Restoring the paleontological collection of Georg Gasser (1857–1931)

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ABSTRACT

The Museum of Nature South Tyrol hosts the paleontological collection of Georg Gasser, a self-taught naturalist, who assembled the most important historical collection of natural objects of the region. Born in Rentsch, Gasser started his collection probably in 1890, creating the typical "Wunderkammer". His exhibition contained botanical, zoological, archeological, mineralogical and paleontological specimens. When Gasser died, part of his collection was purchased by the Mineralogical Institute of the University of Padova, whereas some specimens were sold privately. The remaining part of his legacy was donated by the heirs to form a natural history museum in Bolzano and became the foundation of the Museum of Nature South Tyrol. Thanks to a research project, the Gasser paleontological collection has been given back its former glory, has been digitized using modern techniques and a taxonomical revision is also in progress. The purpose of the research project was to characterize the collection in terms of the number of specimens and species present as well as to understand its stratigraphic and geographical provenance. Composed of paleozoological and paleobotanical objects, the historical collection has the potential to give insights in the scientific memory of the collecting areas during the 18th and 19th centuries. Some of the areas that were sampled during those times may no longer be available due to constructions and/or changes in the natural or human-based landscape.

KEY WORDS

Historical collection, plant fossils, invertebrates, vertebrates, Central Europe

INTRODUCTION

Humanity, during its history, has maintained an attitude of curiosity, discovery and knowledge towards the natural world, developing through time a detached point of view, acting as an external observer. Across time and space, so many questions have followed in people's minds, observing the surrounding nature and its phenomena. Collecting represents one of the expressions of the relationship between humans and the natural world. The collections, over time, have been the manifestation of the human will to observe, describe, understand nature and, at the same time, dominate it (Olmi, 1992). In fact, in the action of collecting there is an intrinsic idea of control upon reality and the ancestral will to overcome death, surviving through the things that become material legacy. The natural object, with its original identity, within the collection acquires a new meaning, interweaving its history with that of the individual who collected, preserved, studied and transmitted it through time (Pomian, 1987).

An example of "machine created to understand and dominate reality" (Olmi, 1992) are certainly the *Wunderkammer*. The word *Wunderkammer* refers in a generic sense to any type of European encyclopedic collection that was established between the late 15th and 18th centuries. Different in composition and purpose, they share the fact that they were made up of objects belonging to different categories. They were essentially microworlds, a synthesis of the experienced universe, in which two essential components appeared: nature and art (Lugli, 1990). In the great phenomenon of the *Wunderkammer*, the *Schatzkammer* (treasure chamber) represents the expression of power of wealthy families and rulers: an instrument to celebrate the greatness of one's family and arouse wonder among the few lucky visitors (e.g. Cipriani, 2006; Merzagora & Rodari, 2007).

Keeping the idea of inspiring astonishment and feeding curiosity, with the spread of "scientific cabinets", we witness, with different examples also in Italy, the creation of collections where the objects started, also, to be studied to understand the world around (e.g. Cipriani, 2006). Collections progressively became a place of meetings, discussions, exchange of ideas, a physical place in which the social construction of knowledge took place (Ciancio, 2018). In the 18th century the first great scientific museums began to appear, and then progressively started to be opened to public. This opening of the collections to an ever-wider audience underlined their function for the collective growth of knowledge (e.g. Grote, 1994; Pomian, 1994; Merzagora & Rodari, 2007). Especially also in the German-speaking areas, there is an additional aspect to be considered, when we speak about collections: the *"Streben nach Vollständigkeit"* [striving for completeness] and the *„Haben-Wollen"* [establish/build a collection (purely) for the sake of owning it]. In this case the ultimate goal does not see the collection to be exposed to the public but rather for the collector himself (see also, Kuhn, 1994; Bellwald, 2008).

During the period of Enlightenment, museums acquired a new organization. They would reflect the new order given by the systematic classification of Linnaeus (e.g. Cipriani, 2006; Merzagora & Rodari, 2007), although the fascination for the

bizarre and the marvelous did not disappear. Particularly in amateur collections both approaches still coexisted in the 19th century, which was considered the age of wonder regarding scientific progress (Merzagora & Rodari, 2007). And now, why do we study historical collections?

The current value of historical collections, including the paleontological field, is given by the complementary function they play together with new collections, produced by today's scientific research campaigns. Although they often suffer limitations caused by loss of information through time, historical collections maintain the role of useful teaching tools, both to understand the evolution of scientific thought and to transmit indications on aspects related to the specimens that compose them. In addition, in some cases, they play the role of valuable data sources in case the original sites disappeared or are no longer accessible for scientific research. Moreover, from a historical point of view, the collections can be used as storytelling instruments concerning the people who made them, their cultural environment or a particular time.

