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„aus einem Trümmerhaufen des ausgebombten Hauses Wien III“ – one century provenance context of the geological-paleontological collections in the Natural History Museum Vienna (1919 to 2019)

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(with 7 figures)

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Abstract

We present an exhaustive survey of the geological-paleontological collection of the Natural History Museum Vienna (Austria) based on 353,704 objects acquired from 1919 to 2019. The data encompass information on geographic origin, provenance, stakeholders and mode of acquisition. Special focus is laid on the interwar period from 1919 to 1938, the Nazi regime and World War II until 1945, and on the recovery during the postwar phase until the fall of the Iron Curtain in 1989. The illegitimate acquisitions during the Nazi regime are documented, referring to the published documents of the Art Restitution Advisory Board. For the first time, all objects sent to the department by soldiers during World War II are reported. A strong increase in acquisitions from Austria took place during the 20th century, whilst international relations appear curbed. A boom phase during the 21st century is related to changing science policy and integration of citizen scientists.

Key words: provenance, interwar period, World War II, restitution, 20th century, citizen scientists.

Introduction

The Natural History Museum Vienna (NHMW) is among the largest natural history museums in Europe and houses about 30 million objects (Jovanović-Kruspel 2015; Caruso *et al*. 2018). Of these, about 5.7 million objects are curated in the collection of the Geological-Paleontological Department (but only a part is registered). A plethora of

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papers describes the general composition and provenance history of objects in geological-paleontological collections of museums and universities (*e. g.*, Hovey 1900; Cioppi & Dominici 2010; Martinez 2012; Nadim *et al*. 2015; Hinz & Werneburg 2019). Recently, Beck & Joger (2018) edited a book on 54 paleontological collections from museums and universities in Austria, Germany, and Switzerland, which provides an invaluable archive on historical data and the current state of these collections. All these papers are highly informative but are basically descriptive, often anecdotal and tend to emphasize outstanding objects and scientists. In contrast, we follow a more analytical and quantitative approach, incorporating an exhaustive documentation of the inventory of the Geological-Paleontological Department of the NHMW. First attempts to outline the history of the collections of the NHMW – apart from collection-specific overviews, which were still published at the end of the 18th century (*e. g.*, Haidinger 1782) – date back to Fitzinger (1856, 1868a, 1868b) and Hochstetter (1884), but these works did not focus explicitly on the geological-paleontological collections. Similarly, the contributions by Hamann (1976) and Riedl-Dorn (1998) discussed the entire collections (giving different attention to different periods of time) and did not focus on the evolution of the inventories of distinct departments. Against this background, Caruso *et al*. (2018: p. 124) could identify various difficulties in treating the "contemporary" history of the NHMW adequately: *"In addition to the size of the NHM (nine autonomously managed departments), the enormous size of the holdings* [...]*, the lack of an institutional history in regard of contemporary history and the history of science, the departmental and collection-specific practices of inventorying also present difficulties for provenance research at the NHM. (Schwierigkeiten für die Provenienzforschung im NHM stellen neben der Größe des Hauses (neun autonom geleitete Abteilungen), dem enormen Umfang der Bestände* […]*, dem Fehlen einer zeithistorisch-wissenschaftsgeschichtlich orientierten Hausgeschichte, auch noch die abteilungs- bzw. sammlungsspezifischen Gepflogenheiten der Inventarisierung dar.)"*

Recently, scientific departments at the NHMW like the Department of Botany have taken a closer look at their history, also dealing with acquisition and inventory practices (*e. g.*, Bräuchler *et al*. 2021). Concerning the Geological-Paleontological Department at the NHMW, Harzhauser & Kroh (2018) first provided a preliminary analysis of the development of the inventory of the geological-paleontological collection and Harzhauser & Krenn (2023) analyzed the provenance history of this collection in the period from 1807 to 1918. The temporal frame of the latter study was set by the focus on potential colonial contexts of acquisitions of a non-colonial power as the Habsburg monarchy. In addition, the authors tackled the problem of how much acts of 'colonial aggression' within the borders of the Austrian-Hungarian Empire could be traced in the collections. Harzhauser & Krenn (2023) documented strong shifts in acquisition numbers during the 19th century and linked these to higher-level political and economic developments. Moreover, the authors described the impact of scientific professionalization and internationalization of the NHMW-based paleontologists on their sampling strategies. With the end of World War I and with the collapse of the Austrian-Hungarian Empire in 1918, this

reference period came to an end. Herein, we try to shed light on the following hundred years of acquisition starting with the year 1919. No quantitative and exhaustive analysis has been undertaken so far for the geological-paleontological collections of the NHMW from the 20th century.

In the first 25 years (from 1919 to 1945), the analyzed period was marked by a rapid succession of political regimes in Austria, by a sequence of economic crises and by nothing less than a worldwide war, followed by a slow, then increasingly faster recovery phase in the course of the Austrian Second Republic. Due to the enormous political upheaval during the 20th century, the acquisition history of the department was far from linear (Fig. 1). In the following we focus especially on the interwar period from 1919 to 1938, discuss the development of the collection during the Nazi regime and World War II until 1945 and analyze the long and slow recovery during the 1950ies and 1960ies. Of course, the period from 1938 to 1945 holds a special position and an analysis of objects in the federal collections of the Republic of Austria, which have been illegitimately acquired during the Nazi regime, was already presented by ANDERL *et al*. (2009) as well as BLIMLINGER & SCHÖDL (2018). These books summarized the status of the work of the Commission for Provenance Research after its first two decades of existence. Within the frame of that project, the role of the Natural History Museum was explored by RIEDL-DORN (2009; see also RIEDL-DORN 2011) and CARUSO *et al*. (2018); other works focused on specific collections at the NHMW (HECHT 2009), on individuals such as the Austrian Jewish botanist Ernst Moriz Kronfeld (1865–1942) (SPRING 2014), or on subunits such as the anthropological library and on the NHMW-libraries in general (SPRING 2011, 2013a, 2013b). Since then, however, nobody tried to merge the various results and observations of the Commission for Provenance Research concerning natural history collections in Austrian museums and institutions to the present day. For the NHMW, this is probably due to the still limited research situation on the years 1938 to 1945, as RIEDL-DORN has already stated in 2009: *"The depiction of the Natural History Museum in the period from 1938 to 1945 is difficult, because a comprehensive treatment is missing so far. (Die Darstellung des Naturhistorischen Museums in der Zeit von 1938 bis 1945 gestaltet sich schwierig, da eine umfangreiche Bearbeitung bisher fehlt.)"* (RIEDL-DORN 2009: p. 177) However, for German institutions such as the Senckenberg Museum Frankfurt, research gaps have likewise only recently been filled (HANSERT 2018).

