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The primeval world by the Austrian painter Josef Hoffmann (1831–1904) – A cross over between art and science and its export to Mexico

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4 Text-Figures, 1 Table, 9 Plates

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History of Science
Darwinism
Art
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Reconstruction
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Abstract

The artistic programme of the Natural History Museum Vienna (NHMW) is unique. Although many museums of the 19th century are extensively decorated, the NHMW's assignment of the decoration as a didactic tool to convey the museum's scientific narrative to the visitors stands quite alone in museum's history. The first director, Ferdinand von Hochstetter (1829–1884), made Darwin's theory of evolution the core narrative of the museum. This article focuses on one part of the decorative programme: the pictures of the primeval world by Josef Hoffmann in the most prominent exhibition hall of the museum (hall X). Its paintings are a fascinating cross-over between art and science. They shed light on the way Hochstetter tried to use the artistic program of the NHMW to communicate the Darwinian narrative to the visitor and by this shaping the museum into a place that can be best described with the term "Darwinian class room". The painter was given scientific advice and access to the paleo-botanic collections of the Imperial Geological Institute (by Dionýs Štúr, 1827–1893). It will be shown that Josef Hoffmann's paintings have their origin in a tradition of earlier primeval images like in "Die Urwelt" (UNGER, 1851) by the Austrian paleo-botanist Franz X. Unger (1800–1870). Josef Hoffmann partly adopted this pictorial tradition for hall X. Challenged by limited space and the architectural framework he found new forms of composition, which already hint towards the style language of the Art Nouveau.

Probably not least because of this modern style, these images had an impact on the artistic furnishing of new scientific museums elsewhere. Hoffmann's paintings became a role model for the 1906 opened Instituto Geológico Nacional in Mexico. Some of the images by Hoffmann were "exported" one-to-one to Mexico, to the Instituto Geológico Nacional (today: Museo de Geología de la UNAM). The Mexican landscape painter José María Velasco (1840–1912) used Josef Hoffmann's compositions as overt templates. However, by several amendments in their content and by the addition of three more paintings, Velasco altered the meaning and function of the complete series.

Die Urwelt des österreichischen Malers Josef Hoffmann (1831–1904) – ein „cross-over" von Kunst und Wissenschaft und sein Export nach Mexiko

Zusammenfassung

Das künstlerische Programm des Naturhistorischen Museums Wien (NHMW) ist einzigartig. Obwohl viele Museen des 19. Jahrhunderts umfassend künstlerisch ausgestaltet waren, ist das NHMW mit seiner Nutzung der Dekoration zur Vermittlung der Leitidee an den Besucher in der Museumsgeschichte ohne Vorbild. Der erste Direktor, Ferdinand von Hochstetter (1829–1884), machte Darwins damals neue Evolutionstheorie zum Hauptthema. Dieser Artikel befasst sich mit einem Teil des künstlerischen Dekorationsprogrammes: den erdgeschichtlichen Bildern des Malers Josef Hoffmann (1831–1904) im prominentesten Schausaal des Museums

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(Saal X). Die Bilder sind das Resultat eines faszinierenden „cross-over" zwischen Kunst und Wissenschaft. Sie erhellen Hochstetters Bemühen, die Lehre Darwins im neuen NHMW durch das künstlerische Programm an den Besucher zu kommunizieren. Hochstetter schuf damit einen öffentlichen Erkenntnisraum, der hier mit dem Begriff „Darwinistisches Klassenzimmer" beschrieben werden soll. Die wissenschaftlichen Informationen erhielt Hoffmann durch den Geologen Dionýs Štúr (1827–1893), der ihm den Zugang zu den Sammlungen der k. k. Geologischen Reichsanstalt ermöglichte. Es wird gezeigt, dass Josef Hoffmanns Werke in einer Tradition früherer erdgeschichtlicher Bilder wie „Die Urwelt" (UNGER, 1851) des österreichischen Paläobotanikers Franz X. Unger (1800–1870) wurzeln. Josef Hoffmann nutzte diese Bildtradition für den Saal X. Eingeschränkt durch die engen Raummöglichkeiten und das architektonische Rahmenwerk, entwickelte Hoffmann neue Bildkompositionen, die bereits auf die Stilsprache des Jugendstils verweisen. Vermutlich nicht zuletzt wegen ihrer modernen Stilistik sollten diese Bilder Einfluss auf die künstlerische Ausstattung anderer neuer naturwissenschaftlicher Museen haben. Hoffmanns Bilder wurden – wie gezeigt werden soll – zum Vorbild für das 1906 eröffnete Instituto Geológico Nacional in Mexiko (UNAM). Einige der Bilder Hoffmanns wurden eins zu eins nach Mexiko, in das dortige Instituto Geológico Nacional, dem heutigen Museo de Geología de la UNAM, „exportiert". Der mexikanische Landschaftsmaler José María Velasco (1840–1912) verwendete offenkundig Hoffmanns Kompositionen als Vorlage. Durch inhaltliche Adaptionen und das Hinzufügen von drei weiteren Bildern erweitert Velasco die Bedeutung und Funktion der gesamten Serie.

Introduction

Ferdinand von Hochstetter was one of the most prominent earth scientists of the 19th century. Beside his work as a scientist, Hochstetter was a very popular proponent of public education and a fervent Darwinist (MARENZI, 1874). As one of the founding members of the "Society for the dissemination of scientific knowledge" ("Verein zur Verbreitung naturwissenschaftlicher Kenntnisse", founded in 1860) he held several talks for broad audiences. Beside this, a great number of very successful textbooks made him famous. His first school book "Allgemeine Erdkunde" was published in 1872 (HANN et al., 1872). It can be considered the first Darwinistic school book in German language. The acceptance of such a pro-Darwinist book for Austrian schools is remarkable. In Germany this was watched with envy: In the congratulation-booklet for Darwin's 70th birthday (ANONYMOUS, 1878: 358) the authors stated: "*…we wish from the heart, our government would take the Austrian as a role model, which accepts the splendid "guide of earth science" by Hann, Hochstetter and Pokorny, which is based on the new cosmovision without any objections as a course book in their schools*".

Appointed tutor of the Crown Prince Rudolf (1858–1889) in 1872 (ANONYMOUS, 1872) Hochstetter reached the summit of his career and in public education in his role as director of the new NHMW, which was planned as a first rank scientific research institute but also as the most important public educational institute for natural sciences. The exhibition had to be designed as a visual instruction for everyone (HOCHSTETTER, 1884). HOCHSTETTER (1884) praised the liberal support by the emperor, indicating that he was free to form the museum with a new concept, for this concept we suggest the term "Darwinian Class Room". Darwin's theory was strongly discussed all over Europe but with special intensity within the Catholic Austrian Empire. But whereas during the 1860s public support of Darwinism could still lead into serious troubles with the church and state authorities this changed 1867 after the Austro Hungarian Compromise ("Ausgleich"). Since then the Liberals dominated for several years the Austrian half of the Empire. Due to this political supremacy also the scientific climate changed significantly (MASON, 1997). It is surely no accident that in 1871 (the year in which Darwin´s "The Descent of Man, and Selection in Relation to Sex" was published) Charles Darwin was appointed corresponding member (with permission by the Emperor himself) of the Austrian Academy of Sciences and in 1875 honorary member. With this, Austria was not among the first in Europe but also not among the last (GLICK & SHAFFER, 2014). In addition to this 1881 a portrait bust of Darwin was put on the façade in, thus being the only portrait of a living scientist within the decorative program of the NHMW. Despite a reluctant start it seems that with delay Darwin's theory found more support in Austria than in any other European country.