The aim of this article is to describe the research project and how it has been carried out including a detailed description of the methods that have been applied to the collection and Georg Gasser as a collector of fossil.

THE COLLECTOR GEORG GASSER (1857–1931)

Georg Gasser (Fig. 1), born in Rentsch near Bozen/Bolzano in 1857, completed his studies at the Franziskaner High School and attended the Academy of Arts in Munich (1878–1885). Despite pursuing a career as an artist in his early years (he mostly painted religious subjects for churches, still lifes, and portraits), Gasser had also a passion for natural history. At the turn of the 19th and 20th centuries, the self-taught naturalist compiled one of the most extensive collections of minerals, fossils and botanical and zoological specimens so far seen in Tyrol (Wagensommer et al., this volume a). What survives of his vast collection is today stored in the Museum of Nature South Tyrol in Bozen/Bolzano and at the University of Padova.

Gasser opened a private museum in his home in Bozen/Bolzano in 1892 (Fig. 2). Here he filled three large rooms with thousands of zoological, mineralogical, paleontological, archaeological and ethnographic specimens, creating an eclectic exposition reminiscent of the *Wunderkammer* or cabinets of curiosities that continued to be popular during the 19th century (Gasser & Baumgarten, 2007a). Historical photographs still convey an idea of his vast interests. Stuffed birds, mammals and reptiles are shown alongside mounted animal skeletons, exotic seashells, corals, minerals, fossils, archaeological objects spanning all ages from prehistory to Roman times, an ethnographical section with objects from indigenous cultures from different continents, and a historical coin collection. Most important was his mineralogical collection. Gasser spent much of his life in the attempt to systematically collect minerals of all kinds, with a keen focus on his native Alpine region of Tyrol. At Gasser's death, his collection included more than 11.000 mineral specimens, many of them rare or unique (Guastoni & Ardit, 2007).

Already while exposed in his private house, Gasser's collection gained a wide notoriety, to the point that it was cited in tourist guides as one of the main attractions to be seen in Bozen/Bolzano. In 1904 the Town Council offered Gasser to move his collections to a newly built public museum. Gasser himself became the curator of the nature history section of the museum (Gasser & Baumgarten, 2007b). At this point, it seemed that Gasser's much estimated collection had been saved for future generations through permanent storage in a public institution. But things changed dramatically after WWI and the rise of fascism in Italy. After South Tyrol had come under Italian rule, the fascist government put its own cultural policies into effect in Bolzano. During the 1920s and 1930s, the museum expositions were reorganized according to new guidelines, and in 1931 the Gasser collection was expelled from the museum because it was considered not useful for the new didactic and cultural programs. Gasser did not survive this decision. Hit by a stroke the same day he was notified of this decision, he died a few days later (Gasser & Baumgarten, 2007c).

For his collection, it was the beginning of an odyssey. Gasser was primarily known as a mineralogist. Besides collecting minerals, he also published popular articles and a book on this topic of the Tyrolean area (mainly mineralotopography); especially his book was highly appraised at the time (Gasser, 1913). Therefore, it is not surprising that the scientific community in Italy was primarily interested in saving his mineralogical collection from dispersion. About 2500 among his best mineral specimens, almost one quarter of the whole collection, were acquired by the University of Padova, where they are stored still

