are likely displayed in the Naturhistorisches Museum der Universität Zürich (by fusion of the Paläontologisches Museum with the Zoologisches, Botanisches, and Anthropologisches



**Fig. 3** Impressions from the Museo dei fossili del Monte San Giorgio at Meride. **a** Entrance with the model of *Ticinosuchus ferox* by Beat Scheffold. **b** Models of marine reptiles by Beat Scheffold (from left to right: *Cyamodus*, *Tanystropheus*, *Ceresiosaurus*, *Cymbospondylus* and *Mixosaurus*). **c, d** Applications of virtual and augmented reality at the museum

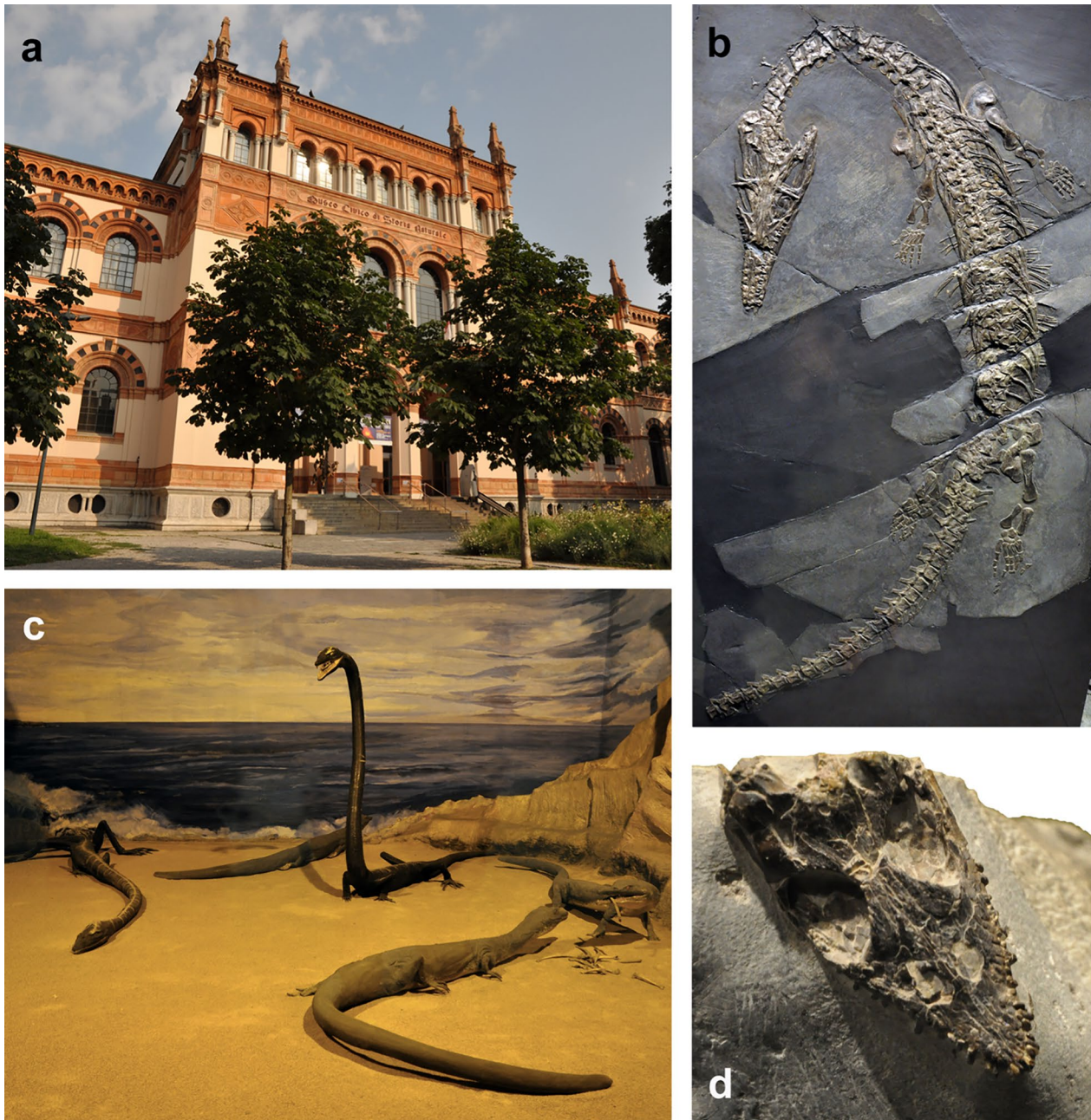


**Fig. 4** Publicly accessible sites on the Swiss side of Monte San Giorgio. **a** Explanatory plates at Cava superiore beds at Acqua del Ghiffo. **b** Platform at Val Mara, where the exposed Kalkschieferzone (uppermost Meride Limestone) yielded many actinopterygian fish, some crustacean, insect and plant fossils, but only one lariosaurid reptile

Museum). The most remarkable specimens are the complete skeletons of *Tanystropheus*, *Ticinosuchus*, *Helveticosaurus*, the thalattosaurs, placodonts, chondrichthyans

etc. Some images of the exhibit are provided in Klug et al., (2024b: figs. 1 to 3).

Website: <http://www.nmz.uzh.ch>.



**Fig. 5** Museo Civico di Storia Naturale di Milano. **a** The beautiful historical façade of the museum. **b** One of the best skeletons of *Askeptosaurus italicus*. **c** The historical diorama featuring *Askeptosaurus* and *Tanytropheus*, showing the earlier notion of a flexible neck and amphibious mode of life of the latter. **d** Holotype of the pachypleurosaurid *Odoiporosaurus terruzzii*

*Museum of fossils from Monte San Giorgio in Meride/ Museo dei fossili del Monte San Giorgio di Meride* This museum and the associated outdoor stations are portrayed in the preceding chapter (Figs. 3, 4).

Websites: <http://www.museodeifossili.ch>, <http://www.montesangiorgio.org/en/>.





**Fig. 6** Museo cantonale di storia naturale di Lugano. **a** Displays in the museum. **b** Plate with several skeletons of *Neusticosaurus pusillus*. **c** Cast and model of the raiusuchian *Ticinosuchus ferox*. **d** Skeleton and model (by B. Scheffold) of *Ceresiosaurus calcagnii*

*Museo Civico di Storia Naturale di Milano* This museum exhibits an excellent overview over the fossils of Monte San Giorgio including a huge *Besanosaurus*,

*Askeptosaurus*, *Tanystropheus* etc. and a nice historic diorama featuring *Tanystropheus* and other marine reptiles on a beach (Fig. 5).



**Fig. 7** Civico Museo Insubric di Storia Naturale e Visitor Center Monte San Giorgio UNESCO di Clivio. **a** Entrance. **b** One of the show cases

Website: <http://www.unescovarese.com/it/14975/Milano-Museo-Civico-di-Storia-Naturale>.

*Museo cantonale di storia naturale di Lugano* The Cantonal Museum of Natural History researches, documents, and disseminates knowledge about the natural heritage of the Canton of Ticino. The permanent exhibition offers visitors an overview over the fossils from ongoing excavations at Monte San Giorgio (Fig. 6).

Website: <http://www.ti.ch/mcsn>.

*Civico Museo Insubric di Storia Naturale e Visitor Center Monte San Giorgio UNESCO di Clivio* As official visitor centre for the UNESCO world heritage site Monte San Giorgio, this museum will likely increase in importance. The museum houses exhibitions on naturalistic aspects of the Insubric region, with a special focus on the Monte San Giorgio area (Fig. 7).

Website: <http://www.unescovarese.com/it/14977/Clivio-VA-Civico-Museo-Insubric-di-Storia-Naturale-e-Visitor-Center-Monte-San-Giorgio-UNESCO>.