Imagining Primeval Times

The first attempt to create realistic primeval landscapes in German speaking Europe was by the Austrian paleobotanist Franz X. Unger with his book "Die Urwelt in ihren verschiedenen Bildungsepochen" published in 1851 (UNGER, 1851; RUDWICK, 1992). Unger (1800–1870) worked together with the painter and lithographer Josef Kuwasseg (1799–1859) who created 14 lithographic landscapes. The clerical press attacked Unger for this undertaking. Not only was the idea to show life's development as a process of millions of years opposed to bible's creation, but also Unger's text emphasised the idea of development (seven years before Darwin's theory of evolution was published; PFAFFL, 1977). The book became very successful. It was published in German and French and later in English (UNGER, 1863). The illustrations of Unger's book became the epitomes of how to imagine primeval times. They were copied in many popular science books like Bernhard Cotta's "Geologische Bilder" (COTTA, 1852) and Rudolf Ludwig's "Das Buch der Geologie oder die Wunder der Erdrinde und der Urwelt" (LUDWIG, 1855) (pointed out by HOFFMANN, 2006). In Vienna the laterna magica-artist Paul Hoffmann (1829–1888) made Kuwasseg's pictures even more popular by producing lantern slides which he presented in so called "Geological performances" (from 1858 until the 1860s; HOFFMANN, 2006). The laterna-magica performances (with Kuwasseg's images and lectures by Paul Hoffmann) toured through Germany. On July 5th 1869 the "Wiener Sonn- und Montags-Zeitung" wrote about the performance: "*In Rome they still hold onto the seven days of creation and it is a miracle, that Professor Hofmann was allowed to show us the history of creation that is counting in millennia; in Mainz it was forbidden by the bishop Ketteler* [bishop in Mainz]." (ANONYMOUS, 1869). The "laterna magica-slides" and "dissolving views" made Kuwasseg's images popular not only in Europe, but even in the USA (WIESER, 1901; BENEDIKT, 1920). A collection of Unger-slides was recently rediscovered at the College of Wooster (Ohio, USA). They were produced by "T.H. Mc Allister Optician, N.Y.", the most prominent producer of lantern slides (WILSON, 2016; WOOSTER GEOLOGISTS BLOG, Dec. 2016). Most probably also in 1858 Kuwasseg created another splendid watercolour cycle of

elaborately coloured 18 pictures ("Urwelt" held in UNIVERSITY OF VIENNA, Historical Collection of the Department for Botany and the Science of Biodiversity; SVOJTKA, 2015).

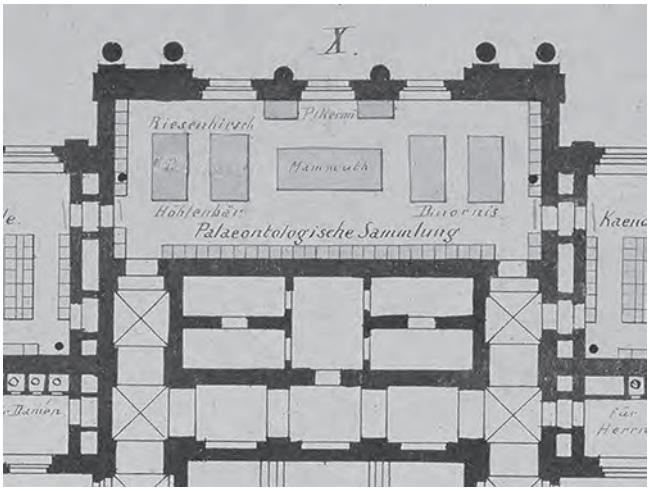
A project similar to Unger was Hochstetter's only children's book: "Geologische Bilder der Vorwelt und der Jetztwelt" (HOCHSTETTER, 1873). The initiative came from Jakob Ferdinand Schreiber (1809–1867). The Schreiber-publishing house (founded 1831) was very successful with children's and nature books and card kits. Schreiber convinced Hochstetter who was at first very reluctant because well aware of the difficulties related to that task. The children's book was based on the theory of evolution (although Darwin's name was not mentioned in the context of the origin of men).

The inspiration came from Unger (UNGER, 1851). But Hochstetter did not want to copy it like COTTA (1852) and LUDWIG (1855). He changed the focus from flora to fauna. The most important difference to Unger's concept was Hochstetter's decision to combine the eras with recent "character-pictures". Six of the 24 pictures show primeval landscapes, one shows Palaeozoic fossils whereas the remaining majority of 17 plates are "character pictures". Although the creator-god was not mentioned, the number of six eras reminds of the "six stages of creation". Regardless of Darwin's theory, the biblical narrative still shaped the perception of evolution. Hochstetter worked together with the illustrator Emil Rose (1821–1896). Born in Nuremberg he lived most of his life in Munich (STADTARCHIV MÜNCHEN). He worked for several publishing houses in Germany, illustrating children's books (e.g. BRAUN, 1873; STÖCKL, 1882). Hochstetter was not entirely convinced by Rose's illustrations: "*even if the result does not completely satisfy my expectations, I still hope that it serves the purpose*." (HOCHSTETTER, 1873: preface). It was the decorative programme of hall X that gave Hochstetter another chance for a more satisfactory realisation of the same idea.

The decorative programme of Hall X

The upper ground floor of the Natural History Museum Vienna (Text-Fig. 1) houses 19 halls with mineralogical, palaeontological, prehistoric and anthropological exhibitions and a lecture room. The decorations were – according to Gottfried Semper's "Gesamtkunstwerk" (SEMPER & SEMPER, 1884; EGGERT, 1978) – not only in perfect tune with the museum's principal purpose but also in closest relation to the collections displayed. All rooms were decorated with paintings and five of them (in the corners and the central hall) with additional "caryatides". According to HOCHSTETTER (1884), the idea stemmed from Carl Hasenauer, but Semper already made very detailed plans much earlier (JOVANOVIC-KRUSPEL & SCHUMACHER, 2014: 132f.). Altogether 111 paintings of landscapes, famous buildings, ethnographic scenes and primeval eras illustrate and explain the exhibitions. Their content was in Hochstetter's responsibility. Already in June 1882 the awarding of contracts for the wall-pictures started. On 5th September, the final commissioning was on the agenda (JOVANOVIC-KRUSPEL & SCHUMACHER, 2014: 162). Many of the paintings (al-

Text-Fig. 1.
Facade of the Museum of Natural History Vienna in the late 19th century (Anonymous, photo-archive, NHMW).