FIG. 1: Portrait of Georg Gasser

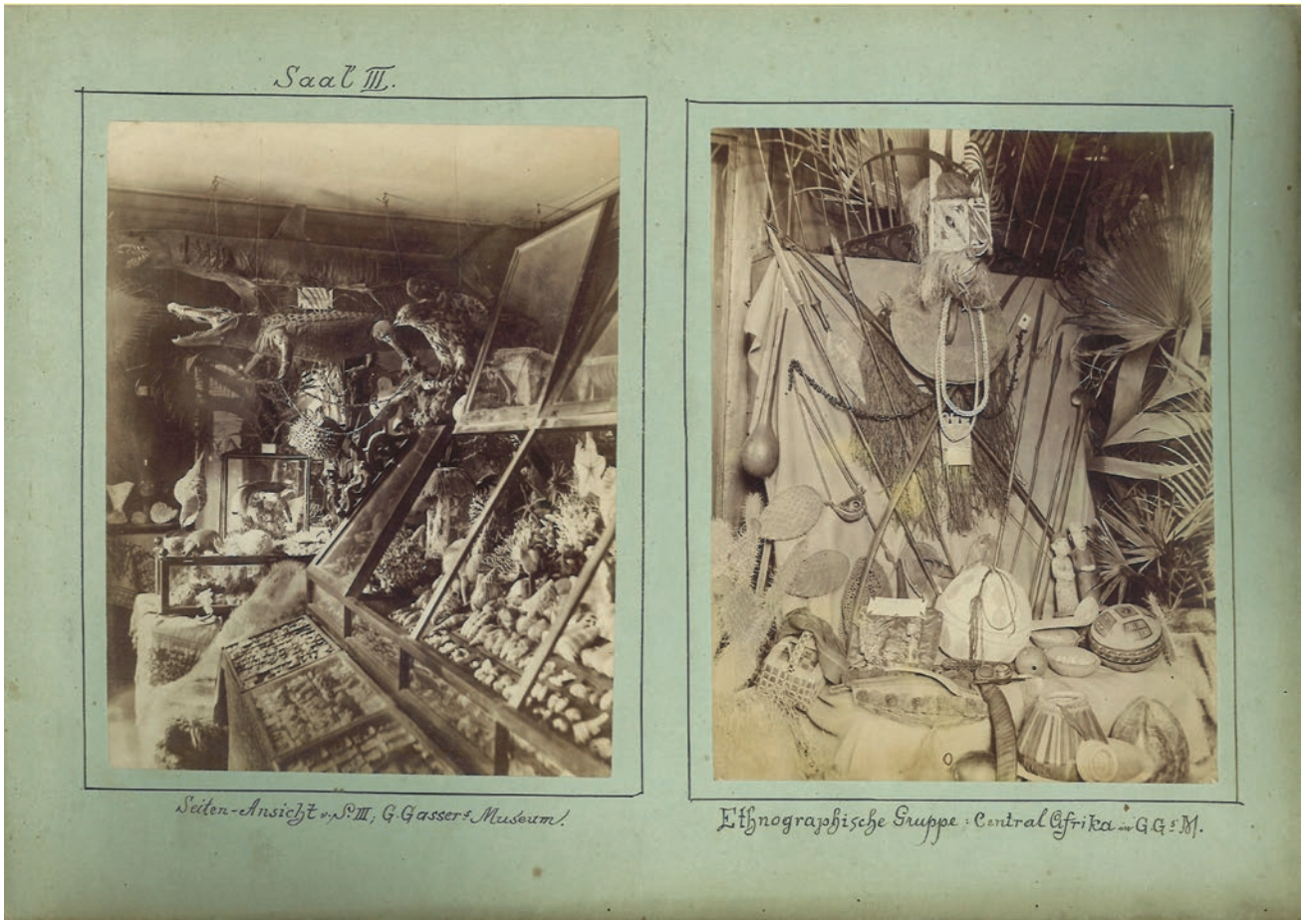

FIG. 2: Two archive photographs showing a general overview of one of the collection rooms (left) and the ethnographic collection (right) in the museum of Georg Gasser.

today. The remaining three quarters of Gasser's mineral collection however, and all the rest of his rich collections, remained in the hands of his heirs. Most of the more delicate specimens, like the complete entomological collection (Fig. 2), were lost due to a lack of care, whereas many of the most valuable specimens were sold and dispersed. What remained was finally donated by Gasser's heirs to the Province of Bozen/Bolzano in 1972. This donation actually created a basis for the establishment of the Museum of Nature South Tyrol some 20 years later, in 1992.

THE RESEARCH PROJECT

The mineral collection of Georg Gasser always received much attention (Gasser & Baumgarten, 2007d), but only in recent years the Museum of Nature South Tyrol started a project aimed at clarifying the role of his paleontological collection with the support of the research funds of the Betrieb Landesmuseen. The research project started on 01.08.2019 and ended on 31.12.2022 after an extension of one year due to the problems related to the Covid-19 pandemic crisis.
The main research questions the project was intended to answer were the following: How important were fossils for Georg Gasser, who loved to define himself as a "Naturhistoriker", that is an expert of natural history? How did he get his specimens, given that he rarely travelled away from his native town? Did he follow any purpose in choosing the fossils he bought (or got through exchange with other collectors), or did he just randomly gather any specimens he could get? Did he attempt a systematic collection of the fossils that can be found in Tyrol, like he did with the minerals? Were there any taxonomic groups or geological periods that attracted his attention more than others?
In order to answer these questions, the project was divided into two parallel research lines. The historical one focused on Georg Gasser as a collector and as a curator of fossils (Wagensommer et al., this volume a, b; Wagensommer, this volume a, b). This was carried out mainly by analyzing the collection of documents in the legacy of Georg Gasser, which include his personal notes and manuscripts, letters and address books, as well as the books in his library. The paleontological research line was based on the collection itself (Tomelleri et al., this volume a, b, c; Wagensommer et al., this volume c; Baucon et al., this volume).