*Museo Civico dei Fossili di Besano* Located in a historical building, the museum at Besano has several rooms with displays of Monte San Giorgio fossils and a forum with a big palaeoart as well as a *Besanosaurus*-model (Fig. 2e).

Website: <https://museodibesano.it/>.

## Conclusions

With this editorial, we introduce an article collection remembering the beginning of scientific excavations by Bernhard Peyer in 1924. This marks an important event

in the history of palaeontology of Switzerland because it is still the most important palaeontological site in this country and the only one that received UNESCO world heritage status. Many articles were published in the past decades, highlighting that the combination of the excellent fossil preservation, numerous new methods, and the fame created by the UNESCO-status fostered palaeontological research. We also stress that Monte San Giorgio and the adjoining Monte Pravello—Monte Orsa is a pioneering area, which is the first among numerous other Triassic Lagerstätten worldwide of this unusual combination of facies and fossils, often rich in marine reptiles. This shows that we can expect a wealth of new insights obtained from this area on both sides of the Swiss-Italian border, which hopefully will stimulate research in other regions globally.

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## Author contributions

CK and TMS had the idea for this study. The photos were contributed by CK, TMS, DA, RS, and HF. All authors wrote parts of the text and approved of the final version.

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## Availability of data and materials

This publication did not use new data.

## Declarations

## Competing interests

The authors declare to have no competing interests.

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## References

- Airaghi, C. (1911). Ammoniti degli scisti bituminosi di Besano in Lombardia. *Bollettino Della Società Geologica Italiana*, 30, 1048–1050.
- Albisetti, D., & Furrer, H. (2023). *Bibliografia del Monte San Giorgio* (p. 35). Fondazione del Monte San Giorgio.
- Argyriou, T., Clauss, M., Maxwell, E. E., Furrer, H., & Sánchez-Villagra, M. R. (2016). Exceptional preservation reveals gastrointestinal anatomy and evolution in early actinopterygian fishes. *Scientific Reports*, 6, 18758. <https://doi.org/10.1038/srep18758>
- Arratia, G., Bürgin, T., & Furrer, H. (2024). A new suction feeder and miniature teleostomorph, *Marcopoloichthys mirigoliensis*, from the lower Besano Formation (late Anisian) of Monte San Giorgio. *Swiss Journal of Palaeontology*, 143(25), 1–22. <https://doi.org/10.1186/s13358-024-00318-5>
- Bassani, F. (1886). Sui fossili e sull'età degli schisti bituminosi triasici di Besano in Lombardia. *Atti Società Italiana Di Scienze Naturali*, 29, 15–72.
- Bastiaans, D. (2024). Thalattosauria in time and space: A review of thalattosaur spatiotemporal occurrences, presumed evolutionary relationships and current ecological hypotheses. *Swiss Journal of Palaeontology*, 143, 36 (2024). <https://doi.org/10.1186/s13358-024-00333-6>
- Bastiaans, D., Buffa, V., & Scheyer, T. M. (2023a). To glide or to swim? A reinvestigation of the enigmatic *Wapitisaurus problematicus* (Reptilia) from the Early Triassic of British Columbia. *Canada. Royal Society Open Science*, 10(11), 231171.
- Bastiaans, D., Herbst, E. C., Van de Kamp, T., Zuber, M., & Scheyer, T. M. (2023b). The first 3D cranial and myological reconstruction of the highly flattened remains of *Askeptosaurus italicus* (Diapsida: Thalattosauriformes). *Abstracts of the International Congress of Vertebrate Morphology*, 28, Cairns, Australia (p. 1)
- Beardmore, S. R., & Furrer, H. (2015). Evidence of a preservational gradient in the skeletal taphonomy of Ichthyopterygia (Reptilia) from Europe. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 443, 131–144.
- Beardmore, S. R., & Furrer, H. (2016a). Preservation of Pachypleurosauridae (Reptilia; Sauropterygia) from the Middle Triassic of Monte San Giorgio, Switzerland. *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 280, 221–240.
- Beardmore, S. R., & Furrer, H. (2016b). Taphonomic analysis of *Saurichthys* from two stratigraphic horizons in the Middle Triassic of Monte San Giorgio, Switzerland. *Swiss Journal of Geosciences*, 109, 1–16.
- Beardmore, S. R., & Furrer, H. (2017). Land or water: Using taphonomic models to determine the lifestyle of the Triassic protosauromorph *Tanystropheus* (Diapsida, Archosauromorpha). *Palaeobiodiversity and Palaeoenvironments*, 98, 243–258.
- Beardmore, S. R., & Furrer, H. (2019). Taphonomic variation within a Middle Triassic fossil lagerstätte (Cassina beds, Meride Limestone) at Monte San Giorgio. *Paläontologische Zeitschrift*, 93, 49–67.
- Beardmore, S. R., Orr, P. J., Manzocchi, T., Furrer, H., & Johnson, C. (2012). Death, decay and disarticulation: Modelling the skeletal taphonomy of marine reptiles demonstrated using *Serpianosaurus* (Reptilia; Sauropterygia). *Palaeogeography, Palaeoclimatology, Palaeoecology*, 337, 1–13.
- Bechly, G., & Stockar, R. (2011). The first Mesozoic record of the extinct apterygote insect genus *Dasyleptus* (Insecta: Archaeognatha: Monura: Dasyleptidae) from the Triassic of Monte San Giorgio (Switzerland). *Palaeodiversity*, 4, 23–37.
- Benton, M. J., Tverdokhlebov, V. P., & Surkov, M. V. (2004). Ecosystem remodeling among vertebrates at the Permian-Triassic boundary in Russia. *Nature*, 432, 97–100. <https://doi.org/10.1038/nature02950>
- Besmer, A. (1947). Die Triasfauna der Tessiner Kalkalpen. XVI. Beiträge zur Kenntnis des Ichthyosauriergebisses. *Schweizerische Paläontologische Abhandlungen*, 65, 1–21.
- Bindellini, G., Wolniewicz, A. S., Miedema, F., Dal Sasso, C., & Scheyer, T. M. (2024). Postcranial anatomy of *Besanosaurus leptorhynchus* (Reptilia: Ichthyosauria) from the Middle Triassic Besano Formation of Monte San Giorgio (Italy/Switzerland), with implications for reconstructing the swimming styles of Triassic ichthyosaurs. *Swiss Journal of Palaeontology*, 143(32), 1–32.
- Bindellini, G., Wolniewicz, A. S., Miedema, F., Scheyer, T. M., & Dal Sasso, C. (2021). Cranial anatomy of *Besanosaurus leptorhynchus* Dal Sasso & Pinna, 1996 (Reptilia: Ichthyosauria) from the Middle Triassic Besano Formation of Monte San Giorgio, Italy/Switzerland: Taxonomic and palaeobiological implications. *PeerJ*, 9, 1–66. <https://doi.org/10.7717/peerj.11179>
- Brayard, A., Bucher, H., Escarguel, G., Fluteau, F., & Bourquin, S. (2006). The Early Triassic ammonoid recovery: Paleoclimatic significance of diversity gradients. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 239, 374–395.
- Brayard, A., Escarguel, G., Bucher, H., Monnet, C., Brühwiler, T., Goudemand, N., Galfetti, T., & Guex, J. (2009). Good genes and good luck: Ammonoid diversity and the end-permian mass extinction. *Science*, 325, 1118–1121.
- Brayard, A., Krumenacker, J., Botting, J. P., Jenks, J., Bylund, K. G., Fara, E., Vennin, E., Olivier, N., Goudemand, N., Saucède, T., Charbonnier, S., Romano, C., Doguzhaeva, L., Thuy, B., Hautmann, M., Stephen, D. A., Thomazo, C., & Escarguel, G. (2017). Unexpected Early Triassic marine ecosystem and the rise of the Modern evolutionary fauna. *Science Advances*, 3, e1602159. <https://doi.org/10.1126/sciadv.1602159>
- Brinkmann, W. (1996). Ein Mixosaurier (Reptilia, Ichthyosauria) mit Embryonen aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Schweiz, Kanton Tessin). *Eclologiae Geologicae Helveticae*, 89, 1321–1344.
- Brinkmann, W. (1997). Die Ichthyosaurier (Reptilia) aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Tessin, Schweiz) - der aktuelle Forschungsstand. *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, 142, 165–177.
- Brinkmann, W. (1998a). Die Ichthyosaurier (Reptilia) aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Tessin, Schweiz) - neue Ergebnisse. *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, 143, 165–177.
- Brinkmann, W. (1998b). "*Sangiorgiosaurus*" n.g.-eine neue Mixosaurier-Gattung (Mixosauridae, Ichthyosauria) mit Quetschzähnen aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Schweiz, Kanton Tessin). *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 207, 125–144.
- Brinkmann, W. (1999). *Ichthyosaurus cornalianus* Bassani, 1886 (currently *Mixosaurus cornalianus*; Reptilia, Ichthyosauria): Proposed designation of a neotype. Case 3122. *Bulletin of Zoological Nomenclature*, 56, 247–249.
- Brinkmann, W. (2004). Mixosaurier (Reptilia, Ichthyosauria) mit Quetschzähnen aus der Grenzbitumenzone (Mitteltrias) des Monte San Giorgio (Schweiz, Kanton Tessin): 1 Tabelle. *Schweizerische Paläontologische Abhandlungen*, 124, 1–84.
- Brough, J. (1939). *The Triassic Fishes of Besano, Lombardy* (p. 117). British Museum (Natural History).
- Bürgin, T. (1990a). Der Schuppenpanzer von *Habroichthys minimus*, einem ungewöhnlichen Strahlenflosser (Actinopterygii; Peltopleuriformes) aus der Mittleren Trias der Südalpen. *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 1990(11), 647–658.
- Bürgin, T. (1990b). Reproduction in Middle Triassic actinopterygians; complex fin structures and evidence of viviparity in fossil fishes. *Zoological Journal of the Linnean Society*, 100, 379–391.
- Bürgin, T. (1992). Basal ray-finned fishes (Osteichthyes; Actinopterygii) from the middle Triassic of Monte San Giorgio (Canton Tessin, Switzerland): Systematic palaeontology with notes on functional morphology and palaeoecology. *Schweizerische Paläontologische Abhandlungen*, 114, 1–164.
- Bürgin, T. (1995). Actinopterygian fishes (Osteichthyes; Actinopterygii) from the Kalkschieferzone (Uppermost Ladinian) near Meride (Canton Ticino, Southern Switzerland). *Eclologiae Geologicae Helveticae*, 88, 803–826.
- Bürgin, T. (1999a). Middle Triassic marine fish faunas from Switzerland. *Mesozoic Fishes*, 2, 481–494.
- Bürgin, T. (1999b). New actinopterygian fishes (Osteichthyes) from the lower Meride Limestones (Lower Ladinian) of Acqua del Ghiffo (Monte San Giorgio, Southern Switzerland). In: *3rd International symposium on lithographic limestones. Rivista Museo civico Scienze Naturali "Enrico Caffi", suppl. al 20*, 57–62.
- Bürgin, T. (2024). The research history of the Middle Triassic fishes of Monte San Giorgio: Getting out of the shadow of aquatic reptiles. *Swiss Journal of Palaeontology*, 143(16), 1–23.