Text-Fig. 2.
Hall X, detail of a plan (signed by Hochstetter 1877) of the upper ground floor ("Hochstetter Collection Basel", Geological department, NHMW).

most 20 %) were completed by September 1883 (letter Hochstetter to Haast in: NOLDEN, 2007: 404). By May 1885, more than half of the pictures (61) were finished.

Hall X has a very distinct position due to four reasons:

1. It is the largest hall on this floor.
2. It is located in central position.
3. Its decorative programme consists of paintings and caryatides.
4. It is at the crossing point between the world before man and the beginning of cultural evolution.

Hall X was planned to present the collection of fossil birds and mammals with eleven Moa skeletons, a skeleton of an Irish Giant Deer and the skeletons of cave-predators as highlights (Text-Fig. 2). The collection of fossil plants was to be displayed on the back wall.

Nine of the total 17 pictures are by Josef Hoffmann, six by Heinrich Otto (1858–1923) and two by Robert Russ (1847–1922). Josef Hoffmann described the decorative concept of hall X in his booklet "Erläuterungen zu den Gemälden. Die Bildungs-Epochen der Erde und Charakterbilder für Asien und Central-Afrika" (HOFFMANN, without date) like this: "*The plan drawn up by the late Director, Ferdinand von Hochstetter, was to present characteristic pictures of the five continents of the world: Central Africa, South Asia, South America and South Australia should each be in one of the four corners of the room, while Europe should be represented on the main wall of the room through the portrayal of the various eras of the Earth with "The marine fauna and flora of the Silurian and Devonian periods", "The animal world of the Carboniferous period", "Characteristic picture of the Carboniferous period in Bohemia", "Characteristic picture of the Triassic period", combining the Northern and the Southern Limestone Alps, "The marine fauna and flora of the Jura in south-west Germany", "The chalk period in Lower Austria at the Hohe Wand near Wiener Neustadt" and "The Miocene period". On the opposite wall, the main types of today's world of plants are to be symbolised by examples of cactus, lilies, orchids and aroids. The last four pictures and the paintings of America and Australia are not yet to be executed*." (HOFFMANN, without date: 1).

Also the two "continent pictures" commissioned to Hoffmann had botanical topics: "Central Africa, character picture, baobab trees" and "Character Picture East India, Banyan tree" (finished in 1886).

After Hochstetter's death (1884), in 1886 the programme was slightly changed: Instead of just four, six paintings illustrating recent vegetation were commissioned: "Jungle at the River Amazon" and "Mangrove wood near Goa", both by Robert Russ (both missing today), "Giant cactus, *Cereus giganteus*, Mexico", "Spruce, *Pinus*, Europe", "Australian jungle, *Eucalyptus*" and "Giant sequoia, *Wellingtonia,* California" (last one missing today), all by the painter Heinrich Otto (1858–1923).

Also two large faunistic paintings were added: "*Elephas primigenius* Blum., mammoth" and "Dinornis, *Moa*, New Zealand" both by Heinrich Otto (HAUER, 1886: 29).

Josef Hoffmann's primeval paintings

A cycle of seven pictures are dedicated to palaeontology. The fact that life on earth was shown as development over millions of years (like UNGER, 1851) already stood in opposition to the biblical creation. Additionally, the position of this cycle on the edge to the beginning of human history (with the prehistory collection starting in the next hall) underlines their role in the museum of evolution.

The idea to decorate nature museums with primeval pictures was not completely new: A similar decorative idea had already been realised between 1875–1877 by Benjamin Waterhouse Hawkins (1807–1894). In 1875, Hawkins was commissioned with a series of 17 huge panoramic paintings of the geological eras. The paintings were hung in the new Elizabeth Marsh Museum of Geology and Archaeology at the College of New Jersey (now Princeton University). As GOSSE (2010: 3) states with this a new museum's tradition was started: "*Hawkins' murals are the first paintings illustrating this theme, setting a precedent for natural history museums in the decades to come.*" It seems very likely that Hochstetter knew about this and was encouraged for his own plan. Like Hawkins' also Hoffmann's paintings were created "*conscientiously and strictly according to all the results of science*." (HOFFMANN, without date: 1). The director of the Imperial Geological Institute, Dionýs Štúr (1827–1893) served as scientific adviser. He and Hochstetter had agreed that Hoffmann would be sent to him to get to know the subjects of his paintings (ŠTÚR, 1886). Hoffmann said he could not have completed the pictures without the richness of the Imperial Geological Institute's collections (RANZONI, 1885).

Like in Hochstetter's children's book (HOCHSTETTER, 1873) Hoffmann combined ideal landscapes of primeval eras with "character-pictures". In both (eras and character-pictures) Hoffmann put the emphasis on botany (like UNGER, 1851). It seems that the depiction of fossil animals was of minor importance for four reasons:

1. As already explained 24 caryatides by Rudolf Weyr (1847–1914) show primeval plants but also many animals as attributes: among them are the first Austrian 3-D-reconstructions of a flying dinosaur, an ichthyosaur and a plesiosaurus.

2. As the skeletons of the Cenozoic period were on display, the need to depict the animals might have seemed less important.
3. The paleo-botanic Unger-illustrations had become the iconographic epitomes of the primeval world.
4. Paleo-botany was one of the main topics of the exhibition.

The palaeontological pictures by Hoffmann can be divided into landscapes (size: approx. 380 cm x 190 cm) and into still-lives (size approx. 95 cm x 190 cm): Three landscapes show primeval eras (Carboniferous, Triassic and Cretaceous period; Pl. 1, Fig. 3; Pl. 2, Fig. 3; Pl. 6, Fig. 1). Two of these are still very much in the tradition of Emil Rose and Josef Kuwasseg (1799–1859). Especially the depiction of the "Carboniferous period" shows the reluctant iconographic transition. As the figures below show, all three pictures (Kuwasseg's, Rose's and Hoffmann's) are quite similar in their principal composition (Pl. 1, Figs. 1–3).

They show a swamp with the typical plants, like the Sigillaria trees and ferns. Like Kuwasseg Josef Hoffmann (Pl. 1, Figs. 1, 3) concentrates on the flora, but it has to be said that also in Rose's illustration (Pl. 1, Fig. 2) the animals are understated. Only Archegosaurus and some fish inhabit the landscape. Hoffmann himself said about his painting: "*the fauna was only hinted at*" (HOFFMANN, without date: 7).

The scene of the Triassic period shows the most "peculiar primeval Austrian flora", which is so unique that it cannot be found in any other museum in the world (ŠTÚR, 1886). It is another example for the strong pictorial tradition that shaped Hoffmann's compositions (Pl. 2, Figs. 1–3).