Material and Methods

The data source for the years 1919–1950 are the bound, handwritten inventory books that are physically stored in the Geological-Paleontological Department of the NHMW. Data from 1951 to 1979 are available from three acquisition books. In addition, the entries of the acquisition books from 1938 to 1940 have been added, to warrant a complete survey of acquired objects during that period. The main difference between acquisition and inventory books is that objects were registered as lots in the acquisition books with a single inventory number (*e.g.*, 1 lot, 20 objects, 1 inventory number), but were

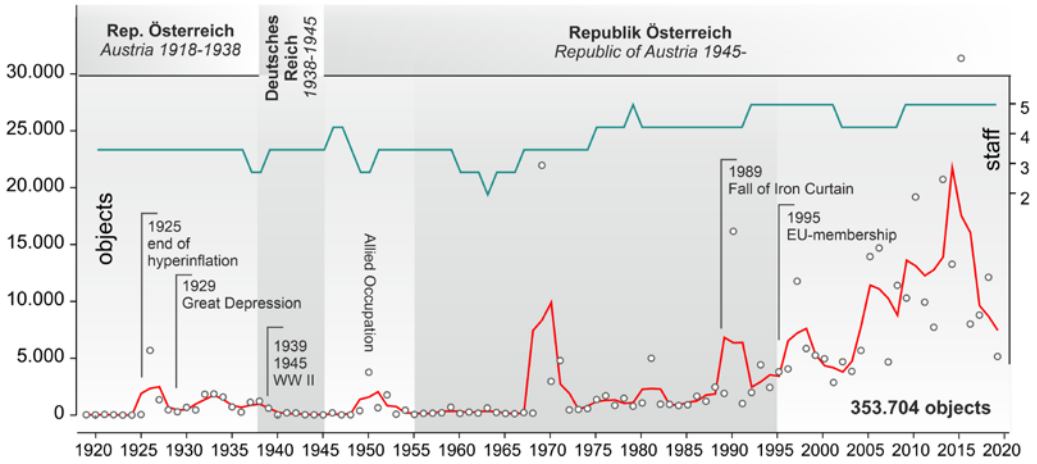


Fig. 1. Acquisition history of the geological-paleontological collection of the Natural History Museum from 1919 to 2019 and number of scientific staff members of the Geological-Paleontological Department. Major political and economic events are indicated. Dots represent annual values; red line represents 3-years running mean.

individually listed with own inventory numbers in the inventory books (*e. g.*, 1 lot, 20 objects, 20 inventory numbers). Both sources result in the same values when objects are counted.

From 1980 onwards, all data are available via an Access-database. The handwritten inventory books have been scanned and access will be provided on demand for scientific purposes.

The entries consist of a brief description of the object(s), usually followed by a reference to the person through whom the objects came into the collection and a note about the context of the acquisition. This information on provenance is followed by information on the number of specimens, inventory number(s), as well as price or value. In many cases, larger lots are listed as 'pl.' (= pluralis). In this compilation, these positions are rated as 1, which means that the actual number of objects is underestimated.

Our analyses are based on a compilation of data structured into year, object type, country, person, and number of objects. For visualization, data are usually given as a 3-point running mean. For additional information see Harzhauser & Krenn (2023).

Stuff follows staff?

Immediately after World War I, the Geological-Paleontological Department was run by the scientists Franz Xaver Schaffer (1876–1953) – *"Nestor and old master of the Austrian geologists (Nestor und Altmeister der* österreichischen *Geologen)"* (Trauth 1954: p. 197), Friedrich Trauth (1883–1967) (Zapfe 1969; Luger 2020a) and Julius

von Pia (1887–1943) (Zapfe 1979), supported by Lotte Adametz (1879–1966) (Svojka 2011; Schmid 2017; Rössner 2020), who would best be described as the collection manager (in the overview Riedl-Dorn 1998). All of them worked during the interwar period and most of them during World War II at the department. During the Nazi regime, Erwin Kamptner (1889–1972) (Zapfe 1971a) and Othmar Kühn (1892–1969) (Steininger 1969; Luger 2020b) started working at the department, followed by Rudolf Sieber (1905–1988) (without permanent position) (Zapfe 1986; Müller 2012) and Friedrich Bachmayer (1913–1989) (Zapfe 1990) in 1946 and 1947, respectively. During the 1950ies, Helmuth Zapfe (1913–1996) (Thenius 1997) and Erik Flügel (1934–2004) (Haditsch 2004) were employed in 1951 and 1958. A generation change occurred during the 1960ies with the appointment of Heinz Albert Kollmann (*1939) in 1964, Herbert Summesberger (1939–2023) in 1966 and Ortwin Schultz (*1944) in 1967, followed in the 1970ies by Fred Rögl (*1936) in 1975 and Johanna Eder (*1957) in 1979. In 1992, the team was reinforced by Gudrun Daxner-Höck (*1941). The latest generation change concerned most of the authors of this paper. It started in 1996 with Mathias Harzhauser (*1973), followed successively by Alexander Lukeneder (*1972) in 2004, Andreas Kroh (*1976) in 2005, Ursula B. Göhlich (*1967) in 2007, Oleg Mandic (*1967) in 2008 and Anna E. Weinmann (*1984) in 2020. In addition, Thomas Nichterl (*1972) was appointed as collection manager in 2009. The directors of the department came from among the scientific staff (see appendix).

In 2012, the former Karst and Cave Department was integrated as a working group into the Geological-Paleontological Department. As the scientists (Pauline Oberender, Lukas Plan) of this working group are not engaged in collecting and inventorying of paleontological material, they are not considered in Figure 1.

Harzhauser & Krenn (2023) document a strong correlation of the number of scientists employed in the department and the number of inventoried objects during the period from 1807 to 1918. The authors explained this positive correlation with increasing international contacts and an intensified exchange policy. For the 20th century no such correlation exists. From 1919 to 1975, the number of staff members ranged around four with a short drop to two employees in the year 1963 (Fig. 1). From 1975 onwards, the number of staff members ranged around five to six. Overall, the number of inventoried objects is not directly correlated with the headcount of scientists but as discussed below, the change in science strategies of the new generation is reflected in the inventory.