- Bürgin, T., Rieppel, O., Sander, P. M., & Tschanz, K. (1989). The fossils of Monte San Giorgio. *Scientific American*, 260, 74–81.
- Carroll, R. L., & Gaskill, P. (1985). The nothosaur *Pachypleurosaurus* and the origin of plesiosaurs. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 309(1139), 343–393.
- Cornalia, E. (1854). Notizie zoologiche sul *Pachypleura edwardsii* Cor. Nuovo sauro acrodonte degli strati triasici di Lombardia. *Giornale Dell'Istituto Lombardo Di Scienze, Lettere Ed Arti*, 6, 45–56.
- Curioni, G. (1847). Cenni sopra un nuovo sauro fossile dei monti di Perledo sul Lario e sul terreno che lo racchiude. *Giornale del J. R. Istituto Lombardo Di Scienze, Lettere Ed Arti*, 16, 159–170.
- Curioni, G. (1863). Sui giacimenti metalliferi e bituminosi nei terreni triasici di Besano. *Memorie Del Istituto Lombardo Di Scienze, Lettere Ed Arti*, 9, 241–268.
- Dal Sasso, C., & Pinna, G. (1996). *Besanosaurus leptorhynchus* n. gen. n. sp., a new shastasaurid ichthyosaur from the Middle Triassic of Besano (Lombardy, N. Italy). *Palaeontologia Lombarda N.s.*, 4, 3–23.
- Felber, M. (2006). *Il Monte San Giorgio. Dai fossili alla lavorazione artistica della pietra* (p. 222). Edizioni Casagrande.
- Felber, M., Furrer, H., & Tintori, A. (2004). The Triassic of Monte San Giorgio in the World Heritage List of UNESCO: An opportunity for science, the local people and tourism. *Eclogae Geologicae Helvetiae*, 97, 1–2.
- Ferrante, C., & Cavin, L. (2023). Early Mesozoic burst of morphological disparity in the slow-evolving coelacanth fish lineage. *Scientific Reports*, 13(1), 11356. <https://doi.org/10.1038/s41598-023-37849-9>
- Ferrante, C., Furrer, H., Martini, R., & Cavin, L. (2023). Revision of the Middle Triassic coelacanth *Ticnecpomis* Rieppel 1980 (Actinistia, Latimeriidae) with paleobiological and paleoecological considerations. *Swiss Journal of Palaeontology*, 142(18), 1–33. <https://doi.org/10.1186/s13358-023-00276-4>
- Friesenbichler, E., Hautmann, M., & Bucher, H. (2021). The main stage of recovery after the end-Permian mass extinction: Taxonomic rediversification and ecologic reorganization of marine level-bottom communities during the Middle Triassic. *PeerJ*, 9, e11654, 1–e116632. <https://doi.org/10.7717/peerj.11654>
- Furrer, H. (1995). The Kalkschieferzone (Upper Meride Limestone; Ladinian) near Meride (Canton Ticino, Southern Switzerland) and the evolution of a Middle Triassic intraplatform basin. *Eclogae Geologicae Helvetiae*, 88(3), 827–852.
- Furrer, H. (2003). Der Monte San Giorgio im Südtessin—vom Berg der Saurier zur Fossil-Lagerstätte internationaler Bedeutung. *Neujahrsblatt der Naturforschenden Gesellschaft in Zürich*, 206, 1–64.
- Furrer, H. (2016). *Palaeontological excavations at Monte San Giorgio: Field map with explanation*. Fondazione del Monte San Giorgio.
- Furrer, H. (2023). *Geschichte des Bergwerks Miniera Tre Fontane in Meride* (p. 64). Fondazione del Monte San Giorgio.
- Furrer, H. (2024). The history of palaeontological research and excavations at Monte San Giorgio. *Swiss Journal of Palaeontology*, 143(18), 1–25. <https://doi.org/10.1186/s13358-024-00314-9>
- Furrer, H., & Vandelli, A. (2014). *Guide to the Museum of fossils from Monte San Giorgio Meride* (p. 128). Fondazione del Monte San Giorgio.
- Gere, K., Nagy, A. L., Scheyer, T., Werneburg, I., & Ősi, A. (2024). Complex dental wear analysis reveals dietary shift in Triassic placodonts (Sauropsida, Sauropterygia). *Swiss Journal of Palaeontology*, 143(4), 1–18. <https://doi.org/10.1186/s13358-024-00304-x>
- Gu, L.-A., Wolniewicz, A., & Liu, J. (2024). New information on the dentition of *Chaohusaurus zhangjiawanensis* (Reptilia, Ichthyosauriformes) from the Early Triassic of Yuan'an, Hubei Province, China. *Swiss Journal of Palaeontology*, 143/35, 1–16.
- Hänni, K. (2004). *Die Gattung Ceresiosaurus. Ceresiosaurus calgagnii Peyer und Ceresiosaurus lanzi n. sp. (Lariosauridae, Sauropterygia)*. PhD Thesis, Paläontologisches Institut und Museum, University of Zürich, Zürich (p. 146)
- Hautmann, M., Bagherpour, B., Brosse, M., Frisk, Å., Hofmann, R., Baud, A., Nützel, A., Goudemand, N., & Bucher, H. (2015). Competition in slow motion: The unusual case of benthic marine communities in the wake of the end-Permian mass extinction. *Palaeontology*, 58, 871–901.
- Hu, Y.-W., Li, Q., & Liu, J. (2024). A new pachypleurosaur (Reptilia: Sauropterygia) from the Middle Triassic of southwestern China and its phylogenetic and biogeographic implications. *Swiss Journal of Palaeontology*, 143(1), 1–15. <https://doi.org/10.1186/s13358-023-00292-4>