The main difference between Hoffmann and his predecessors can be seen in the more dramatic lighting atmosphere. The light-impressions seem to have become more important than the authentic representation of the landscapes. Nevertheless, the realistic depiction was astonishing for the audiences: "*The trees, ferns and horsetails appear so realistic and familiar like the sycamore trees or the trees of heaven in our city park or the white poplars and chestnut trees in Prater.*" (RANZONI, 1885: 4). The third primeval landscape "Idealized scene from the Late Cretaceous period, Alps in Lower Austria" (Pl. 6, Fig. 1) is a rather free composition. Josef Hoffmann chose a reknown Austrian area with the mountain formations "Hohe Wand" and "Wechsel" as a background. As Štúr pointed out, this painting is "*through and through an Austrian picture*" (ŠTÚR, 1886: 346). But despite this Kuwasseg's images still were an important source. As Josef Hoffmann states in his booklet the palm tree in the middle of the painting is a one-to-one quote from Unger's "Urwelt": "*Almost in the middle of the picture is the beautiful feather palm tree* [German: Fiederpalme] *of the new world, that already Unger published*" (HOFFMANN, without date: 10).

Apart from the landscapes, which are still in the tradition of Unger, Josef Hoffmann created also some very independent picture-compositions. The four still-lives: "Marine fauna and flora, Jura" (Pl. 3, Fig. 1), "Marine fauna and flora, Silurian and Devonian" (Pl. 4, Fig. 1) "Fauna and flora of Carboniferous coal deposits, Bohemia", and "Fauna and flora, Miocene" (Pl. 5, Fig. 1) are mainly characterised by their ornamental compositions.

The reason for these ornamental arrangements was: *"The limited space that was provided for the paintings forced to restriction […] starting with the Silurian and Devonian period even these two periods had to be contracted into one painting, which had to get a more ornamental form to present all items in the same clearness*." (HOFFMANN, without date: 4). Some art-critics were critical about this: "*I wished the artist had had more room, maybe whole walls, to make use of all the previous studies and sketches he made*." (R., 1885: 434f.), but others praised the results (RANZONI, 1885; two sketches are held at WIEN MUSEUM: M1130-165093 and M1130-165092).

From today's point of view Hoffmann's still-life compositions seem far more innovative than his landscape paintings. Whereas the landscapes still vary the tradition, the still-lives point in a future direction (Pl. 3). Their resemblance to images created later by Anton Seder (1850–1916; "Die Pflanze in Kunst und Gewerbe", SEDER, 1886–1890; Pl. 3, Fig. 2) or Ernst Haeckel (1834–1919; "Art forms of Nature", HAECKEL, 1899–1904; Pl. 3, Fig. 3) which shaped the arts and crafts of Art Nouveau proves their progressive potential.

Especially Haeckel's "Art forms of Nature" dwell on a similar idea. Haeckel and Hoffmann – both opened a completely new source for art. For Haeckel it was the microscopic world: "*The main purpose of my art forms was an aesthetic one. I wanted a wider circle of educated people to gain access to the wonderful treasures of beauty, which are hidden in the depth of the seas or can only be seen through the microscope because of their small size.*" (HAECKEL, 1899–1904 cited in LÖTSCH, 1998: 354). Hoffmann instead opened the fossil world. 1853 already Bernhard Cotta had urged artists to use fossil forms as an art source: "*Until now only a few artists tried to dwell on this source to gain their patterns and motives from the primeval world. Almost the only attempt to treat the fossil world in an artistic way, were Unger's primeval landscapes; but their purpose is still the instruction […]. Why should the primeval forms not become the subject and the mean of art as such?*" (COTTA, 1871: 338).

Beside their educative purpose, Hoffmann's paintings used fossils in a realistic but also a free way for his compositions. He even gave up the exact proportions for better artistic results (HOFFMANN, without date: 4). The same can be seen with Haeckel. He also beautified his observations for the benefit of the aesthetic effect. In contrast to his own statements that his art forms were true to nature and "all stylistic and decorative use" was left to the visual artist (HAECKEL, 1899–1904; see FRANZ, 1998) a description (BÄTSCHMANN, 1989 in FRANZ, 1998: 476) pins down what every beholder intuitively feels: "*What can be found in nature from the simplest water beasts to the hummingbirds or antelopes was artfully organised on plates by Haeckel and Giltsch [Chromolithographer Adolf Giltsch 1852–1911], fitted into the higher framework of a complex symmetry to engage directly with the sense of beauty*." This same ethos of being true to nature and science and the desire to achieve beauty guided Hoffmann. At least as a side remark, it should be pointed out that Haeckel probably knew Hoffmann's paintings and might have seen them as an inspiration.

Josef Hoffmann's paintings were broadly discussed in public. Soon after their completion (May to June 1885) the paintings were exhibited at the "Österreichischer Kunst-Verein" with the booklet as catalogue (HOFFMANN, without

date). Most probably at the same time (in 1885/1886) the Imperial and Royal court photographer Josef Löwy took photographs of the paintings (Pl. 4, Fig. 2; Pl. 5, Fig. 2; Pl. 6, Fig. 2), which Hoffmann distributed to various institutions like the Academy of Sciences, the Imperial Geological Institute and the NHMW (ANONYMOUS, 1886; NHMW / Archive for the History of Science; ŠTÚR, 1886). Hoffmann held talks about their content for the interested public (June 3rd, 1885 see RANZONI, 1885). The catalogue was meant as an instruction for the beholder. "*Whoever takes the trouble to read the catalogue and to look at the paintings would learn more in one hour's time about the evolution of earth than by sitting for half a day over a geological book*" (RANZONI, 1885: 4). The paintings were meant to instruct the viewer and by this they contributed to Hochstetter's aim to establish the new museum as a public class room. But apart from their pedagogic aspect some of Hoffmann's paintings had progressive artistic potential and their impact is still understudied. Thanks to the distribution of Hoffmann's catalogue and the Löwy-photos, the images even found their way to Mexico. The next part of this article will focus on this astonishing "export".

Velasco's Geological Series for the Instituto Geológico Nacional

In September 1906, the Instituto Geológico Nacional opened its new headquarters in Mexico City. This new space was envisioned as a cosmopolitan institution devoted to the development of geology and the building was conceived within a broader project of urban transformation of the capital city. Between the 1880s to the 1910s, the city saw the creation of multiple scientific and cultural institutions. During this period, known as the *Porfiriato*, a reference to General Porfirio Díaz (1830–1915), who held the presidential seat for seven terms between 1876 to 1911, the architecture of the city saw several changes in order to realise an ideal and a cosmopolitan city in the lead up to celebrations for the centennial anniversary of Mexican Independence in 1910. That same year the Mexican Revolution erupted (TENORIO TRILLO, 1996).

Located in Santa María la Ribera, in the northwest area of the city, where many of the privileged neighborhoods for urban development were located, the building for the Instituto Geológico Nacional was constructed by the architect Carlos Herrera López. It was designed in the neoclassical style, popular during the epoch, and had two floors. On the ground level, the entrance of the building had three main doors with semicircular arches. The upper floor, had details such as a large balcony, Ionic columns, and medallions that decorated the walls. The building façade was decorated with figures of shells, fish, and reptile fossils (Text-Fig. 3).