Interwar (Austrian) period (1919–1938)

Austria underwent a succession of political regimes during the period between World War I and World War II. After signing the Treaty of Saint-Germain on September 10th, 1919 Austria had to accept a strong reduction of its territory. Former parts of the Austrian-Hungarian Empire such as South Tyrol or "Deutschböhmen" (German Bohemia), which had initially been included into the Republic Deutschösterreich (proclaimed on November 12th 1918 in Vienna), were lost (here and

below in overview: Rathkolb 2020a). In this treaty the name Republik Österreich ('Republic of Austria') was defined for Austria. In March 1933, the right winged Federal Chancellor Engelbert Dollfuß (1892–1934) took over by a 'self-elimination of Parliament' and proclaimed the austro-fascist 'corporate state' Bundesstaat Österreich ('Federal state of Austria') on May 1st, 1934. The political instability was spurred by a depressing economical frame (for Austria's economic history see Sandgruber 2005). The years after World War I were marked by the hyperinflation of the early 1920ies. Although, the excessive price increases were stopped by the introduction of the Schilling currency in 1925, the beginning stabilization was soon stifled by the Great Depression, which started with the New York stock market crash on October 24th, 1929. In addition to the global crises, Austria suffered from high reparation payments to the former enemies. In the inventory books of the Geological-Paleontological Department of the NHMW, this catastrophic economic situation was reflected by low numbers of acquisitions. Only 16,460 objects are listed in the inventory between 1919 to 1937 and for the years 1923 and 1924 no entries are recorded at all (Harzhauser *et al*. 2022; Fig. 1). The end of the hyperinflation coincided strikingly with a distinct increase in acquisitions. 1,253 objects arrived in the collections from 1925 to 1938 per year on average compared to only 22 objects per year between 1919 to 1938 (Fig. 1).

Most of the objects have been collected on Austrian territory (57%) and international relations have not been as intense as during the boom phases in the 19th century (Harzhauser & Krenn 2023). Comparatively rich non-European collections derived only from the USA and Canada (1,292 objects), followed by 578 objects from the Pacific region (Australia, New Zealand, Sumatra, Tasmania, Timor). Only 356 objects arrived from Africa (Egypt, Madagascar, South Africa, Morocco). Own expeditions were nearly non-existent and only 17 objects from Egypt and South Africa have been collected during expeditions by the paleontologist Franz X. Schaffer and the anthropologist Viktor Lebzelter (1889–1936), who were both employed at the NHMW (Trauth 1953; Weninger 1970; further aspects Fuchs 2003). A small lot of vertebrates have been handed over by the German geologist Johannes Wanner (1878–1959) (Sieverts-Doreck 1959), who led a scientific expedition to Timor in 1910 and 1911 (Wanner 2009). Similarly, a lot of molluscs from Gatun in Panama were collected by the Austrian paleontologist Franz Toula (1845–1920) already in 1911 (Seidl 2016). Toula was professor at the Technical University in Vienna and his collection was handed over to the Natural History Museum in 1933 by his successor Josef Stiny (1880–1958) (Kieslinger 1958).

The development of the collection was maintained during the 1920ies and 1930ies mainly by donations and own collections (70%) and to a lesser extent by exchange (25%). Purchase played a subordinate role (5%) (Fig. 2). Only two cases of patronage can be traced in the inventory books: The most outstanding collection of the interwar period is a large collection of 4,906 Mesozoic invertebrates from the Alps, collected by the medical councilor and fossil collector August Heinrich (1859–1926) from Bischofshofen in Salzburg (Austria) (Zapfe 1971b). The huge collection was bought in 1926 from Heinrich's widow for 2,000.– Schilling, which corresponds today to a purchasing power of

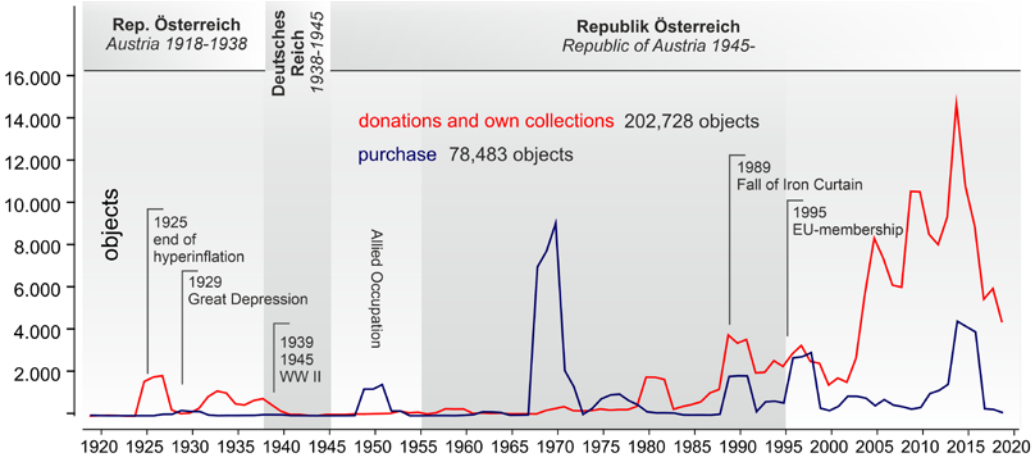


Fig. 2. Relation between purchases and donations (including own collecting campaigns). Note the peak in 1969, related to the acquisition of a huge collection of Miocene invertebrates. Lines represent 3-years running mean.

€ 8,447.– (according to the historical currency converter of the Austrian National Bank, https://www.eurologisch.at/docroot/waehrungsrechner/#/; accessed 03/10/2022). Interestingly, this sum was donated by Sultan Pakubuwono X (1866–1939) of Surakarta Sunanate in Java. Unfortunately, we have not been able to clarify the background of this unusual constellation; the Sultan seemed to have been on friendly terms with the NHMW since one of Franz Heger's collecting expeditions in this world region (HEGER 1906; ANONYMOUS 1906: p. 40). Another interesting acquisition is a collection of 624 Jurassic invertebrates from Vienna from the bequest of the late Franz Toula. The collection was bought in 1927 by the society 'Freunde des Naturhistorischen Museums in Wien' ('Friends of the Natural History Museum Vienna') for 400.– Schilling (= € 1,640.–, date 03/10/2022). This society was founded in 1923 (SUMMESBERGER 2013) and this purchase is the first record of the society's support of the Geological-Paleontological Department.

Concluding, the interwar period was characterized by a somewhat curbed development, a rather reduced portfolio of international relations and restricted economic resources. No exceptional and spectacular objects were acquired during this period.

Austria as part of Deutsches Reich (1938–1945)