- Hugi, J. (2011). The long bone histology of *Ceresiosaurus* (Sauropterygia, Reptilia) in comparison to other eosaurpterygians from the Middle Triassic of Monte San Giorgio (Switzerland/Italy). *Swiss Journal of Palaeontology*, 130, 297–306. <https://doi.org/10.1007/s13358-011-0023-6>
- Hugi, J., & Scheyer, T. M. (2012). Ossification sequences and associated ontogenetic changes in the bone histology of pachypleurosaurids from Monte San Giorgio (Switzerland/Italy). *Journal of Vertebrate Paleontology*, 32, 315–327. <https://doi.org/10.1080/02724634.2012.646376>
- Hugi, J., Scheyer, T. M., Sander, P. M., Klein, N., & Sánchez-Villagra, M. R. (2011). Long bone microstructure gives new insights into the life of pachypleurosaurids from the Middle Triassic of Monte San Giorgio, Switzerland/Italy. *Comptes Rendus Palevol*, 10, 413–426. <https://doi.org/10.1016/j.crpv.2011.03.009>
- Jaquier, V. P., Fraser, N. C., Furrer, H., & Scheyer, T. M. (2017). Osteology of a new specimen of *Macrocnemus* aff. *M. fuyuanensis* (Archosauromorpha, Protosauria) from the Middle Triassic of Europe: potential implications for species recognition and paleogeography of tanystropheid protosauroids. *Frontiers in Earth Science*, 5, 91. <https://doi.org/10.3389/feart.2017.00091>
- Jeannet, A. (1933). Die Triasfauna der Tessiner Kalkalpen. VI. Note sur un *Miocidaris* nouveau. *Schweizerische Paläontologische Abhandlungen*, 53, 1–7.
- Kelley, N. P., & Pyenson, N. D. (2015). Evolutionary innovation and ecology in marine tetrapods from the Triassic to the Anthropocene. *Science*, 348, aaa371. <https://doi.org/10.1126/science.aaa3716>
- Klein, N., Furrer, H., Ehrbar, I., Torres Ladeira, M., Richter, H., & Scheyer, T. M. (2022). A new pachypleurosaur from the early Ladinian Prasanto Formation in the Eastern Alps of Switzerland. *Swiss Journal of Palaeontology*, 141(12), 1–27. <https://doi.org/10.1186/s13358-022-00254-2>
- Klein, N., Sander, M. P., Liu, J., Druckenmiller, P., Metz, E., Kelley, N. P., & Scheyer, T. M. (2023). Comparative bone histology of two thalattosaurians (Diapsida: Thalattosauria) *Askeptosaurus italicus* from the Alpine Triassic (Middle Triassic) and a Thalattosauroida indet. from the Carnian of Oregon (Late Triassic). *Swiss Journal of Palaeontology*, 142/15, 1–20. <https://doi.org/10.1186/s13358-023-00277-3>
- Klug, C., Sivign, T., Miedema, F., Scheffold, B., Reisdorf, A. R., Stössel, I., Maxwell, E. E., & Scheyer, T. M. (2024a). Swiss ichthyosaurs—a review. *Swiss Journal of Palaeontology*, 143/31, 1–29. <https://doi.org/10.1186/s13358-024-00308-7>
- Klug, C., Spiekman, S. N. F., Bastiaans, D., Scheffold, B., & Scheyer, T. (2024b). The marine conservation deposits of Monte San Giorgio (Switzerland, Italy)—the prototype of Triassic black shale Lagerstätten. *Swiss Journal of Palaeontology*, 143(11), 1–28. <https://doi.org/10.1186/s13358-024-00308-7>
- Kolb, C., Sánchez-Villagra, M. R., & Scheyer, T. M. (2011). The palaeohistology of the basal ichthyosaur *Mixosaurus* (Ichthyopterygia, Mixosauridae) from the Middle Triassic: Palaeobiological implications. *Comptes Rendus Palevol*, 10, 403–411.
- Košťák, M., Schlögl, J., Fuchs, D., Havrila, M., Kolar-Jukovšek, T., Vörös, A., Havelcová, M., Šurka, J., Havrila, J., & Holcová, K. (2024). Rare Middle Triassic coleoids from the Alpine-Carpathian system: new records from Slovakia and their significance. *Swiss Journal of Palaeontology*, 143/19, 1–19. <https://doi.org/10.1186/s13358-024-00316-7>
- Krebs, B. (1963). Bau und Funktion des Tarsus eines Pseudosuchiers aus der Trias des Monte San Giorgio (Kanton Tessin, Schweiz). *Paläontologische Zeitschrift*, 37, 88–95.
- Krebs, B. (1965). *Ticinosuchus ferox* nov. gen. nov. sp.: Ein neuer Pseudosuchier aus der Trias des Monte San Giorgio. *Schweizerische Paläontologische Abhandlungen*, 81, 1–140.
- Krzeminski, W., & Lombardo, C. (2001). New fossil Ephemeroptera and Coleoptera from the Ladinian (Middle Triassic) of Canton Ticino (Switzerland). *Rivista Italiana Di Paleontologia e Stratigrafia*, 107(1), 69–78.
- Kuhn, E. (1942). Über einen weiteren Fund von *Paraplacodus broilii* Peyer aus der Trias des Monte San Giorgio. *Eclogae Geologicae Helvetiae*, 35, 174–183.
- Kuhn, E. (1946a). Über *Acrodus*-Funde aus dem Grenzbitumenhorizont der anisischen Stufe der Trias des Monte San Giorgio. *Eclogae Geologicae Helvetiae*, 38, 662–673.
- Kuhn, E. (1946b). Der Schädel von *Askeptosaurus italicus* Nopcsa. *Eclogae Geologicae Helvetiae*, 39, 363.
- Kuhn-Schnyder, E. (1960). Über Placodontier. *Paläontologische Zeitschrift*, 34, 91–102.