THE RESTORATION OF THE COLLECTION

One main focus of the project was the restoration of the paleontological collection. After the death of Georg Gasser in 1931 the remains of his collection were moved around several times (see also Wagensommer et al., this volume a). In 1971, it was donated to the Province of Bozen/Bolzano and thereafter stored in the attic of the Franziskaner Gymnasium. In 1992, after the

FIG. 3: Archive picture of 2009 showing the curator Evelyn Kustatscher and Helmut Buratti, unpacking the old crates.

Museum of Nature South Tyrol was founded, the curator of geology Benno Baumgarten moved it to the museum, where it was stored in the cellar for several years. In 2009, with the help of Helmut Buratti (Fig. 3), the crates with the paleontological objects were opened and the old newspaper the specimens were wrapped in was removed, carefully checking them for old labels. The specimens were then newly wrapped into soft paper tissues and stored in new crates, divided into major groups of fossils (plants, animals, and, within the latter, bivalves, ammonites etc.). Afterwards, they were deposited in an external depot of the Museum of Nature South Tyrol. In 2019, with the start of the research project, the specimens were brought to the museum again.

Cleaning

The first step in the restauration process of the fossils was to clean them from dust and other remains, accumulated during the past century. This was carried out by using brushes and, when necessary, water. We preferred this choice, compared to other previously tested techniques, such as dry-cleaning (Del Favero et al., 2015), for the following reasons:

- the high number of specimens (about 4,000 inventoried objects in 3,502 numbers)
- the small size of the samples (in some cases mm-sized)
- the high fragility of some specimens (especially those of the Cenozoic)
- the almost total absence of specimens subjected to an historical consolidation treatment
- fossils sometimes glued on glass plates or wooden supports

Historical labels (Fig. 4) glued to the samples were protected during the cleaning treatment. A little brush was used to reach difficult surfaces when applying water to the objects. Historical labels were cleaned with soft tissues, trying to preserve the old writings on them, and stored in special plastic bags.

Inventary and digitalization

The museum has its own database where all fossils, minerals and biological objects are registered. Each sample of the paleontological collection Georg Gasser was assigned a collection number in case the specimens were big enough to be distinct and provided with a number. In this case the number has been applied to the less important surface of the specimen, such as for example the rock surface the fossil belongs to, using a transparent glue (removable). In case the object was a glass plate with several mm-sized fossils of the same species glued to its surface, the collection number was given to the entire glass plate (Fig. 5).

The database was filled with all information provided by the specimens and their labels. This includes old collection numbers applied by Georg Gasser and/or previous owners of the specimens. The labels provided a very heterogeneous amount of information (Figs. 6, 7). In some cases, the specimens were determined at species level, but also determinations of genus or major plant/animal group occur, sometimes even descriptive indications. In addition to the historical determinations of the fossils, modern revisions of the specimens were added to the database once specialists revised the material. The information on the localities existed at various levels of precision, from

FIG. 4: Front- (A) and backside (B) of a fish fossil from Monte Bolca, with historical and modern inventory number glued on the rock sample (PZO 13446).

FIG. 5: About 200 gastropods (*Paludina impura**) from the Cenozoic of Steinheim glued on a glass support (PZO 15011).

FIG. 6: Plant fossil (*Calamites*) with several historical labels glued to the front (A) and to the backside (B) of the specimen (PAL 3249); The label on the front side is for the general public, the one on the backside shows all the data about origin and age, as well as several numbers (old inventory numbers?).

FIG. 7: Plant fossil (*Lepidodendron*) with several labels glued to the front (A) and to the backside (B) of the specimen (PAL 3210); The label on the front side is for the general public showing name, origin and age, the one on the backside seems written by a different person and shows the historical number of Georg Gasser's inventory.

FIG. 8 (left): Original specimen with stem, stalk and historical label of *Encrinus liliiformis* (PZO 14269).
FIG. 9 (right): 3D Model of the *Encrinus liliiformis* crown (PZO 14269).

villages or mountains up to geographic areas or entire nations. In some cases, obsolete geopolitical units, such as for example Böhmen (Bohemia) and Schlesien (Silesia) were indicated. The chronostratigraphic assignment was generally restricted to period level, sometimes also only the era was indicated. Stratigraphic information was mainly provided for Tyrolian localities, in the historical sense. Information of former collectors or owners of the fossils are rare (see also Wagensommer et al., this volume a). Everything on the label(s) was transliterated and inserted in the database to preserve it for the future. In addition to the historical data, the specimens were measured and weighed to have unique records of the specimens that are easy to recall later.
Also a photographic documentation has been carried out. This included taking photographs of all specimens and their labels, as well as any important detail on the fossil or rock sample. In addition, 80 specimens were selected for 3D reproductions for science communication (Fig. 8, 9).