Antonio del Castillo (1820–1895), a prominent Mexican mineralogist and geologist, who introduced Charles Lyell's theories in Mexico, founded the institution in 1888. The institute's main goal was to create a national geological cartography and to expand the field of geological studies, which until then was dominated by knowledge about mining (AZUELA BERNAL, 2005: 170). After del Castillo's death in 1895, his student José Guadalupe Aguilera (1857–1941) took over directorship of the institute and advanced the projects begun by the former. Aguilera materialised the project with the construction of the building in 1906. For the building's inauguration, Aguilera commissioned a series of ten paintings depicting the geological eras to José María Velasco, who was the most well-known landscape painter in the country at the time (ALTAMIRANO PIOLLE, 1993: 442).

Inside the institute's building, the collections of minerals and fossils were exhibited on the ground level. This space was conceived as a museum exhibition of many geological objects, from minerals to fossil specimens. The upper lev-

Text-Fig. 3.
Facade of the Museum of Geology (Anonymous, Gelatin-silver plate. Photographic archive of the Division of Graduate Studies of the ENAP, San Carlos).

Text-Fig. 4.
Upper part of the main foyer of the Museum of Geology (Anonymous, Gelatin-silver plate. Photographic archive of the Division of Graduate Studies of the ENAP, San Carlos).

el housed the offices and workspaces and in the corridor Velasco's paintings were displayed (Text-Fig. 4). There one can see an allegory of geology, stained glass windows depicting places and geological features of the country, and in a prominent way, Velasco's geological series.

Plenty of similarities can be found between the *Instituto Geológico* and the Natural History Museum in Vienna. The most stunning similarity is the iconography of the *Eras* series, which was almost copied from Josef Hoffmann's series in Vienna. The exact date in which Velasco's paintings were created is unknown, but, for the reasons explained below, we can assume that it was in 1905. Fact is that the series of ten large canvases was already there when the institution opened in 1906. The Mexican landscapist added three more pictures to complete the geological series that Hoffmann created in Vienna.

It is worth comparing Hoffmann's and Velasco's professional careers. Both artists were landscape painters by training and, similar to other artists of the time, deeply involved in scientific endeavours. These two artists were part of a nineteenth century wave of scientific visualisation catalysed by the beginning of a broad circulation of image reproduction.

Velasco's formal education began in 1858 at the *Academia de Bellas Artes de San Carlos.* Founded in the eighteenth century, the *Academia* installed the neoclassic style and the aesthetics appreciated by the Spanish Bourbon monarchy in New Spain. It was not until 1855 that the teaching of landscape started at the academy, through the Italian landscape painter Eugenio Landesio (1810–1879), who was Velasco's teacher. Landesio was essential to Velasco's engagement in science (Nulman Magidin, 2009), but also the flexible curricula during that period in the Academy allowed the young student to take lessons at scientific institutions like the *Escuela Nacional de Medicina* (National School of Medicine) where he studied zoology and botany (Trabulse, 1992: 137).

As a landscape painter, Velasco yielded much success. He was an appointed teacher of landscaping at the Academy in 1877, and he was responsible for the entries of Mexican painting for the Paris Exposition Universelle of 1889. Throughout his entire career, Velasco's landscapes showed a meticulous attention to drawing and composition. Moreover, the Mexican painter was successful also in field of science. He was member of the *Sociedad Mexicana de Historia Natural* (Mexican Natural History Society) and collaborated with the magazine of the institution *La Naturaleza* (Nature) by creating hundreds of scientific images. He contributed his own scientific studies to the magazine including an article about the "Axolotls" (an amphibian: *Ambystoma velasci*, Dugès 1888) that questioned the observations and conclusions of August Weismann's neo-Darwinist approach about the same species (Trabulse, 1992: 212).

All these qualifications made Velasco the ideal artist to produce the visualisation of the geological eras for the *Instituto Geológico*, fundamental for a coherent representation of the "deep-time". Velasco's work would qualify as a copy in the way that he took the photographs of Josef Hoffmann's series and translated them into the canvas, in a homogenous vertical format (Pl. 6; Pl. 2, Fig. 3; Pl. 7, Figs. 1, 2). Because the paintings underwent restoration in the 1990s, it is unclear if the signatures on them are the painter's originals. In some cases, the phrase "Velasco copió" (Velasco copied) is visible. This gives the impression that the intention was to leave testimony to the fact that what he was doing was a kind of reproduction.

As already stated above, Josef Löwy captured the photographs of Hoffman's paintings probably about 1885/1886. Most likely José Guadalupe Aguilera, the commander of the *oeuvre*, delivered them to Velasco. There are two hypotheses regarding how these photographs ended up in the hands of Velasco. The first is that Antonio del Castillo, during his visit to the Vienna Natural History Museum in

1888, acquired a copy of the photographs, perhaps distributed by the museum to foreign institutions and delegations (Löwy-photographs: Pl. 4, Fig. 2; Pl. 5, Fig. 2; Pl. 6, Fig. 2). The second is based on the fact, that Aguilera was in Vienna for the 9th session of the International Geological Congress (IGC) in 1903, where he could have retrieved them as well (ANONYMOUS, 1904: 81).

Regardless of whoever appropriated these photographs, what is clear is the solid bond between Austrian and Mexican geology during these years. Only three years after the 9th International Geological Congress (IGC) in Vienna, the Mexican capital hosted the 10th session of the IGC, where at least 31 Austrian geologists participated. From the press coverage in national newspapers, we know that Emil Tietze (1845–1931) and Carl Diener (1862–1928) gave opening lectures. (ANONYMOUS, 1906a; ANONYMOUS, 1907).

This event was covered in detail by national newspapers and international reports, depicting Mexico City as a cosmopolitan metropolis and a country with advanced sciences. During the conference, many foreign geologists gave their presentations and travelled across the country to conduct fieldwork. For many of them these short trips were a great opportunity to observe the geological particularities of America. Additionally, the Díaz regime utilised this conference for propaganda: it showcased the facilities granted to the international guests and promoted the fact that they were travelling securely throughout the country, mainly by train (ANONYMOUS, 1906b).

From this point of view, Velasco's series can be seen as part of a general effort to construct Mexico as being on a not so distant level with Europe. Most likely, when visiting the *Instituto Geológico* the Austrian geologists were able to identify the iconographic source of the paintings and even perceived the changes in style introduced by the Mexican landscapist (Pls. 4–7). In a certain way, this observation could have led them to feel an affinity with Mexico (a land not so long ago ruled by Maximilian of Habsburg) and to be proud of the outreach of Austrian sciences overseas. From a different point of view, the relation between Austrians and Mexicans went far beyond mimicry. The visualisation of the eras challenged prevailing notions of nature as a place of harmonious order; it also defined a set of coordinates in time, space and species that were used to give boundaries to the object of the geological discipline.