- Kuhn-Schnyder, E. (1962). Ein weiterer Schädel von *Macrocnemus bassanii* Nopcsa aus der anisischen Stufe der Trias des Monte San Giorgio (Kanton Tessin, Schweiz). *Paläontologische Zeitschrift*, 36, 110–133.
- Kuhn-Schnyder, E. (1966). Der Schädel von *Paranotosaurus amleri* Peyer aus dem Grenzbitumenhorizont der anisisch-ladinischen Stufe der Trias des Monte San Giorgio (Kanton Tessin, Schweiz). *Eclogae Geologicae Helveticae*, 59, 517–540.
- Kuhn-Schnyder, E. (1967). Das Problem der Euryapsida. *Mitteilungen Aus Dem Paläontologischen Institut der Universität Zürich*, 49, 335–348.
- Kuhn-Schnyder, E. (1974). Die Triasfauna der Tessiner Kalkalpen. *Neujahrsblatt der Naturforschenden Gesellschaft Zürich*, 176, 1–119.
- Kuhn-Schnyder, E. (1979). *Die Fossilien des Monte San Giorgio. Führer zum Paläontologischen Museum Meride (Kanton Tessin)*. Kurhotel Serpiano.
- Kuhn-Schnyder, E. (1987). Die Triasfauna der Tessiner Kalkalpen. XXVI. *Lariosaurus-lavizzarii* new species (Reptilia; Sauropterygia). *Schweizerische Paläontologische Abhandlungen*, 110, 1–24.
- Kuhn-Schnyder, E. (1988). Bemerkungen zur Ordnung der Thalattosauria (Reptilia). *Eclogae Geologicae Helveticae*, 81, 879–886.
- Lanz, H., & Felber, M. (2020). Wissenschaftliche Grabungen, Landschaften und Menschen im Gebiet des Monte San Giorgio–Aufnahmen 1924–1936. *Geologia Insubrica*, 14, 1–110.
- Lautenschlager, S., & Desojo, J. B. (2011). Reassessment of the Middle Triassic rauisuchian archosaurs *Ticinosuchus ferox* and *Stagonosuchus nyassicus*. *Paläontologische Zeitschrift*, 85, 357–381.
- Lombardo, C. (2013). A new basal actinopterygian fish from the Late Ladinian of Monte San Giorgio (Canton Ticino, Switzerland). *Swiss Journal of Geosciences*, 106, 219–230.
- Lombardo, C., & Tintori, A. (2004). New Perleidiforms from the Triassic of the Southern Alps and the revision of *Serrolepis* from the Triassic of Württemberg (Germany). *Mesozoic Fishes*, 3, 179–196.
- Lombardo, C., Tintori, A., & Tona, D. (2012). A new species of *Sangiorgioichthys* (Actinopterygii, Semionotiformes) from the Kalkschieferzone of Monte San Giorgio (Middle Triassic; Meride, Canton Ticino, Switzerland). *Bollettino Della Società Paleontologica Italiana*, 51, 203–212.
- López-Arbarello, A., & Brocke, R. (2024). New generic name for a small Triassic ray-finned fish from Perledo (Italy). *Swiss Journal of Palaeontology*, 143/30, 1–12.
- López-Arbarello, A., Bürgin, T., Furrer, H., & Stockar, R. (2016). New holostean fishes (Actinopterygii: Neopterygii) from the Middle Triassic of the Monte San Giorgio (Canton Ticino, Switzerland). *PeerJ*, 4, e2234. <https://doi.org/10.7717/peerj.2234>
- López-Arbarello, A., Bürgin, T., Furrer, H., & Stockar, R. (2019). Taxonomy and phylogeny of *Eosemionotus* Stolley, 1920 (Neopterygii: Ginglymodi) from the Middle Triassic of Europe. *Palaeontologia Electronica*, 22(1), 1–64. <https://doi.org/10.106879/904>
- López-Arbarello, A., Stockar, R., & Bürgin, T. (2014). Phylogenetic relationships of the Triassic *Archaeosemionotus* Deecke (Halecomorphi, Ionoscoptiformes) from the Perledo Fauna: *PLoS ONE*, 9(10), e108665. <https://doi.org/10.1371/journal.pone.0108665>
- Lukeneder, P., Fuchs, D., & Lukeneder, A. (2024). Coleoid diversity and trophic contacts from the late Triassic Polzberg Konservat-Lagerstätte (Lower Austria, Northern Calcareous Alps). *Swiss Journal of Palaeontology*, 143(21), 1–23. <https://doi.org/10.1186/s13358-024-00319-4>
- Magnani, F., Stockar, R., & Lourenço, W. R. (2022). A new family, genus and species of fossil scorpion from the Meride Limestone (Middle Triassic) of Monte San Giorgio (Switzerland). *Faunitaxys*, 10(24), 1–7.
- Maisch, M., & Matzke, A. (1997). *Mikadocephalus gracilirostris* n. gen., n. sp., a new ichthyosaur from the Grenzbitumenzone (Anisian-Ladinian) of Monte San Giorgio (Switzerland). *Paläontologische Zeitschrift*, 71, 267–289.
- Maisch, M. W., & Matzke, A. T. (1998). Observations on Triassic ichthyosaurs. Part II: A new ichthyosaur with palatal teeth from Monte San Giorgio. *Neues Jahrbuch Für Geologie und Paläontologie-Monatshefte*, 1998(1), 26–41.
- Maxwell, E. E., Argyriou, T., Stockar, R., & Furrer, H. (2018). Re-evaluation of the ontogeny and reproductive biology of the Triassic fish *Saurichthys* (Actinopterygii: Saurichthyidae). *Palaeontology*, 18, 559–574.
- Maxwell, E. E., Furrer, H., & Sánchez-Villagra, M. R. (2013). Exceptional preservation demonstrates a new mode of axial skeleton elongation in early ray-finned fishes. *Nature Communications*, 4, 2570. <https://doi.org/10.1038/ncomms357010.1038/ncomms3570>