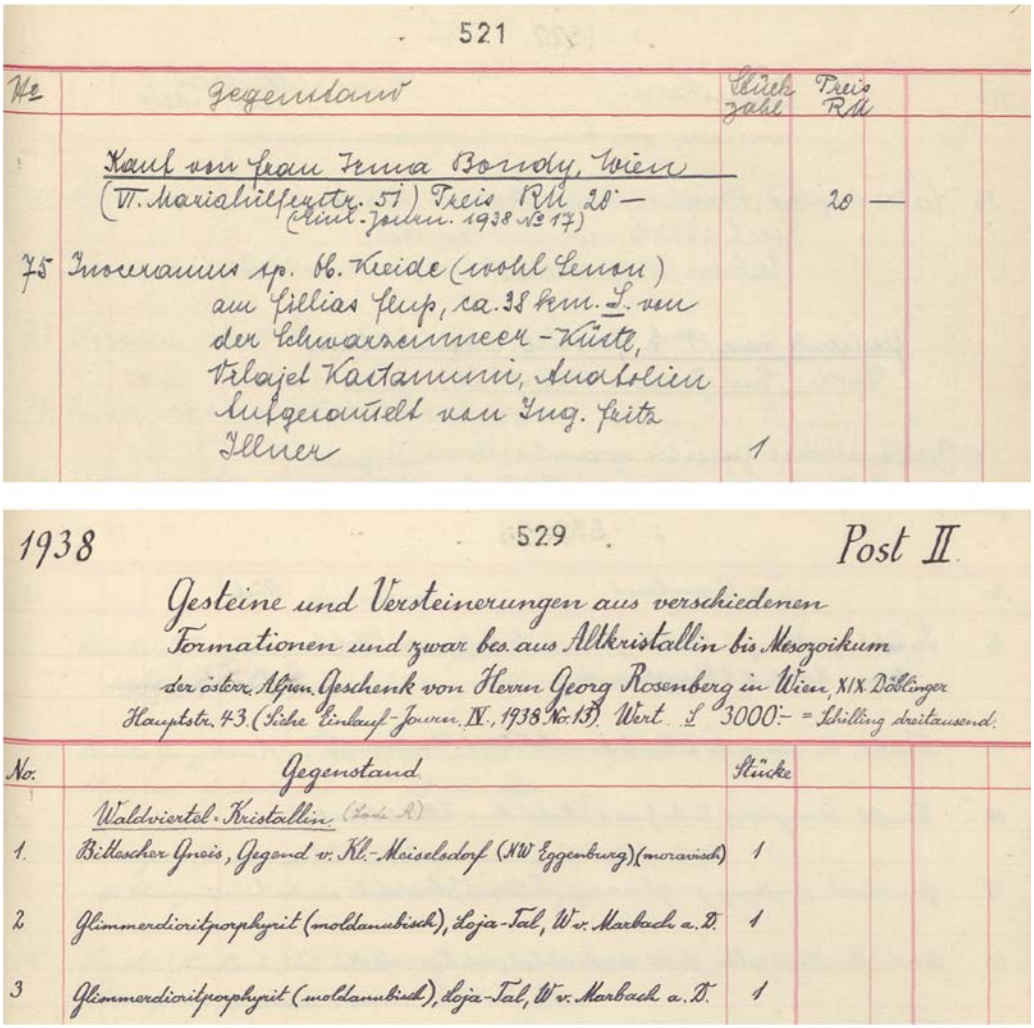
German troops invaded Austria in the night from 11th to 12th March 1938 and already on March 13th, Adolf Hitler (1889–1945) proclaimed the 'Anschluss' (annexation) of Austria by Germany in Linz (*Gesetz über die Wiedervereinigung Österreichs mit dem Deutschen Reich*; see BOTZ 1971). The economic upswing during the early phase of the 'Deutsches Reich' – as a direct consequence of the National Socialist rearmament policy – was soon stopped by the start of World War II on September 1st, 1939. No uptrend,

however, is documented in the inventory of the Geological-Paleontological Department. Only 2,306 objects have been acquired between 1938 and 1945. Of these, 1,730 objects have been listed in the regular inventory book, whereas 576 objects were recorded only in the acquisition book. Usually, new entries were first listed in the acquisition books and were registered at a later stage in the inventory book with own inventory numbers. It is unclear why these objects have not been inventoried. Neither object type nor provenance suggest any common bracket for these lots and most probably it was simply a matter of setting subjective priorities by the various staff members during the years of war. To give a complete overview of the acquisitions during the Nazi regime, we have also added the acquisition entries here. Nevertheless, these entries may underestimate the number of objects, because the entries frequently lack a clear indication of specimen numbers, and such lots were counted as 1.

About 74% of the objects were collected in Austria and Germany (in modern sense). Of the remaining objects, 4.4% were obtained from America (USA, Trinidad, Venezuela), 3.6% from the Pacific region (Australia, New Zealand) and 1.7% from the Middle East (Iran, Iraq). Most of these non-European acquisitions, however, had been collected already before 1938. Last exchange activities with the Peabody Museum of Natural History at Yale University and with Hubert Gregory Schenck (1921–1956) from the Stanford University are registered in 1938. Thus, the evolution of the acquisitions documents a complete breakdown of international relations, which corresponds to a low number of exchanged objects (12%). Similarly, the limited financial resources are clearly reflected by a low number of purchased items (6%) (Fig. 2). Overall, a distinct drop in acquisitions followed the outbreak of World War II resulting in a mean of 81 acquired objects per year between 1940 and 1945 (with a peak of 199 objects in 1941) (Fig. 1).

Jewish collections

The small number of objects acquired from 1938 to 1945 demonstrates that the department had not profited on a large scale by systematic and intentional enrichment of the collections at the expense of annexed countries and expelled or murdered Jews and other politically persecuted groups. Despite the low numbers, however, the inventory reveals several touching cases of problematic or clearly illegitimate acquisition contexts (Fig. 3). These cases have been identified, analyzed, and evaluated by the Commission for Provenance Research. This commission was established in 1998 by the Republic of Austria to search for objects, governed by the 'Federal Art Restitution Act on the return of works of art in Austrian national museums and collections to their rightful owners' (*Bundesgesetz über die Rückgabe von Kunstgegenständen aus den Österreichischen Bundesmuseen und Sammlungen*) from 1998 (amended in 2009). All cases have been investigated by historians and their results have been submitted in dossiers to the Art Restitution Advisory Board, which made recommendations whether restitution should take place. All reports and decisions of the advisory board meetings can be accessed here: https://www.provenienzforschung.gv.at/de/kunstrueckgabebeirat-2/beschluesse/



521

No.	Gegenstand	Stück-zahl	Preis RM
	Kauf von Frau Irma Bondy, Wien (VI. Mariahilferstr. 51) Preis RM 20.– (Einl.-Journ. 1938 No 17)		20 —
75	Inoceramus sp. ob. Kreide (wohl Senon) am Fillias Kup, ca. 38 km. S. von der Schwarzenmeer-Küste, Vilajet Kastamuni, Anatolien aufgenommen von Ing. Fritz Illner	1	

1938 529 Post II

Gesteine und Versteinerungen aus verschiedenen Formationen und zwar bes. aus Altkristallin bis Mesozoikum der österr. Alpen. Geschenk von Herrn Georg Rosenberg in Wien, XIX. Döblinger Hauptstr. 43. (Siehe Einlauf-Journ. IV., 1938 No. 13). Wert S 3000.– = Schilling dreitausend.