Although Velasco and Aguilera, like their Austrian counterparts Hoffmann and Hochstetter, would have been able to create a genuine representation of the *Eras*, they chose to copy it. There is no doubt that Aguilera and researchers at the Institute knew the different geological strata of the country very well. In 1893 he published his study *Datos para la geología de México* (*Elements for Mexico's Geology*), in which he tried to do a systematization of the geological areas of the entire country (AGUILERA & ORDOÑEZ, 1893). Carl E. Burckhardt (1869–1935), an Austrian geologist, became a researcher at the Instituto G*eológico* in 1904 and specialised in the fossils of the Mesozoic. Burckhardt also systematised several marine invertebrates found in Mexican soil in his work Étude synthétique sur le Mésozoique mexicain (*Summary study of the Mesozoic in Mexico*, published until 1930) (BURCKHARDT, 1930). Velasco and Aguilera had other sources on which to rely for the task of depicting geological time, like the Spanish edition of Louis Figuier's *Earth Before the Deluge* (*El mundo antes de la creación del hombre*, 1870) (FIGUIER, 1870a). However, for practical reasons or not, they preferred the particularly compact solution, in seven episodes, that Hochstetter-Hoffmann had created.

It has to be pointed out that Velasco added to the seven episodes taken from Hoffmann's iconography (e.g. Pl. 4–7) three more paintings (Pl. 8, Fig. 2; Pl. 9, Figs. 3, 4). For this ending trilogy, he relied on other sources. Therefore, an examination of the ten paintings has to use two orientations: first, an iconographic and stylistic comparison between Hoffmann and Velasco's series, and secondly, a comparison in style, composition and subject of Velasco's last three scenes with the rest of the Mexican and Austrian representations.

Even though it is probable that Velasco could not identify the species represented by Hoffmann when he copied them from the plates he had, he did it in a very accurate way, making it possible for viewers to recognise each figure. Unlike Hoffmann, neither Velasco nor Aguilera wrote a description explaining the iconography. In the first painting of the series, the representation of Silurian and Devonian eras (Pl. 4, Figs. 1–3), Hoffmann painted a sort of winged fish with a shell (described by Hoffmann as "gepanzerte Flügelfische"), a *placoderm*, probably from the genus of *Bothriolepis*, present in the late Devonian period.

In the paintings by Velasco almost every specimen is presented but with little modifications, such as the former shelled-fish, with its two seemingly winged-fins, without the appearance of having a shell. Velasco interpreted it, as it was only a kind of winged fish; he did not go so far as to investigate the correct morphology of the specimen. The study of the palaeontologist SILVA-BÁRCENAS (1991), based only on the Mexican paintings, attempted to name all of the species represented. For this first image of the series, he found the following species: a moss from the genus: *Entalophora*; an *Archimides*; the coral *Rhipidiogorgia*; the cephalopod of the genus *Lituites*; a gastropod *Eumophalus*; a crinoid *Scyphocrinites*; and an alga *Chorda*.

Hoffmann did not describe in detail every species he drew, but for the alga represented we know that it was a *Zostera marina* L. 1753, ("Bandtang"), not a *Chorda*. It results then that today, based on Hoffmann's description, a new interpretation of the represented specimens is possible. Table 1 proposes certain amendments to Silva-Bárcenas description.

Although Velasco respected almost every element in some cases he changed, the drawing dramatically and by this transformed also its meaning profoundly. An example of this is the fourth painting of the series: *Characteristics of the Trias Period: the Northern and Southern Chalk Alps* (Pl. 7, Figs. 1, 2, compare to Pl. 2, Fig. 3). In this image, the full process from transporting the iconography can be observed.

In the original painting by Hoffmann (Pl. 2, Fig. 3) a "frog dinosaur" ("Froschsaurier") is painted on the right side, near the ground, standing in a marsh. Because not very clear in the photograph, Velasco did not represent it in his first sketch (Pl. 7, Fig. 1) of the final painting. This was not the case for the animals in the centre of the scene: a *Plesiosaurus* CONYBEARE 1821 and a *Belodon* VON MEYER, 1844 identified as such by Hoffmann, and consistently repre-

Title*	Eras/periods in contemporary scale	Species according to Silva-Bárcenas (1991)	Species proposed in this work
1. The Silurian and Devonian marine, fauna and flora.	*Era*: Palaeozoic. *Period*: A) Silurian; B) Devonian.	Entalophora; Archimedes; Rhipidiogorgia; Lituites; Eumophalus; Scyphocrinites; Chorda	*Zostera marina* (L., 1753).
2. Animal and plants of the coal period.	*Era*: Palaeozoic. *Period*: Carboniferous.	Sigillaria, Lepidodendron; Calamites.	*Archaeocalamites radiatus* (Lacey & Eggert, 1964). *Calamites suckowi* (Brongniart, 1828). *Noegerathia*, *Rhacopteris*.
3. Characteristics of the Coal period in Bohemia.	*Era*: Palaeozoic. *Period*: Carboniferous.	Labyrinthodontia *Eryops*; Urocordylus, Dolichosoma; Mishoptera; Pteridospermas; Gimnosperma; Calamites	*Westlothiana lizziae* (Smithson & Rolfe, 1990).
4. Characteristics of the Trias period: the northern and southern Chalk Alps.	*Era*: Mesozoic. *Period*: Triassic.	Calamites; Neocalamites	
5. Marine fauna and flora in the Jura period.	*Era*: Mesozoic. *Period*: Jurassic.	Amonnoidea *Macroscaphites*; Gastropoda *Murex*; Crinoids *Scyphocrinites*; sponges Craticularia, Tremadictyon; corals *Leptoria*, *Cladangia*, *Isastrea*; cefalopodes; fishes; Bryozoans *Archimedes*, *Diastopora*, *Bugula*; Crinoids *Batocrinus*; Cephalopoda Belemnoidea.	
6. Characteristics of the Chalk period in Lower Austria: Hohe Wand near Wiener Neustadt.	*Era*: Mesozoic. *Period*: Cretaceous.	Angiosperms	
7. Animals and plants of the Miocene period.	*Era*: Cenozoic. *Epoch*: Miocene.	Rhinocirotidae *Teleoceras*; Schizoteriinae *Moropus*; Pongidae; Conifers.	*Palaeotherium* (Cuvier, 1804) *Cercopithecus* (L., 1758).
8. Flora and fauna of Quaternary Pliocene-Pleistocene.	*Era*: Cenozoic. *Periods*: *A)* Neogene; *B)* Quaternary.	*Similodon californicus*	*Machairodus* (Kaup, 1833).
9. Scene from the Quaternary Inferior Palaeolithic.	*Era*: Cenozoic. *Period*: Quaternary.	*Homo neanderthalensis*	*Homo sapiens*
10. Scene from the Quaternary Superior Palaeolithic.	Era: Cenozoic. Period: Quaternary.	Cro-Magnon man	*Homo sapiens*

Tab. 1.
List of species depicted in Velasco's paintings at the Museo de Geología (UNAM).
*The titles listed here are taken from the names in English visible on the paintings' photographs. From number 8 to 10 the names follow the proposal by Silva-Bárcenas (1991).

sented in former iconographies about the era, for example in Franz X. Unger's *Ideal Views of the Primitive World* (Unger, 1863). Velasco ambiguously sketched the two reptiles to appear more like serpents or *Tetrapodes*. He decided not to represent any animal in the final version (Pl. 7, Fig. 2). In this image, the representative fauna established by many iconographies was completely omitted. The era was interpreted as mainly vegetative, subjected to violent geological changes, represented synthetically by the two smoky volcanoes in the background, and the impression of polluted air.