A taxonomic revision of the various fossils, also intended within the project, was only partially carried out. Due to the difficult and complicated pandemic situation linked to Covid-19, there have been limitations in the exchange of information with specialists. It was not possible for most specialists to arrange a visit at the Museum of Nature South Tyrol. Parts of the collection were nonetheless revised by Alexander Nützel and Baran Karapunar (gasteropods and some bivalves; Tomelleri et al., this volume b), Herwig Prinoth (some bivalves; Tomelleri et al., this volume b), Hans Hagdorn (Echinodermata; Tomelleri et al., this volume b), Alexander Lukeneder, Günter Schweigert and Helmuth Buratti (part of the ammonoids; Tomelleri et al., this volume c), Cristina Lombardo, Giorgio Carnevale and Silvio Renesto (vertebrates; Wagensommer et al., this volume c). The bioturbations were revised by Andrea Baucon (Baucon et al., this volume). The Carboniferous plants were revised by Christopher Cleal, Mesozoic plants by Evelyn Kustatscher and Cenozoic plants by Rainer Butzmann (Tomelleri et al., this volume a). For this reason, when specimens were not revised during the project, the historical identifications of Georg Gasser are used and indicated by an asterisk in the corresponding paper.

THE PALEONTOLOGICAL COLLECTION

Georg Gasser's paleontological collection, as preserved today, is composed of about 4000 fossil specimens, registered under 3502 inventory numbers. This does not correspond to the original collection. A cross-check with the historical catalogue shows that less than 1200 specimens were registered in Gasser's catalogue, which was compiled prior to 1900 and apparently not updated during the last years or even decades of Gasser's life. About 80% of the fossils are the remains of invertebrates, whereas vertebrate fossils amount to 10% and plant fossils to about another 10% of the collection. Originally, the samples were probably accompanied by historical labels, which recorded information about the source area and/or additional data relative to the ancient taxonomical or generic classification, the chronostratigraphy, the lithostratigraphy and short notes. Unfortunately, the many relocations that the collection suffered after Gasser's death have affected in some cases the preservation of the fossils and the presence and quality of the labels. All tags are handwritten, and sometimes this made them difficult to encipher and, combined with the bad conservation of the ink, creates a lack of data. Occasionally, when the labels were missing, a cross-check with the catalogue permitted to integrate those data, thanks to the presence of the original collection numbers.

The distribution of the specimens over taxonomic groups, time intervals or geographic areas does not allow to identify any area of interest that might have lead Gasser in building up the collection (Figs. 10, 11, 12). An interesting part of the collection are the specimens from the central and eastern Alpine region, which make up about one quarter of all specimens and focus mainly on the Triassic and Eocene. These are potentially important as documents of fossil localities that were accessible in the late 19th and early 20th centuries.

The remaining three quarters of the collection can be considered as didactic and were probably meant to give the average museum visitor of the early 20th century a broad overview of the main taxonomic groups represented in the fossil record, and how the faunal and floral assemblages changed through geological time. Many classical European fossil sites are represented, including Eocene fishes from Bolca, a variety of fossils from the Jurassic of Solnhofen, plant fossils from the Carboniferous of Central Europe, Cenozoic marine molluscs from France and Austria.

The presence of fossils from primarily Germany and secondly from northern Italy and Austria testifies that the collecting effort was guided both by the geographic proximity of these localities and by the accessibility of contacts, facilitated by the common German language. A glimpse on the network of relationships on which Gasser could rely to build up his collection is given by the addresses of other collectors and dealers preserved in his notebooks. Although rare, some labels give additional information about the date of collection or, exceptionally, on the collector. An interesting example in this sense is the specimen interpreted, on the label, as a vertebra of the fossil whale *Zeuglodon*, object of a donation by the prince of Salm-Salm (Wagensommer, this volume a).

Where it is present, the paper documentation shows the desire to organize the fossil record according to a systematic classification, with a scientific approach that takes into account the basic reference data for an analytical study, although sometimes only sketchy or primitive, such as the geographical framework, the chronostratigraphic location and the lithostratigraphic reference.