No.	Gegenstand	Stücke
	Waldviertel-Kristallin (Land R)	
1.	Bittescher Gneis, Gegend v. Kl.-Meiselsdorf (NW Eggenburg) (moravisch)	1
2	Glimmerdioritporphyrit (moldanubisch), Loja-Tal, W v. Marbach a. D.	1
3	Glimmerdioritporphyrit (moldanubisch), Loja-Tal, W v. Marbach a. D.	1

Fig. 3. Two cases of illegitimate acquisitions during the Nazi regime in the year 1938. Upper entry: Irma Bondy (1885–1945); lower entry: Georg Rosenberg (1897–1969). Tragic fates are hidden behind brief, businesslike entries. The numbers 521 and 529 represent page numbers of the inventory book.

beschluesse-chronologisch/. Herein we will only briefly discuss the identified cases in chronological order:

On April 18th, 1938, a large collection of 846 Mesozoic rocks have been donated to the NHMW by the Viennese autodidactic geologist Georg Rosenberg (1897–1969) (ZAPFE 1970) (Fig. 3). The collection was stated by the director of the department Friedrich Trauth (1883–1967) to be worth 3,000.– Schilling, which corresponds today to a purchasing power of € 18,817.– (date 03/10/2022). Rosenberg had worked as a volunteer in the Natural History Museum and published several small contributions on the Geology

of Austria in the 1950ies and 1960ies. The donation of his huge collection occurred immediately after he had lost his job due to the 'Aryanization' of his employer. Rosenberg and his wife survived persecution by emigration to Israel on February 27th, 1939, but had lost accommodation, personal property and social status. Economically impoverished, Georg Rosenberg returned to Austria on March 17th, 1947 and continued to work at the museum as a volunteer. In 1949 he became corresponding member of the Natural History Museum Vienna and in 1951 he was elected corresponding member of the Geological Survey Vienna (Zapfe 1970). The advisory board decided that the objects must be returned to the heirs (97th Advisory Board Meeting, June 29th, 2021). The search for the legal successors is ongoing.

On June 13th, 1938, Irma Bondy (1885–1945) (SalzburgWiki 2020) sold four invertebrate fossils from the Cretaceous of Anatolia to the NHMW for 20 Reichsmark (= € 127.–, date 03/10/2022) (Fig. 3). The specimens have been collected by her brother-in-law Fritz Illner (1885–1945), who had worked since 1928 as road builder in Greece and Turkey. Irma Bondy and Fritz Illner have both been murdered in Auschwitz in 1945. Consequently, the advisory board decided that the objects must be returned to the heirs (94th Advisory Board Meeting, October 18th, 2019). On July 28th 2022, these fossils have been transferred to the legal successors in Israel.

On August 16th, 1938, Martha Schlesinger (1887–1944), sold two fossil fish from Wyoming for 40 Reichsmark (= € 234.–), which is considered a distress sale by the advisory board. Marta Schlesinger and her husband both have been murdered in concentration camps. Consequently, the advisory board decided that the objects must be returned to the heirs (35th Advisory Board Meeting, June 28th, 2006). In 2020, the heirs transferred the specimens to the NHMW as permanent loan.

On September 12th, 1938, Walter Hersch (1918–1995), who studied Technical Chemistry in Vienna, handed over 12 rock samples with trace fossils from the Eocene of the Vienna Woods to the Natural History Museum in Vienna. Only ten days later he was forced to flee from the Nazi terror. This coincidence clearly indicates that the 'donation' took place under enormous pressure, and most probably not of his own free will. Consequently, the advisory board decided to return the material to the heirs (48th Advisory Board Meeting, September 11th, 2009). As the original specimens could not be found in the collection, the Museum handed over newly collected specimens to the heirs on November 29th, 2019.

On November 7th, 1938, Gertrude Zarfl (1901–1970) donated about 12 objects as bequest of her late husband, the Viennese physician Max Zarfl (1876–1938) (Bauer-Merinsky 1980: pp. 288–289), who was also member of the Geological Society in Vienna. In this case the advisory board decided that the offence of withdrawal according to § 1 of the Art Restitution Act has not been fulfilled (48th Advisory Board Meeting, September 11th, 2009). Nevertheless, the search for the heirs is still ongoing to offer the objects to the successors.

The Viennese paleontologist Martin F. Glaessner (1906–1989) was working in the Geological-Paleontological Department from 1923 to 1932 as a freelancer. In 1932, he

was employed as a petroleum geologist in Moscow, where he stayed until 1937 (ZAPFE 1992). Back in Austria in 1938, Glaessner managed to flee to London on July 4th, where he started to work for the Anglo-Persian Oil Company. Already between 1927 and 1937 he had donated 501 fossils to the NHMW. In 1938, three additional entries, encompassing about 27 objects, are listed in the acquisition book for June 15th, November 7th and December 9th. These dates are dubious because they partly postdate Glaessner's flight to London. Thus, even if these objects were voluntarily donated, the circumstances document a dramatic emergency situation. After the war, however, Glaessner did not file an application on restitution. Moreover, he continued the cooperation with the NHMW and in 1963 he donated 10 valuable fossils from the famous Ediacara Fauna in Australia. Therefore, the advisory board did not recommend restitution (35th Advisory Board Meeting, June 28th, 2006).

Except for the case of Gertrude Zarfl, which might, indeed, represent a voluntary act following the last will of her husband, all other cases are clearly related to the Nazi terror. All cases occurred soon after the annexation of Austria by Germany in 1938, documenting the pressing need to escape immediately from persecution. After 1938, no case of a transfer of Jewish collections is documented in the acquisition book of the Geological-Paleontological Department.

Missionshaus St. Gabriel

The mission house St. Gabriel in Maria Enzersorf close to Vienna had a long tradition in ethnographic research, which was especially promoted by Pater Martin Gusinde (1886–1969) (BORNEMANN 1970; ROHRBACHER 2021; for the NHMW anthropological collection recently SCHATTKE 2021). In 1941, the Nazis closed the mission house by regulation and on November 24th the collections were handed over to the NHMW on a trust basis. Therefore, these objects did not become a regular part of the collection and, consequently, they have not been registered in the acquisition book. In 2007, 175 geological objects from the St. Gabriel collection could still be traced in the collections of the Geological-Paleontological Department. The advisory board recommended to return these objects in the 39th Advisory Board Meeting on December 7th, 2007, but the representatives of the Missionshaus St. Gabriel waived this claim.