- Maxwell, E. E., Romano, C., Wu, F., & Furrer, H. (2015). Two new species of *Saurichthys* (Actinopterygii: Saurichthyidae) from the Middle Triassic of Monte San Giorgio, Switzerland, with implications for character evolution in the genus. *Zoological Journal of the Linnean Society*, 173, 887–912. <https://doi.org/10.1111/zoj.12224>
- Miedema, F., Bindellini, G., Dal Sasso, C., Scheyer, T. M., & Maxwell, E. E. (2023a). Ontogenetic variation in the cranium of *Mixosaurus cornalianus*, with implications for the evolution of ichthyosaurian cranial development. *Swiss Journal of Palaeontology*, 142, 1–23. <https://doi.org/10.1186/s13358-023-00289-z>
- Miedema, F., Klein, N., Blackburn, D. G., Sander, P. M., Maxwell, E. E., Griebeler, E. M., & Scheyer, T. M. (2023b). Heads or tails first? Evolution of fetal orientation in ichthyosaurs, with a scrutiny of the prevailing hypothesis. *BMC Ecology and Evolution*, 23(12), 1–13. <https://doi.org/10.1186/s12862-023-02110-4>
- Miedema, F., Spiekman, S. N. F., Fernandez, V., Reumer, J. W. F., & Scheyer, T. M. (2020). Cranial morphology of the tanystropheid *Macrocnemus bassanii* unveiled using synchrotron microtomography. *Scientific Reports*, 10(1), 12412. <https://doi.org/10.1038/s41598-020-68912-4>
- Montagna, M., Haug, J. T., Strada, L., Haug, C., Felber, M., & Tintori, A. (2017). Central nervous system and muscular bundles preserved in a 240 million year old giant bristletail (Archaeognatha: Machilidae). *Scientific Reports*, 7(46016), 1–9. <https://doi.org/10.1038/srep46016>
- Montagna, M., Magoga, G., & Magnani, F. (2024). The Middle Triassic palaeontofauna of Monte San Giorgio with the description of *Merithone laetitiae* (Permithonidae), gen. et sp. nov. *Swiss Journal of Palaeontology*, 144, 17. <https://doi.org/10.1186/s13358-024-00317-6>
- Montagna, M., Strada, L., Dioli, P., & Tintori, A. (2018). The Middle Triassic Lagerstätte of Monte San Giorgio reveals the oldest lace bugs (Hemiptera: Tingidae): *Archetingis ladinica* gen. n. sp. n. *Rivista Italiana Di Paleontologia e Stratigrafia*, 124, 35–44.
- Montagna, M., Tong, K. J., Magoga, G., Strada, L., Tintori, A., Ho, S. Y., & Lo, N. (2019). Recalibration of the insect evolutionary time scale using Monte San Giorgio fossils suggests survival of key lineages through the End-Permian Extinction. *Proceedings of the Royal Society B*, 286(1912), 20191854. <https://doi.org/10.1098/rspb.2019.1854>
- Müller, J. (2005). The anatomy of *Askeptosaurus italicus* from the Middle Triassic of Monte San Giorgio and the interrelationships of thalattosaurs (Reptilia, Diapsida). *Canadian Journal of Earth Sciences*, 42, 1347–1367.
- Mutter, R. J. (1998). Zur systematischen Stellung einiger Bezahnungsreste von *Acrodus georgii* sp. nov. (Selachii, Hybodontoidae) aus der Grenzbitumenzone (Mittlere Trias) des Monte San Giorgio (Kanton Tessin, Schweiz). *Eclogae Geologicae Helveticae*, 91, 513–519.
- Mutter, R. J. (2004). The “perleidiform” family Colobodontidae: A review. *Mesozoic Fishes*, 3, 197–208.
- Mutter, R. J., & Herzog, A. (2004). A new genus of Triassic actinopterygian with an evaluation of deepened flank scales in fusiform fossil fishes. *Journal of Vertebrate Paleontology*, 24, 794–801.
- Neenan, J., Li, C., Rieppel, O., Bernardini, F., Tuniz, C., Muscio, G., & Scheyer, T. M. (2014). Unique method of tooth replacement in durophagous placodont marine reptiles, with new data on the dentition of Chinese taxa. *Journal of Anatomy*, 224, 603–613. <https://doi.org/10.1111/joa.12162>
- Nopcsa, F. B. (1925). *Askeptosaurus*, ein neues Reptil der Trias von Besano. *Zentralblatt Für Mineralogie Stuttgart Abt B*, 8, 265–267.
- Nosotti, S. (2007). *Tanystropheus longobardicus* (Reptilia, Protosauria): Reinterpretations of the anatomy based on new specimens from the Middle Triassic of Besano (Lombardy, northern Italy). *Memorie Della Società Italiana Di Scienze Naturali e Del Museo Civico Di Storia Naturale Di Milano*, 35, 1–88.
- Nosotti, S., & Rieppel, O. (2003). *Eusauropsphargis dalsassoii* n. gen. n. sp., a new, unusual diapsid reptile from the Middle Triassic of Besano (Lombardy, N Italy). *Memorie Società Italiana Scienze Naturali*, 16, 1–33.
- Nowak, H., Schneebeil-Hermann, E., & Kustatscher, E. (2019). No mass extinction for land plants at the Permian-Triassic transition. *Nature Communications*, 10(384), 1–8. <https://doi.org/10.1038/s41467-018-07945-w>
- Pardo-Pérez, J. M., Kear, B. P., & Maxwell, E. E. (2020). Skeletal pathologies track body plan evolution in ichthyosaurs. *Scientific Reports*, 10(1), 1–7.
- Payne, J. L., & Clapham, M. E. (2012). End-Permian mass extinction in the oceans: an ancient analog for the twenty-first century? *Annual Reviews Earth and Planet Sciences*, 40, 89–111. <https://doi.org/10.1146/annurev-earth-042711-105329>