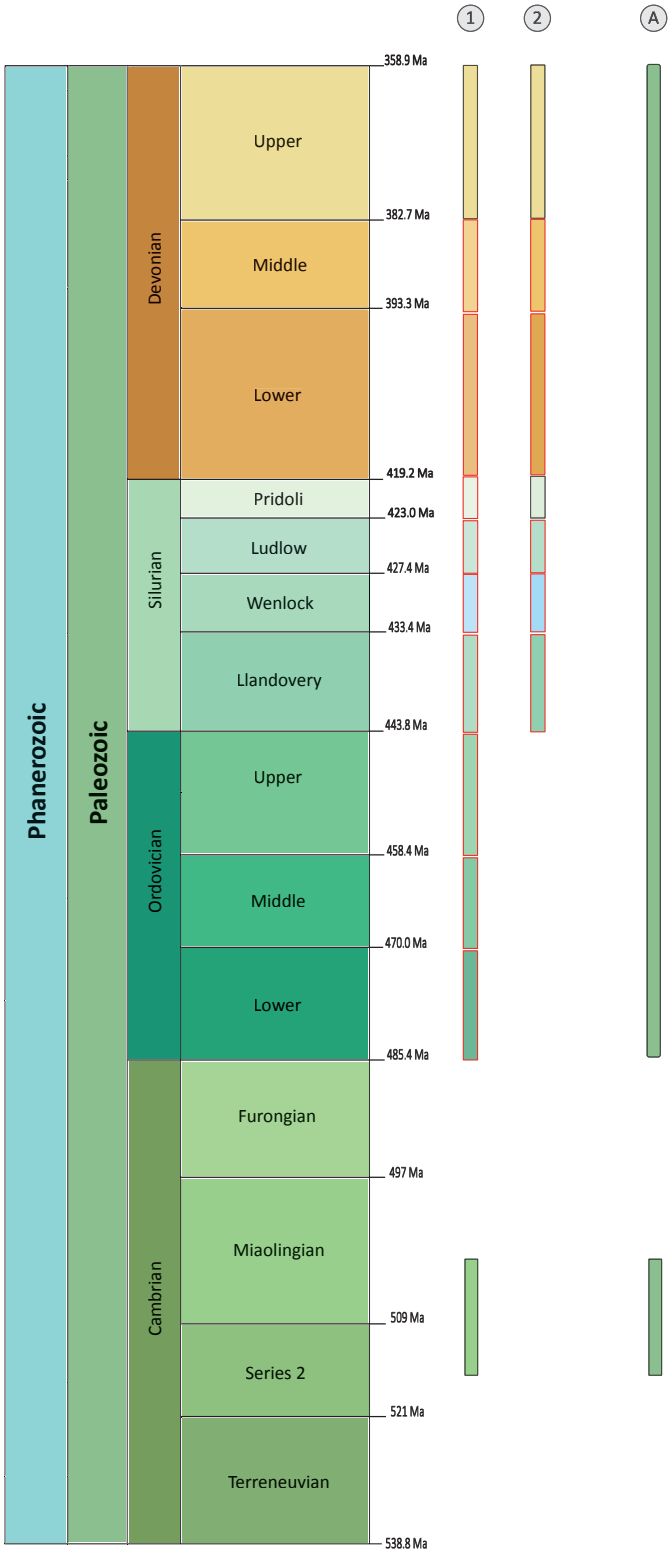

FIG. 10: Overview of the chronostratigraphic distribution of the main groups described: 1. Invertebrates; 2. Cephalopods; A. Synthesis of all groups, considering also the generic attribution at period level (ichnofossils, vertebrates and plants have no documentation). The red evidenced bars refer to the generic attribution at period level only.