Collections obtained from soldiers

Intense enquiries by historians are necessary to decipher and trace the connections between acquired objects and the discrimination of Jewish persons. The context with military operations, in contrast, can be identified easily because most entries are registered with the military postal code of the sending soldiers ('Feldpost No.'). Although World War II started in 1939, most of these cases are linked to the 'Unternehmen Barbarossa', the German invasion of the Soviet Union starting on June 22nd, 1941. The first war-related acquisitions date back to November 1942, when the Austrian zoologist

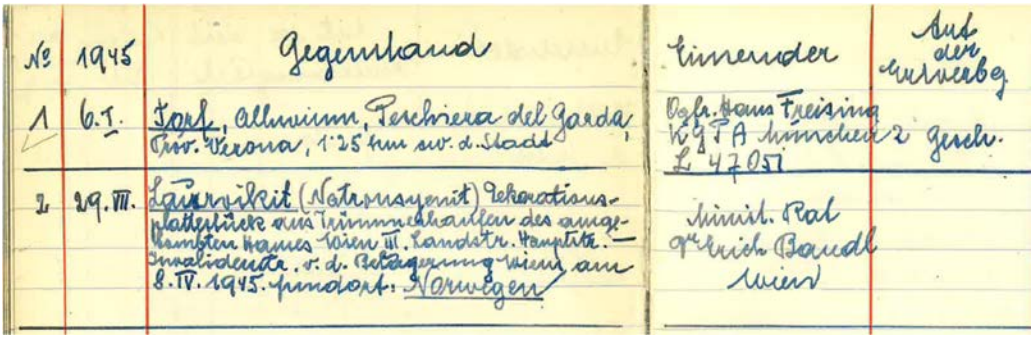


Fig. 4. Entry in the acquisition book from 1945, listing objects which have not been registered in the inventory book. Upper entry represents a submission by a German soldier from the Italian front including the Feldpost No. The lower entry documents the dramatic situation during the last days of the Nazi regime in Vienna. The text describes the salvage of a decoration slab from the ruins of a bombed out house by the hobby-geologist Erich Bandl (1880–1960) directly from the battle ground between German and Russian troops.

and later director of the Alpenzoo in Innsbruck Hans Psenner (1912–1995) brought an iron-oxide concretion from the right riverbank of the Kshen near Kursk and Liwny in Russia (Oblast Kursk). This indicates that Psenner had collected the objects during the summer offensive of the German Wehrmacht in 1942. Soon after, the fossil collector Otto Lienhart (1911–?) sent cherts from Olinino at Rshew in Russia in December 1942. His Feldpost No. 38866 indicates that he was part of the Feldgendarmerie (military police) during the bloody battles of Rshew. The Austrian geologist Alois Kieslinger (1900–1975) was drafted in 1942 into the Organisation Todt and supervised bunker constructions in the Narvik region in Norway (Horninger 1975). In this function, he sent extant calcareous red algae from Narvik in June 1943 and a diatomite sample from the Nordland province in Norway in December 1944, listed with the Feldpost No. 30043.

In May 1944, Gefreiter (private) Wilhelm Leitner (Feldpost No. 29098) sent Paleozoic invertebrates from Püssi in Estonia. Soon after, during September 1944, German troops had to retreat from Estonia. A case from the southern front is a peat sample from Peschiera del Garda in Italy, which was sent by Obergefreiter (corporal) Hans Freisinger (Feldpost No. L 47051, Luftwaffe) in January 1945, immediately before the final spring offensive of the allied forces (Fig. 4). No direct connection to military operations is obvious for two plant fossils from Westfalen in Germany, sent by Feldwebel (sergeant) Frank Heinrich (Feldpost No. L. 54218, Luftwaffe) in two parcels in October 1943 and in June 1944.

The dramatic demise of Nazi Germany is also reflected in the acquisition book of the Geological-Paleontological Department. Two entries from April 8th, 1945 state that the Viennese lawyer and hobby-geologist Erich Bandl (1880–1960) (Schiener 1963) salvaged three polished decoration slabs of Norwegian Larvikite ‘from the ruins of a bombed out house at the corner between Landstraßer Hauptstraße and Invalidenstraße in

the third district in Vienna from the battle(siege)ground' *('aus einem Trümmerhaufen des ausgebombten Hauses Wien III Landstr. Hauptstr.-Invalidenstr. im Kampf(Belagerungs) gebiet am 8. IV. 45')* (Fig. 4). A risky 'collecting campaign' was performed during the peak phase of the Soviet offensive in Vienna, which lasted from 5th to 13th April, 1945. This military operation finally ended the Nazi regime in Vienna, paved the way for the Austrian Second Republic, but also heralded the Allied Occupation of Austria (RATHKOLB 2020b).

Allied Occupation and the Iron Curtain (1946–1989)

Already on April 27th, 1945 a provisional state government under the provisional chancellor Karl Renner (1870–1950) was instated by the Soviets and the re-establishment of the Republic of Austria was proclaimed by the leaders of the decisive political parties (SPÖ, KPÖ, ÖVP). Few days later, World War II ended with the overall surrender of the National Socialist Deutsches Reich to the Allies on May 8th, 1945. Despite the formal renaissance of the republic, its territory was factually disintegrated into four administrative districts under command of the different allied forces until 1955 (RAUCHENSTEINER 1979, 2005). This resulted in limited freedom of movement of the population especially between the western (US, British, French) sectors and the Soviet sector. Simultaneously, the Iron Curtain started to divide Europe as a boundary with strongly reduced permeability. The depressing political and economic situation is reflected in the acquisitions, which remain at very low levels immediately after the war. A first slight upswing in the inventory numbers started in 1949 and continued throughout the 1950ies and 1960ies, ranging around 527 objects per year until 1969. The backbone for this stabilization after the collapse in 1945 was the European Recovery Program (= Marshall Plan) between 1948 and 1952 (HAAS 2007). During this developing program, the USA were pumping huge amounts of money into Europe's economy, which eventually also backed governmental institutions such as the Natural History Museum.

Contact with western institutions was re-established during this phase, *e.g.*, by correspondence and exchange with the National Museum of Natural History in Washington in 1949 and 1951. The contact with scientists and institutions from the Eastern Bloc, however, was strongly limited. A rare case of contact is the donation of few Neogene invertebrates from Yugoslavia by the Serbian paleontologist Petar Stevanović (1914–1999) (GRUBIĆ 1999). Most other objects, registered in the inventory from Eastern Bloc countries during the 1950ies and 1960ies, turned out to represent newly inventoried old collections dating back to the Austrian-Hungarian Empire (*e.g.*, specimens, which were transferred in 1959 to the NHMW from the Technische Hochschule, which is now the Technische Universität). Some reinforcement of co-operations especially with Hungarian scientists occurred from 1958 to 1960, when the entomologist and paleontologist Gábor Kolosváry (1901–1968) (ANONYMOUS 1981), the paleontologists Kálmán Balogh (1915–1995) (ANONYMOUS 2022a) and Erzsébet Szörényi (1904–1987) (ANONYMOUS 2022b) and the geologist Sándor Végh (1930–2009) donated or exchanged small