The suppression of fauna can also be seen in other images in the series, like *Characteristics of the Chalk Period in Lower Austria: Hohe Wand near Wiener Neustadt* (Pl. 6). In the original painting by Hoffmann (Pl. 6, Fig. 1), and depicted as well in the photograph (Pl 6, Fig. 2), there is a recognisable topography of Austrian lowlands, where the local spectator could see the ancient geological and ecological features of *Wiener Neustadt* as an ancient lake. Near to the right margin of the canvas, an *Iguanodon* Mantell, 1825 climbing a tree is depicted. In contrast, Velasco's version (Pl. 6, Fig. 3) removed the dinosaur, as well as many of the important vegetation and the mountain landscape.

The scene painted by Hoffmann possibly intends to represent the recent geological studies in a familiar space. The Mexican landscapist instead created an ideal and almost-universal place by narrowing down the things represented and by smoothing out the background. Velasco did not want to present a specific place. Instead, he tried to achieve an abstraction of time. We can conclude that Velasco made changes not only in iconography but also in style, which were fundamental for giving his series new meaning.

In all of Velasco's pictures actions of suppression, slimming down, production of a depth-field, and space openness are repeated. This contributes to a much more schematic sequence. By cutting the three Hoffmann images horizontally and transforming them into a vertical format, Velasco made all canvases uniform. These changes are evident in the pictures Hoffmann called "still-life" ("Stilleben"): the images for the Silurian and Devonian (Pl. 4, Figs. 1–3), the "Coal Period" (Carboniferous; Pl. 7, Fig. 3), and for the Jurassic (compare Pl. 3, Fig. 1 with Pl. 7, Fig. 4). In every case, Velasco lightened the arrangement of all objects, opened the margins and gave depth to the composition. If Hoffmann, for these cases, was using the visual characteristics of the "still-life" in almost a two-dimension-

al representation, Velasco applied the conventions of landscape view to compose his three images. This is particularly evident for the scenes of Silurian-Devonian eras and the Jurassic period: in both he added a diffuse light in the background to emphasise a feeling of space depth. Moreover, this stylistic attitude is equally valid for the rest of Velasco's series.

All these changes raise the question about the continuity of the series' general meaning for the Mexican context. The visualisation of the eras had several implications for an evolutionist point of view of Earth's history. The perception of lengthened time, carried by the view of "eras", was central to the explanation of evolution, and its visualisation in "ecological" scenes was key in order to put the pieces together between many different realms of nature's observation (RUDWICK, 1992). There is no doubt that Josef Hoffmann held an evolutionist point of view when he expressed his opinion on the significance of fossils. However, Velasco, a fervent catholic who directly fought evolution theory decades before, was most likely not thoroughly subscribing to the same idea of evolution as Hoffmann but instead to a progression of natural stages that brought better conditions for human living. This can be exemplified in Velasco's final addition to Hoffmann's series (Pl. 8, Fig. 2; Pl. 9, Figs. 3, 4).

Who had the idea to continue the geological series by adding three more paintings? It was either Velasco or Aguilera; we do not know with certainty. However, there is no doubt that one of them had the intention to give a proper "finale" to Earth's history. The three ending scenes Velasco painted to complete the series demonstrate a serious departure from Hoffmann's quest and rely completely on different sources. The three scenes added are not representing the same time scale. The first one is dedicated to the Pleistocene and the following two are representing the Holocene. The "Flora and Fauna of Quaternary: Pliocene-Pleistocene" represented a Saber-toothed tiger, from the genus *Machairodus* (Pl. 8, Fig. 2). The original source of the scene "Quaternary Scene from the Superior Paleolithic" can be found in the illustrations for HENRY ROBERT KNIPE's (1854–1918) book, *Nebula to Man*, from 1905. Knipe commissioned different artists to create a variety of images for his book. Lancelot Speed (1860–1931), a book illustrator and film director of silent movies, drew the image of the *Machairodus* (Pl. 8, Fig. 1). The result is very different compared to Hoffmann's representations (KNIPE, 1905: 162). The scene pretends to capture dramatically an instant in motion. It depicts two Saber-toothed tigers arriving to an open space in the jungle after hunting their prey: monkeys. The tiger in the foreground has stopped, turns his head to the monkey, and gestures a move as if about to jump. The tiger in the background has thrown himself onto his prey, hidden in the bush.

The other scene also taken from Knipe's book is the ending image in Velasco's series (compare Pl. 9, Figs. 2–4). Two men and three women are gathered around a campfire, where a male engraves a drawing in a mammoth's tusk. The title of the image in the book was "Cave Men (Hunter-Artists)". This was another "scene", in the sense that it was capturing a concrete instant, even an anecdote. However, we have to consider that the original image in the book does not show as much as Velasco did in his canvas (Pl. 9, Fig. 4). In addition, strangely it was not attributed to any artist as Knipe did with several other pictures. It is probable that the image in the book was already a copy from another painting. It is surprising however, the short amount of time in which Velasco appropriated this iconography. Probably Velasco had been preparing his sketches in the same year Knipe's book was published.

Knipe's *Nebula to Man* sought to popularise the geological advancements of its epoch from an evolutionist insight. It was planned as an account of Earth's history from a nebula in space to the human "modern period", in the form of an epic poem of more than two hundred pages. The book served as a way to popularise science but also as platform to combine new arguments to establish relations between geological observations, evolution theory, and human descent. In fact the book broke with the tradition of representing "primitive humans" like modern humans, as it had been done before in LOUIS FIGUIER's book "L'homme primitif" (1870b), and presented two drawings of hominids. One of them was the *Pithecanthropus* (today known as *Homo erectus*), drawn also by Lancelot Speed (Pl. 9, Fig. 1).

Certainly the scenes selected by Velasco and/or Aguilera were not the most controversial. They adopted the solution – by this time already conservative – of representing all prehistoric humans like modern human beings (Pl. 9, Figs. 3, 4). In addition to this, in formatting all images into the canvases' same vertical dimensions, Velasco created the appearance of continuity and succession of times. This was, without doubt, a key issue for the visualisation of eras and for geology itself in its goal to provide an explanation of change, even if there was not, in Velasco's final tri-sequence, an attempt to gather a multitude of species and to refer them to particular geological and environmental conditions – as Josef Hoffmann tried in his seven pictures.