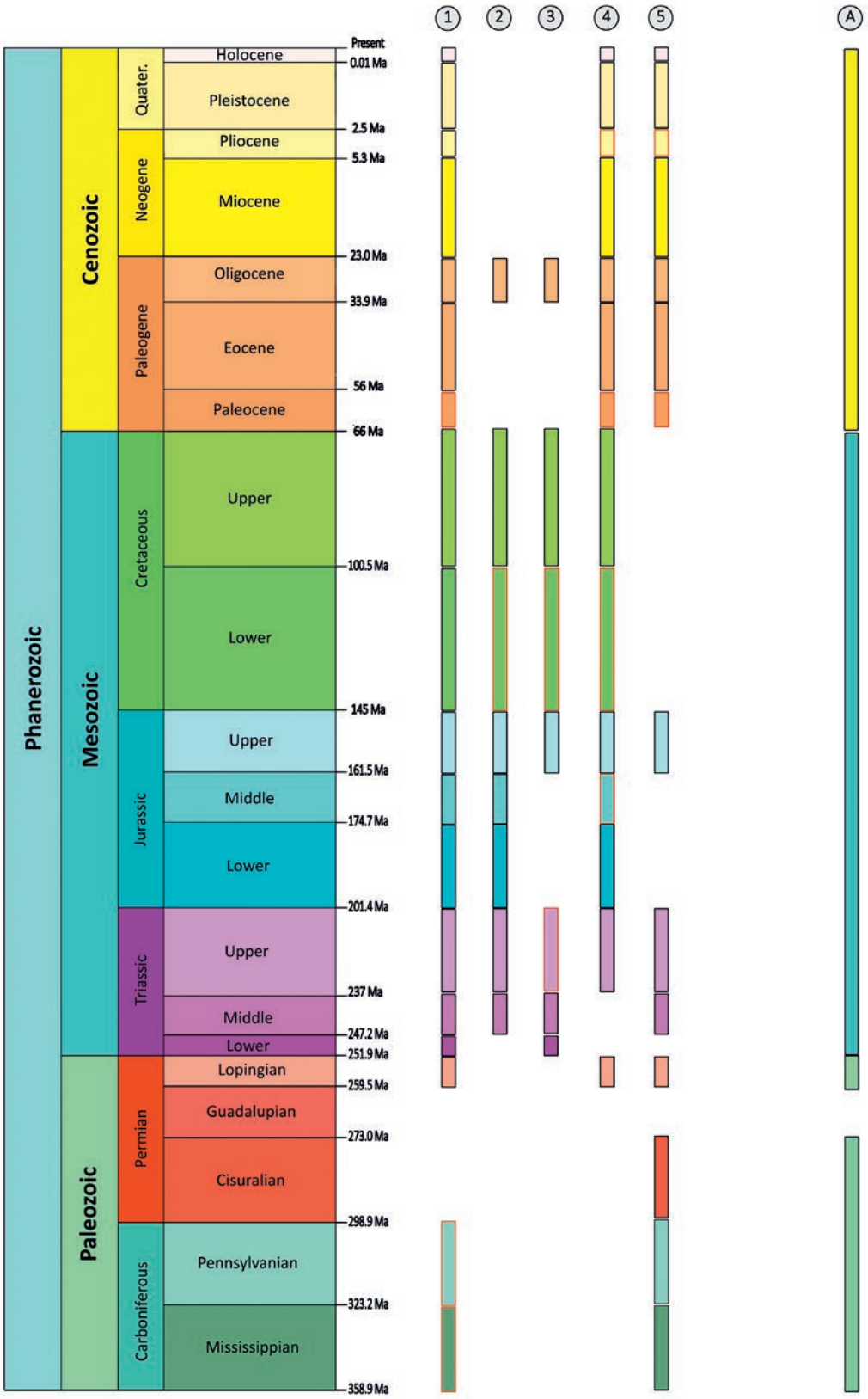

FIG. 11: Overview of the chronostratigraphic distribution of the main groups described: 1. Invertebrates; 2. Cephalopods; 3. Ichnofossils; 4. Vertebrates; 5. Plants; A. Synthesis of all groups, considering also the generic attribution at period level. The red evidenced bars refer to the generic attribution at period level only.