- Peyer, B. (1927). Demonstration von Wirbeltierresten aus der Trias von Meride. *Eclogae Geologicae Helveticae*, 20(2), 312.
- Peyer, B. (1930). *Tanystropheus longobardicus* Bass. sp.: Vorläufige Mitteilung. *Centralblatt Für Mineralogie, Geologie und Paläontologie Abt. B*, 1930, 336–337.
- Peyer, B. (1931a). Die Triasfauna der Tessiner Kalkalpen. I. Einleitung. *Schweizerische Paläontologische Abhandlungen*, 50, 1–5.
- Peyer, B. (1931b). Die Triasfauna der Tessiner Kalkalpen. II. *Tanystropheus longobardicus* Bass. sp. *Schweizerische Paläontologische Abhandlungen*, 50, 7–110.
- Peyer, B. (1931c). Die Triasfauna der Tessiner Kalkalpen. III. Placodontia. *Schweizerische Paläontologische Abhandlungen*, 51, 1–25.
- Peyer, B. (1931d). Die Triasfauna der Tessiner Kalkalpen. IV. Peyer, B. 1931. *Ceresiosaurus calcagnii* nov. gen. nov. spec. *Schweizerische Paläontologische Abhandlungen*, 62, 1–87.
- Peyer, B. (1931e). *Paraplacodus broilii* nov. gen. nov. sp., ein neuer Placodontier aus der Tessiner Trias: Vorläufige Mitteilung. *Centralblatt Für Mineralogie und Paläontologie*, B, 1931, 570–573.
- Peyer, B. (1932). Die Triasfauna der Tessiner Kalkalpen. V. *Pachypleurosaurus edwardsii* Corn. spec. *Schweizerische Paläontologische Abhandlungen*, 52, 1–18.
- Peyer, B. (1934). Die Triasfauna der Tessiner Kalkalpen. VII. Neubeschreibung der Saurier von Perledo. *Schweizerische Paläontologische Abhandlungen*, 53–54, 1–130.
- Peyer, B. (1935). Die Triasfauna der Tessiner Kalkalpen. VIII. Weitere Placodontierfunde. *Schweizerische Paläontologische Abhandlungen*, 55, 1–26.
- Peyer, B. (1936a). Die Triasfauna der Tessiner Kalkalpen. X. *Clarazia schinzi* nov. gen. nov. spec. *Schweizerische Paläontologische Abhandlungen*, 57, 1–61.
- Peyer, B. (1936b). Die Triasfauna der Tessiner Kalkalpen. XI. *Heschleria ruebli* nov. gen. nov. spec. *Schweizerische Paläontologische Abhandlungen*, 58, 1–48.
- Peyer, B. (1944). Die Reptilien vom Monte San Giorgio. *Neujahrsblatt der Naturforschenden Gesellschaft Zürich*, 146, 1–95.
- Pieron, V. (2022). Middle Triassic Nautilida from the Besano Formation of Monte San Giorgio, Switzerland. *Swiss Journal of Palaeontology*, 141(21), 1–12. <https://doi.org/10.1186/s13358-022-00263-1>
- Pieron, V. (2023). The first Cyclida from the Triassic of Italy. *Swiss Journal of Palaeontology*, 143(9), 1–8. <https://doi.org/10.1186/s13358-024-00306-9>
- Pinna, G. (1992). *Cyamodus hildegardis* Peyer, 1931 (Reptilia, Placodontia). *Memorie Della Societa Italiana Di Scienze Naturali e Del Museo Civico Di Storia Naturale Di Milano*, 26, 2–21.
- Pohle, A., & Klug, C. (2024). Orthoceratoid and coleoid cephalopods from the Middle Triassic of Switzerland with an updated taxonomic framework for Triassic Orthoceratoidea. *Swiss Journal of Palaeontology*, 143(14), 1–32. <https://doi.org/10.1186/s13358-024-00307-8>
- Renesto, S. (1993). A juvenile *Lariosaurus* (Reptilia, Sauropterygia) from the Kalkschieferzone (Uppermost Ladinian) near Viggiu (Varese, Northern Italy). *Rivista Italiana Di Paleontologia e Stratigrafia*, 99, 199–212.
- Renesto, S. (2005). A new specimen of *Tanystropheus* (Reptilia Protosauria) from the Middle Triassic of Switzerland and the ecology of the genus. *Rivista Italiana Di Paleontologia e Stratigrafia*, 11, 377–379.
- Renesto, S., & Avanzini, M. (2002). Skin remains in a juvenile *Macrocnemus bassanii* Nopcsa (Reptilia, Procolacertiformes) from the Middle Triassic of northern Italy. *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 224, 31–48.
- Renesto, S., Dal Sasso, C., Fogliazza, F., & Ragni, C. (2020). New findings reveal that the Middle Triassic ichthyosaur *Mixosaurus cornalianus* is the oldest amniote with a dorsal fin. *Acta Palaeontologica Polonica*, 65, 511–522. <https://doi.org/10.4202/app.00731.2020>
- Renesto, S., Magnani, F., & Stockar, R. (2021a). A new species of *Saurichthys* (Actinopterygii: Saurichthyidae) from the Middle Triassic of Monte San Giorgio. *Rivista Italiana Di Paleontologia e Stratigrafia*, 127(1), 33–55. <https://doi.org/10.13130/2039-4942/15143>
- Renesto, S., Magnani, F., & Stockar, R. (2021b). A new coelacanth specimen with elongate ribs from the Middle Triassic (Ladinian) Kalkschieferzone of Monte San Giorgio (Canton Ticino, Switzerland). *Rivista Italiana Di Paleontologia e Stratigrafia*, 127(3), 689–700. <https://doi.org/10.13130/2039-4942/16731>
- Renesto, S., & Stockar, R. (2018). First record of a coelacanth fish from the Middle Triassic Meride Limestone of Monte San Giorgio (Canton Ticino, Switzerland). *Rivista Italiana Di Paleontologia e Stratigrafia*, 124, 639–653.
- Rieber, H. (1965). Zur Wirbellosen-Fauna der Grenzbitumenzone der mittleren Trias des Monte San Giorgio (Kt. Tessin, Schweiz). *Eclogae Geologicae Helveticae*, 58, 1083–1092.
- Rieber, H. (1968). Die Artengruppe der *Daonella elongata* MOJS. aus der Grenzbitumenzone der mittleren Trias des Monte San Giorgio (Kt. Tessin, Schweiz). *Paläontologische Zeitschrift*, 42, 33–61.
- Rieber, H. (1969). Daonellen aus der Grenzbitumenzone der mittleren Trias des Monte San Giorgio (Kt. Tessin, Schweiz). *Eclogae Geologicae Helveticae*, 62(2), 657–683.
- Rieber, H. (1973a). Cephalopoden aus der Grenzbitumenzone (Mittlere Trias) des Monte San Giorgio (Kanton Tessin, Schweiz). *Schweizerische Paläontologische Abhandlungen*, 93, 1–96.
- Rieber, H. (1973b). Ergebnisse paläontologisch-stratigraphischer Untersuchungen in der Grenzbitumenzone (Mittlere Trias) des Monte San Giorgio (Kanton Tessin, Schweiz). *Eclogae Geologicae Helveticae*, 66(3), 667–685.
- Rieppel, O. (1980). A new coelacanth from the Middle Triassic of Monte San Giorgio, Switzerland. *Eclogae Geologicae Helveticae*, 73, 921–939.
- Rieppel, O. (1981). The hyodontiform sharks from the Middle Triassic of Monte San Giorgio, Switzerland. *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 161(3), 324–353.
- Rieppel, O. (1982). A new genus of shark from the Middle Triassic of Monte San Giorgio, Switzerland. *Palaeontology*, 25(2), 399–412.
- Rieppel, O. (1985a). A second actinistian from the Middle Triassic of Monte San Giorgio, Kanton Tessin, Switzerland. *Eclogae Geologicae Helveticae*, 78(3), 707–713.
- Rieppel, O. (1985b). Die Triasfauna der Tessiner Kalkalpen XXV. Die Gattung *Saurichthys* (Pisces, Actinopterygii) aus der mittleren Trias des Monte San Giorgio, Kanton Tessin. *Schweizerische Paläontologische Abhandlungen*, 108, 1–103.
- Rieppel, O. (1987). *Clarazia* and *Heschleria*: A re-investigation of two problematical reptiles from the Middle Triassic of Monte San Giorgio (Switzerland). *Palaeontographica Abteilung A*, 195, 101–129.
- Rieppel, O. (1989). A new pachypleurosaur (Reptilia: Sauropterygia) from the Middle Triassic of Monte San Giorgio, Switzerland. *Philosophical Transactions of the Royal Society of London B*, 323, 1–73.
- Rieppel, O. (1992). A new species of the genus *Saurichthys* (Pisces: Actinopterygii) from the Middle Triassic of Monte San Giorgio (Switzerland), with comments on the phylogenetic interrelationships of the genus. *Palaeontographica A*, 221, 63–94.
- Rieppel, O. (1994). *Lariosaurus balsami* Curioni (Reptilia, Sauropterygia) aus den Gailtaler Alpen. *Carinthia II*, 184, 345–356.
- Rieppel, O. (2019). *Mesozoic Sea Dragons: Triassic Marine Life from the Ancient Tropical Lagoon of Monte San Giorgio (Life of the Past)* (p. 256). Indiana University Press.
- Rieppel, O., Müller, J., & Liu, J. (2005). Rostral structure in Thalattosauria (Reptilia, Diapsida). *Canadian Journal of Earth Sciences*, 42, 2081–2086.
- Romano, C., & Brinkmann, W. (2009). Reappraisal of the lower actinopterygian *Birgeria stensioei* Aldinger, 1931 (Osteichthyes; Birgeriidae) from the Middle Triassic of Monte San Giorgio (Switzerland) and Besano (Italy). *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 252, 17–31.
- Romano, C., Koot, M. B., Kogan, I., Brayard, A., Minikh, A. V., Brinkmann, W., Bucher, H., & Kriwet, J. (2016). Permian-Triassic Osteichthyes (bony fishes): Diversity dynamics and body size evolution. *Biological Reviews*, 91, 106–147.
- Sander, P. M. (1988). A fossil reptile embryo from the Middle Triassic of the Alps. *Science*, 239, 780–783.
- Sander, P. M. (1989a). The pachypleurosaurids (Reptilia: Nothosauria) from the Middle Triassic of Monte San Giorgio (Switzerland) with the description of a new species. *Philosophical Transactions of the Royal Society of London B*, 325, 561–666.
- Sander, P. M. (1989b). The large ichthyosaur *Cymbospondylus buchseri*, sp. nov., from the Middle Triassic of Monte San Giorgio (Switzerland), with a survey of the genus in Europe. *Journal of Vertebrate Paleontology*, 9, 163–173.
- Scheyer, T. M. (2010). New interpretation of the postcranial skeleton and overall body shape of the placodont *Cyamodus hildegardis* Peyer, 1931 (Reptilia, Sauropterygia). *Palaeontologia Electronica*, 13(2), 15A, 1–16.
- Scheyer, T. M., & Desojo, J. B. (2011). Palaeohistology and external microanatomy of raiusuchian osteoderms (Archosauria: Pseudosuchia). *Palaeontology*, 54, 1289–1302.