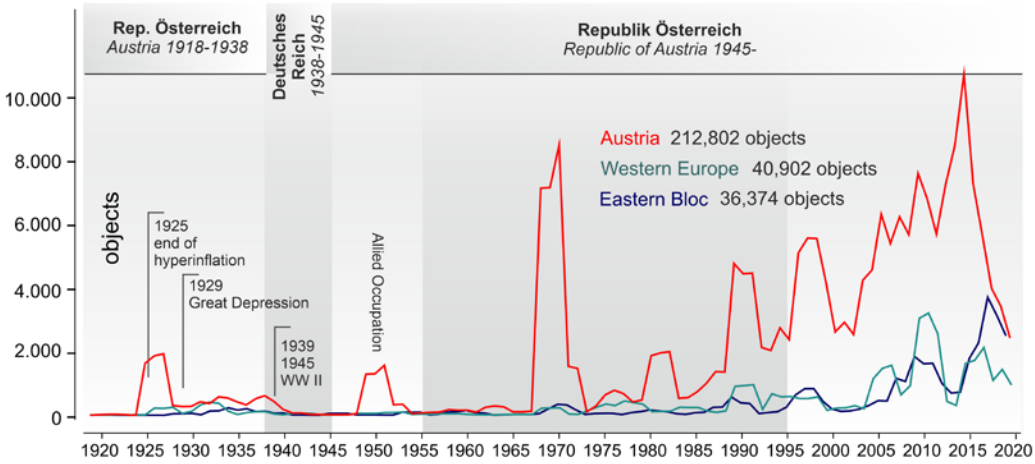


Fig. 5. Acquisition history of material from Austria compared to acquisitions of objects from countries of the (former) Eastern Bloc and 'Western' European countries. Lines represent 3-years running mean.

numbers of invertebrate fossils. These contacts postdate the Hungarian Uprising in 1956 and thus are not directly related to political events. Similarly, the few contacts with Czech colleagues, mentioned in the inventory of 1969, postdate the "Prague Spring" of 1968 and cannot be related reasonably with this rebellion.

The scientific contacts between Austrian paleontologists and colleagues from the Eastern Bloc increased in the 1970ies within the framework of stratigraphic correlation programs under the umbrella of the IUGS (International Union of Geological Sciences) (Harrison 1978; Riccardi 2012). From the Austrian side, these activities have been intensified by Adolf Papp (1915–1983) (Zapfe 1971c) and Friedrich Franz "Fritz" Steininger (*1939), both from the University of Vienna. These contacts are reflected by various records in the inventory of the NHMW. The low number of objects related with these contacts, however, indicates that the fossils represented small guest gifts rather than systematic exchange of collections across the Iron Curtain. The effectiveness of this political border is clearly expressed in the strong increase of objects from countries of the former Eastern Bloc after its fall in 1989 (Fig. 5). These ranged around 42 objects per year from 1946 to 1989 but jumped to an annual average of about 666 from 1999 to 2019. The acquisition of objects from Western European countries was less restricted but nevertheless lingered at rather low levels during the 1960ies and 1970ies (Fig. 5).

A general economic upswing is reflected by the development of purchases, which display a twofold pattern from 1946 to 1989 (Fig. 2). Only 224 objects have been purchased per year from 1946 to 1968. Starting with 1969 the values increase distinctly to 1,556 objects per year in the period from 1969 to 1989. The turning point was an outstanding purchase of 21,000 objects of Miocene invertebrates from the Vienna Basin from Adolf Papp (1915–1983) on February 11th, 1969. Papp was professor at the Institute

for Paleontology at the University of Vienna. His collection contained holotypes and illustrated material from PAPP (1951) and was purchased for 12,500.– Schilling, which corresponds today to a purchasing power of € 4,917.– (date 03/10/2022).

The step into the new millennium (1990–2019)

Already in 1980, a digital inventory system was established under the department's director Heinz A. Kollmann, which stimulated increasing efforts of data input in the department. The next leap in inventoried objects, however, occurred nearly ten years after the database roll-out. During the early 1990ies, the NHMW-based paleobotanist Johanna Eder initiated the OeTyp-Project, which is still a nationwide cataloguing program to include all paleontological types and illustrated specimens in Austrian collections. Since 1993, the OeTyp database is formally associated with the Austrian Academy of Science (https://www.oeaw.ac.at/oetyp/palhome.htm). Most data, however, were and are generated at the NHMW, which, therefore, also boosted the museum's inventory (Fig. 1).

The 1990ies and early noughties involved a change in science strategies by increased project fundraising for projects on mammal stratigraphy and paleobotany (*e.g.*, FWF: P-10505-GEO, "Entwicklung der Fauna und Flora im Oligozän-Miozän der Mongolei" under the leadership of Gudrun Höck). In addition, this period was shaped by a major generation change of the department's scientists. Most newly employed scientists established externally funded, collecting-oriented projects, reflected in increasing acquisitions. Simultaneously, the retired colleagues continued their research and thus increased the performance of the department.

In 2005 and 2008, the Geological-Paleontological Department organized two large excavations focusing on a huge fossil oyster-reef near Vienna. More than 200 volunteers and citizen scientists were involved in these campaigns, which resulted in the opening of the geopark Fossilienwelt Weinviertel in 2009 (https://www.fossilienwelt.at). After finalization of this project, some of the volunteers asked to continue their cooperation with the NHMW and quickly became skilled in classification, sorting, and taxonomic identification of old collections. The invaluable input of these citizen scientists is also reflected in increasing numbers of inventoried objects. The peak observed for the 21st century is thus also based on revisions and cataloguing of historical collections. The importance of own collections becomes resulted in a marked dichotomy between purchases versus donations and own collections, starting in the late 1980ies (Fig. 2).

These lucky coincidences resulted in an all-time high of the inventory with a peak in 2015. Overall, 14,286 objects entered the inventory per year on average from 2005 to 2015. HARZHAUSER & KRENN (2023) observed two earlier boom phases of acquisitions during the 19th century. The 'first boom phase' lasted from 1850 to 1865, with 3,957 inventoried objects per year, and the 'second boom phase' lasted from 1876 to 1890, with a mean of 5,969 objects per year. Therefore, the 'third boom phase' of the 21st century exceeds the historical peak of the 'golden age' by 2.4 times.

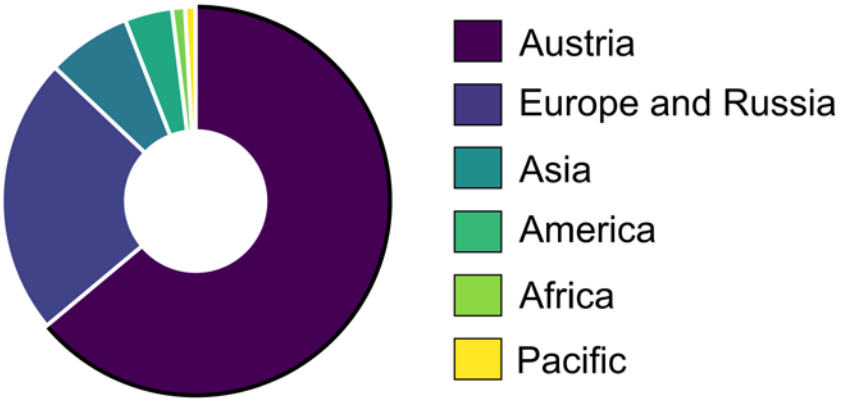


Fig. 6. Relation between the contributions of acquisitions from Austria, Europa and Russia, Asia, America, Africa, and the Pacific region, based on the data from 1919 to 2019.