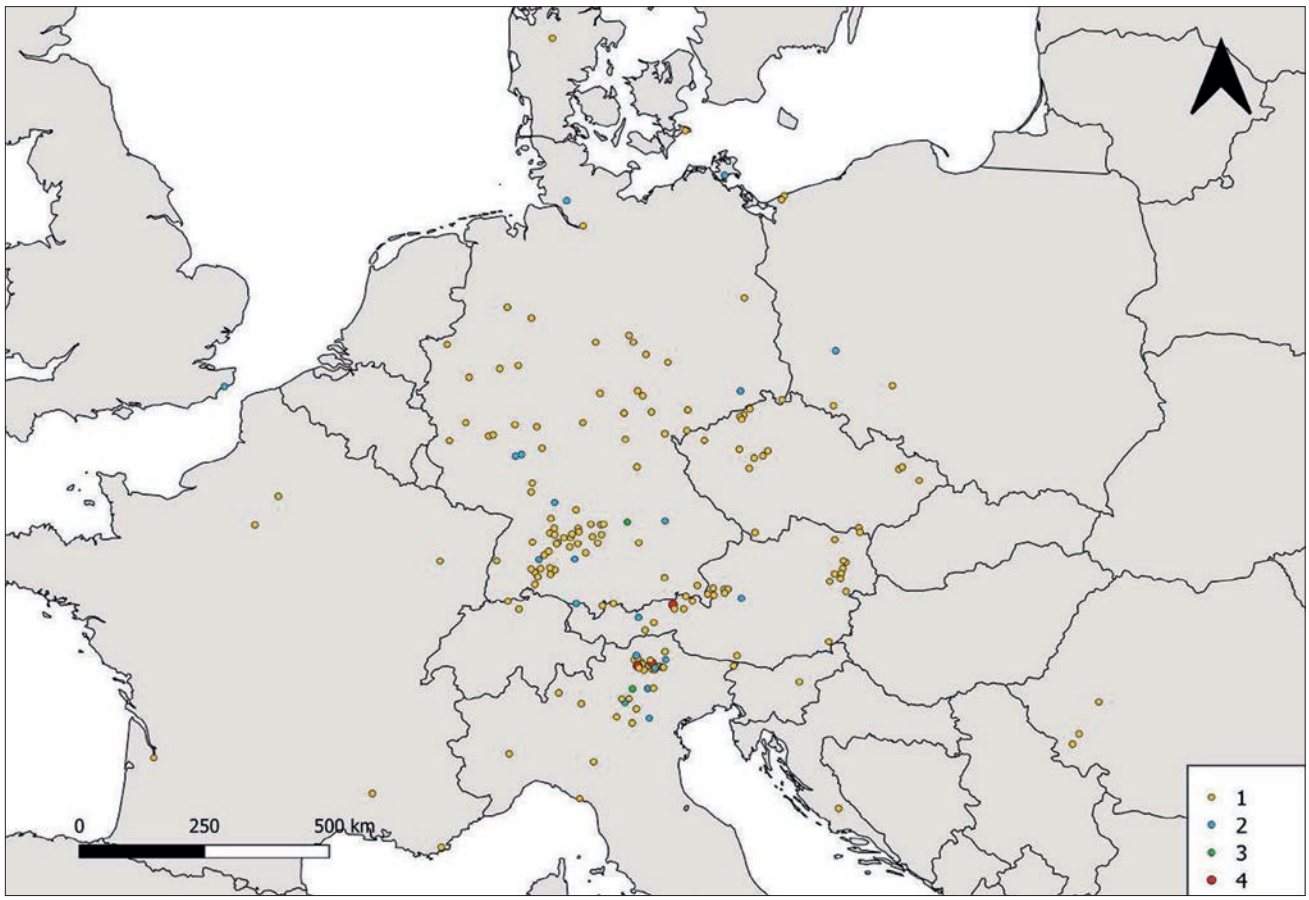

FIG. 12: Map of Europe with an overview of the geographic distribution of the specimens in Gasser's collection. The color, associated to the numbers (1–4) refer to the representation, for each locality, of the main groups (invertebrates, cephalopods, ichnofossils, vertebrates, plants) discussed in this work, following the gradient from low (1) to maximum diversity (4). In the focus, the Spanish island of Menorca and the localities outside Europe are not present.

CONCLUSIONS

In Gasser's days, his museum would have been the only place in South Tyrol where people could learn about the major fossil localities in Europe and get at least a rough idea about fossils, Earth history and evolution. Gasser used the museum for public lectures on a variety of topics, including a series of lectures about what he called "Die Wunder der Schöpfung" (the marvels of creation; Wagensommer, this volume b), in which he talked about the history of life on Earth, although mixing up science with religious and philosophical digressions. In this sense, Gasser has the merit of bringing natural sciences – mostly mineralogy, zoology and paleontology – to the attention of the public in South Tyrol, during a time when scientific knowledge and information was not easily accessible in his native town and country. Currently the Gasser collection, with its paleontological component, is unique in the scenario of the historical collections of South Tyrol, and integrates the distribution pattern of the naturalistic collections in the Italian and European context.

As a historical paleontological collection, it keeps its important role, providing a valuable data source also in case the original sites disappear or are no longer accessible to extract fossils. Those fossils are then the only testimony of the former outcrops and provide important geographic, stratigraphic and paleogeographic data. In this way, the collection has the complementary function of "historical memory", integrating the modern research collections even if the historical collection has suffered the loss of information through time.

Moreover, old collections are historical treasures in their own right, providing insights into the evolution of scientific thought. The collection and inventory of Georg Gasser, for example, reflects the human-centered vision of nature (for more details see also Wagensommer et al., this volume a, b) typical of the 19th and early 20th centuries. It becomes an important storytelling instrument concerning both the vision of the collector that compiled it and the imprint of the society as well as the cultural environment of that time. The organization and composition of Gasser's exhibition in his private museum and later the Stadtmuseum reflect the various aspects of the evolution of collecting efforts over time; on the one hand the approach reflects the idea of *Wunderkammer* of the late Renaissance and the following centuries, with the goal of creating wonder and astonishment in the audience, with rare, eccentric, exotic objects, as well as representing a microcosm, inserting elements both of the natural world and of art. On the other hand, we can perceive the scientific spirit, a product of the Enlightenment, which characterized the 19th century. The purpose of the collector was to describe nature with its physical manifestations, following – in the case of biological and paleontological specimens – the rules of the taxonomic classification proposed by Linnaeus and providing a powerful didactic tool. For this reason, Gasser's initiative to make the collection available to the public, like modern scientific museums, is very meaningful.

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