- Scheyer, T. M., Neenan, J. M., Bodogan, T., Furrer, H., Obrist, C., & Plamondon, M. (2017). A new, exceptionally preserved juvenile specimen of *Eusaurophargis dalsassoi* (Diapsida) and implications for Mesozoic marine diapsid phylogeny. *Scientific Reports*, 7(4406), 1–22. <https://doi.org/10.1038/s41598-017-04514-x>
- Scheyer, T. M., Romano, C., Jenks, J., & Bucher, H. (2014a). Early Triassic marine biotic recovery: The predators' perspective. *PLoS ONE*, 9(e88987), 1–20. <https://doi.org/10.1371/journal.pone.0088987>
- Scheyer, T. M., Schmid, L., Furrer, H., & Sánchez-Villagra, M. R. (2014b). An assessment of age determination in fossil fish: The case of the opercula in the Mesozoic actinopterygian *Saurichthys*. *Swiss Journal of Palaeontology*, 133, 243–257.
- Schwarz, W. (1970). Die Triasfauna der Tessiner Kalkalpen. XX. Birgeria Stensioi ALDINGER. *Schweizerische Paläontologische Abhandlungen*, 89, 1–93.
- Sordelli, F. (1879). Sulle piante fossili recentemente scoperte a Besano nel circondario di Varese. *Atti Della Società Italiana Di Scienze Naturali e Del Museo Civico Di Storia Naturale Milano*, 22, 81–94.
- Spiekman, S. N. F., Ezcurra, M. D., Rytel, A., Wang, W., Mujal, E., Buchwitz, M., & Schoch, R. R. (2024). A redescription of *Trachelosaurus fischeri* from the Buntsandstein (Middle Triassic) of Bernburg, Germany: The first European Dinocephalosaur-like marine reptile and its systematic implications for long-necked early archosauromorphs. *Swiss Journal of Palaeontology*, 143(10), 1–33. <https://doi.org/10.1186/s13358-024-00309-6>
- Spiekman, S. N. F., Fraser, N. C., & Scheyer, T. M. (2021). A new phylogenetic hypothesis of Tanystropheidae (Diapsida, Archosauromorpha) and other "protosaurs", and its implications for the early evolution of stem archosaurs. *PeerJ*, 9, 1–174. <https://doi.org/10.7717/peerj.11143>
- Spiekman, S. N. F., & Mujal, E. (2023). Decapitation in the long-necked reptile *Tanystropheus* (Archosauromorpha, Tanystropheidae). *Current Biology*, 33, R699–R709. <https://doi.org/10.1016/j.cub.2023.04.027>
- Spiekman, S. N. F., Neenan, J. M., Fraser, N. C., Fernandez, V., Rieppel, O., Nosotti, S., & Scheyer, T. M. (2020a). Aquatic habits and niche partitioning in the extraordinarily long-necked Triassic reptile *Tanystropheus*. *Current Biology*, 30, 1–7. <https://doi.org/10.1016/j.cub.2020.07.025>
- Spiekman, S. N. F., Neenan, J. M., Fraser, N., Fernandez, V., Rieppel, O., Nosotti, S., & Scheyer, T. M. (2020b). The cranial morphology of *Tanystropheus hydroides* (Tanystropheidae, Archosauromorpha) as revealed by synchrotron microtomography. *PeerJ*, 8, e10299, 1–e103076. <https://doi.org/10.7717/peerj.10299>
- Stockar, R. (2010). Facies, depositional environment, and palaeoecology of the Middle Triassic Cassina beds (Meride Limestone, Monte San Giorgio, Switzerland). *Swiss Journal of Geosciences*, 103, 101–119. <https://doi.org/10.1007/s00015-010-0008-2>
- Stockar, R., Adatte, T., Baumgartner, P. O., & Föllmi, K. B. (2013). Palaeoenvironmental significance of organic facies and stable isotope signatures: The Ladinian San Giorgio Dolomite and Meride Limestone of Monte San Giorgio (Switzerland, WHL UNESCO). *Sedimentology*, 60, 239–269.
- Stockar, R., Baumgartner, P. O., & Condon, D. (2012a). Integrated Ladinian bio-chronostratigraphy and geochronology of Monte San Giorgio (Southern Alps, Switzerland). *Swiss Journal of Geosciences*, 105, 85–108.
- Stockar, R., Dumitrica, P., & Baumgartner, P. O. (2012b). Early Ladinian radiolarian fauna from the Monte San Giorgio (southern Alps, Switzerland): Systematics, biostratigraphy and paleo (bio) geographic implications. *Rivista Italiana Di Paleontologia e Stratigrafia*, 118, 375–437. <https://doi.org/10.13130/2039-4942/6012>
- Stockar, R., & Garassino, A. (2013). *Meridecaris ladinica* n. gen. n. sp. (Crustacea, Decapoda, Clytiopsidae) from the Middle Triassic (Ladinian) of Monte San Giorgio (Canton Ticino, Switzerland). *Neues Jahrbuch Für Geologie und Paläontologie, Abhandlungen*, 270, 347–356.
- Stockar, R., & Kustatscher, E. (2010). The Ladinian flora from the Cassina beds (Meride Limestone, Monte San Giorgio, Switzerland): Preliminary results. *Rivista Italiana Di Paleontologia e Stratigrafia*, 116, 173–188.
- Stockar, R., & Renesto, S. (2011). Co-occurrence of *Neusticosaurus edwardsii* and *N. peyeri* (Reptilia) in the lower Meride limestone (Middle Triassic, Monte San Giorgio). *Swiss Journal of Geosciences*, 104, 167–178.
- Stoppani, A., & Bellotti, C. (1857). *Studii geologici e paleontologici sulla Lombardia & colla descrizione di alcune nuove specie di pesci fossili di Perledo e di altre località lombarde. Studii di Cristoforo Bellotti* (Turati, p. 461)
- Strada, L. (2015). The Triassic Insects from Monte San Giorgio: Systematics and Palaeoenvironmental Implications. *PhD thesis, Scienze Naturalistiche ed Ambientali. Milano, Università degli Studi di Milano* (p. 84 + appendix)
- Strada, L., Montagna, M., & Tintori, A. (2014). A new genus and species of the family Trachypachidae (Coleoptera, Adephaga) from the upper Ladinian (Middle Triassic) of Monte San Giorgio. *Rivista Italiana Di Paleontologia e Stratigrafia*, 120, 183–190.
- Sues, H.-D. (2024). Bernhard Peyer and his discoveries of Triassic vertebrates in Switzerland. *Swiss Journal of Palaeontology*, 143(8), 1–6. <https://doi.org/10.1186/s13358-024-00310-z>
- Tintori, A., & Lombardo, C. (2007). A new early Semionotidae (Semionotiformes, Actinopterygii) from the Upper Ladinian of Monte San Giorgio area (Southern Switzerland and Northern Italy). *Rivista Italiana Di Paleontologia e Stratigrafia*, 113, 369–381.
- Viaretti, M., Bindellini, G., & Dal Sasso, C. (2023). A new Mesozoic scorpion from the Besano Formation (Middle Triassic, Monte San Giorgio UNESCO WHL), Italy. *Paläontologische Zeitschrift*, 97, 505–517.
- Villier, L., & Korn, D. (2004). Morphological disparity of ammonoids and the mark of Permian mass extinctions. *Science*, 306(5694), 264–266. <https://doi.org/10.1126/science.1102127>
- Wild, R. (1973). Die Triasfauna der Tessiner Kalkalpen. XXIII. *Tanystropheus longobardicus* (Bassani). *Schweizerische Paläontologische Abhandlungen*, 95, 1–162.
- Wild, R. (1980). Die Triasfauna der Tessiner Kalkalpen. XXIV. Neue Funde von *Tanystropheus* (Reptilia, Squamata). *Schweizerische Paläontologische Abhandlungen*, 102, 1–43.
- Wirz, A. (1945). Die Triasfauna der Tessiner Kalkalpen. XV. Beiträge zur Kenntnis des Ladinikums im Gebiete des Monte San Giorgio. *Schweizerische Paläontologische Abhandlungen*, 65, 1–4.
- World Heritage Committee (2003, 2010). *Nomination file 1090bis*. Unesco World Heritage Convention. <https://whc.unesco.org/en/list/1090>. Accessed 10 July 2024

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