Based on the 3-year-running mean, the high level of acquisitions achieved around 1885 during the 'second boom phase' was not reached again before the year 2004. Thus, it took nearly 120 years to recover from the political and economic crises of the 20th century.

Provenance context and collecting policy during the 20th century

353,704 objects or lots have been inventoried from 1919 to 2019 (Fig. 1). Of these, 65% derived from Austria (Fig. 6). Another 22% of the objects have been obtained from other European countries and the Soviet Union. This indicates a distinct change in collecting strategy compared to the period from 1807 to 1918. According to the data of Harzhauser & Krenn (2023) the number of objects from Austria has been distinctly lower during the 19th century, ranging around 19%. Another 27% derived from various countries of the Austrian-Hungarian Empire, but 42% of the objects were obtained from other European countries and (tsarist) Russia. This high number suggests that the collecting strategy of the 19th century aimed for taxonomic and geographic completeness of the collection including specimens from famous and important international localities. During the 20th century, in contrast, a broadening and deepening of the Austrian collections took place. Purchase of objects from non-European countries was negligible in total numbers but encompassed spectacular objects for the permanent exhibitions, such as the skeleton of the giant turtle *Archelon* (1977), the replica of an *Allosaurus*-skeleton (1984) and the skeletons of the marine reptiles *Dolichorhynchops* (1991) and *Platecarpus* (2003).

All other regions are subordinate in total numbers and do not show any trends or changes in collecting strategy during the 20th century. Only 3.8% of the objects were obtained from America, 1.2% from Africa and 0.8% from the Pacific region (Figs 6, 7). An exception are objects from Asia. Only 0.7% of the annually acquired objects from 1919 to 2000 had an Asian origin, which is identical to the values of the 19th century. The low ratio increased distinctly to 9.7% during the 21st century (Fig. 7). Especially in the

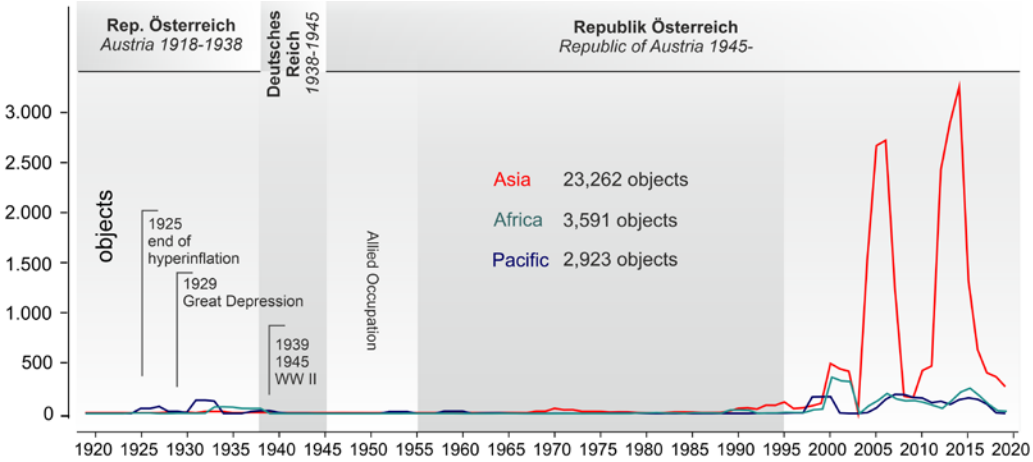


Fig. 7. Acquisition history of objects from Asia, Africa and the Pacific region. Lines represent 3-years running mean.

years 2001, 2005, 2006 and 2013, large collections from Mongolia have been acquired within the frame of several Austrian-Mongolian joint-projects under the leadership of the NHMW-based vertebrate-paleontologist Gudrun Daxner-Höck. These projects were funded by the Austrian Science Fund (FWF) and focused on the evolution of small mammals during the Oligocene and Miocene. Large quantities of small fossils have been collected during the sampling campaigns and were split contractually between Mongolian institutions and the NHMW (pers. comm. Gudrun Daxner-Höck, 2022).

Thus, except for the Mongolian projects, the general focus of the collections had not changed significantly during the 20th century despite the turbulent times.

Conclusions

Our approach to rate high numbers of acquisitions as expression of prospering periods and vice versa to interpret lows in acquisitions as stagnant phases may be questioned. A priori, low numbers of acquisitions could also reflect a focus on working with the existing material and/or on a restructuring of the collections. The striking correlation of the inventory with political and economic developments in the 1920ies to 1950ies, however, is strongly supporting our growth-oriented view. Similarly, the coincidence of the 'third boom phase' with increasing funding of projects, the employment of a new generation of scientists and intensified integration of citizen scientists indicates that acquisition numbers are clearly a function of favorable economic conditions.

WHITAKER & KIMMIG (2020) emphasized the pitfalls of anthropogenically introduced bias in analyzing paleontological collections. These authors discussed a hierarchical sequence of potential bias, starting from the mode of collection and the collector's

interests up to curation-, preparation-, publication- and digitization biases. Accounting for these biases is crucial for a meaningful analysis of past biodiversity based on museum collections. Herein, we add the global and national political, historic, and economic frame as an additional factor, which strongly governs collection policies and eventually shapes the picture of past biodiversity in collections.

Our data allow for tracing networks between scientists, dealers, collectors, and other stakeholders. Moreover, we provide a sound database for a comparison with other national and international paleontological collections – as well as fora comparative view to other scientific departments and collections at the NHMW. Based on our exhaustive data, similarities or differences between collections and institutions can be defined and discussed in the light of politics, economy, and institutional science policy.

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Supplementary material

The supplementary material to this article has been deposited in the NHMW Data Repository: https://doi.org/10.57756/m884e2.

File 1: List of acquisitions of the Geological-Paleontological Department of the Natural History Museum Vienna from 1919 to 2019. [Microsoft Excel, 246 KB]

File 2: List of acquisitions of the Geological-Paleontological Department of the Natural History Museum Vienna from 1919 to 2019. [same as File 1, in CSV format, 384 KB]

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Appendix

Directors of the Geological-Paleontological Department since 1919:

Franz X. Schaffer (1913–1935)

Friedrich Trauth (1936–1946)

Alfred Schiener (1947–1948)

Othmar Kühn (1949–1951)

Helmut Zapfe (1952–1964)

Friedrich Bachmayer (1965–1978)

Heinz Albert Kollmann (1979–2003)

Mathias Harzhauser (since 2004)