Velasco's treatment of human evolution without framing it into a particular time-scheme, from catastrophism to uniformitarianism, avoided the question how humankind developed. Moreover, clearly, for a narrative on human evolution the ending scenes can be read as an improvement of life conditions and a sequence of cultural progression. Velasco tried with his series to make geological observation independent from any point of view. By this, it corresponded well to positivist ideals of late nineteenth century Mexico.

Velasco was not replicating the pictorial path of Hoffmann's paintings and past representations of geological eras. More than an interpretation of Earth's deep time, he was constructing a geological imaginary as cosmopolitan and objective knowledge. In this sense, the appropriation by Velasco was not simply an attempt to visualise geological time as to create a standard of it, that at the same time, could be replicated elsewhere through the global circulation of images.

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Plates

Plate 1

Fig. 1: Josef Kuwasseg: Carbon, watercolour (ca. 1858), University of Vienna, Historical Collection of the Department of Botany and Biodiversity Research, Sign. P1 (photo: Matthias Svojtka).

Fig. 2: Emil Rose: Carboniferous period, Europe (reproduced from HOCHSTETTER, 1873: Plate 2).

Fig. 3: Josef Hoffmann: Carboniferous Period, Bohemia, NHMW, Hall X (photo: Alice Schumacher).

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Plate 2

Fig. 1: Josef Kuwasseg: Coloured Sandstone, watercolour (ca. 1858), University of Vienna, Historical Collection of the Department of Botany and Biodiversity Research, Sign. P1 (photo: Matthias Svojtka).

Fig. 2: Emil Rose: Triassic period, Europe (reproduced from HOCHSTETTER, 1873: Plate 3).

Fig. 3: Josef Hoffmann: Idealized scene from the Triassic period in Carinthia and Styria, NHMW, Hall X (photo: Alice Schumacher).


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Plate 3

Fig. 1: Josef Hoffmann: Marine fauna and flora, Jura, Hall X (photo: Alice Schumacher).

Fig. 2: Reproduced from SEDER, 1886–1890: Plate 28.

Fig. 3: Reproduced from ERNST HAECKEL, 1899–1904: Plate 6, „Tubulariae“.


Marine Fauna und Flora.
Jura.
J. Hoffmann.

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Nereocystis Lütkeana
Agloophyllum
Epineuron spiralis
Padina pavonia
Sargassum
Hippoglossum
Laminaria saccharina

Plate 4

Fig. 1: Josef Hoffmann: Marine fauna and flora, Silurian and Devonian periods, NHMW, Hall X (photo: Alice Schumacher).

Fig. 2: Josef Löwy: Josef Hoffmann, The Silurian and Devonian Marine, fauna and Flora, ca. 1885–1886, 9 x 14 cm, Velasco's family archive (reproduced from ALTAMIRANO PIOLLE, 1993: 445).

Fig. 3: José María Velasco: The Silurian and Devonian Marine, fauna and Flora, ca. 1905, Oil on canvas, 260 x 140 cm, Museo de Geología, UNAM.

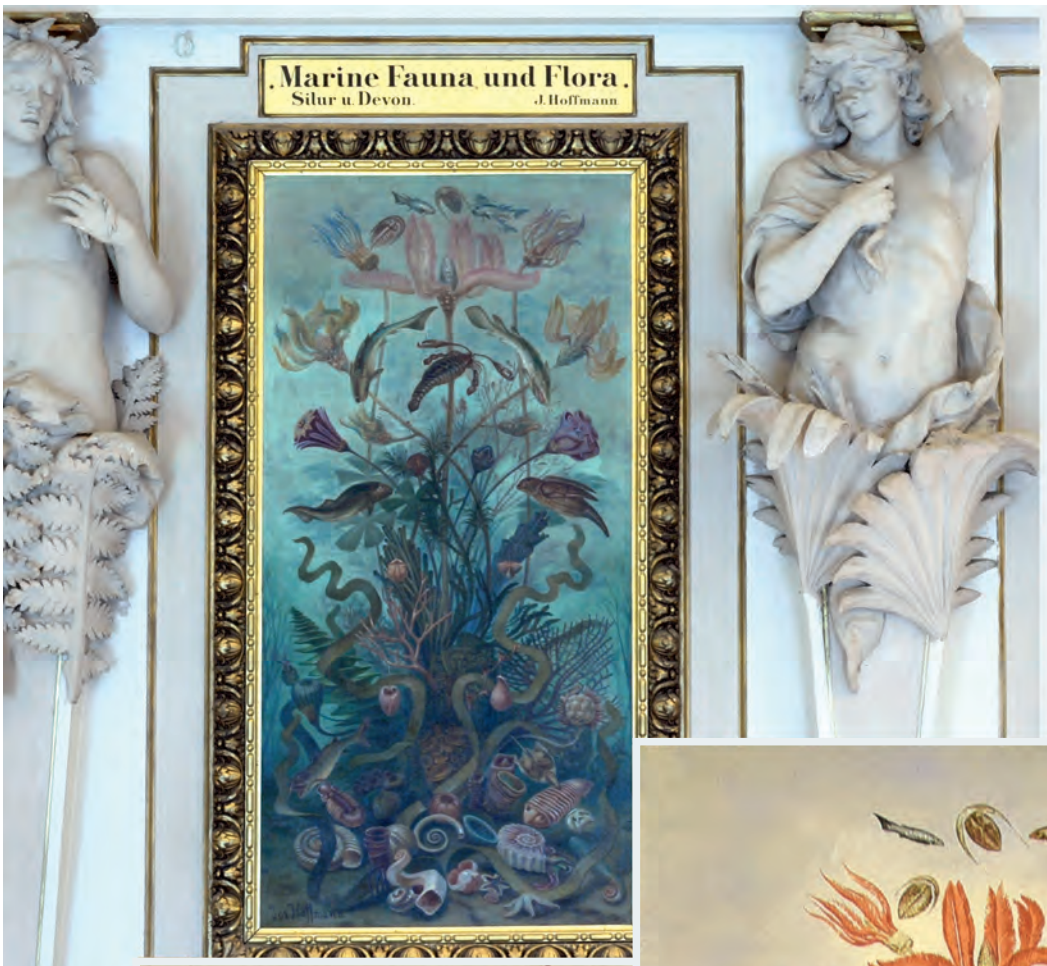

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Plate 5

Fig. 1: Josef Hoffmann: Fauna and flora Miocene, Hall X (photo: Alice Schumacher).

Fig. 2: Josef Löwy: Josef Hoffmann, Animals and plants of the Miocene period, ca. 1885–1886, 9 x 14 cm, Velasco's family archive (reproduced from ALTAMIRANO PIOLLE, 1993: 451).

Fig. 3: José María Velasco: Animals and plants of the Miocene period, ca. 1905, Oil on canvas, 260 x 136 cm, Museo de Geología, UNAM.

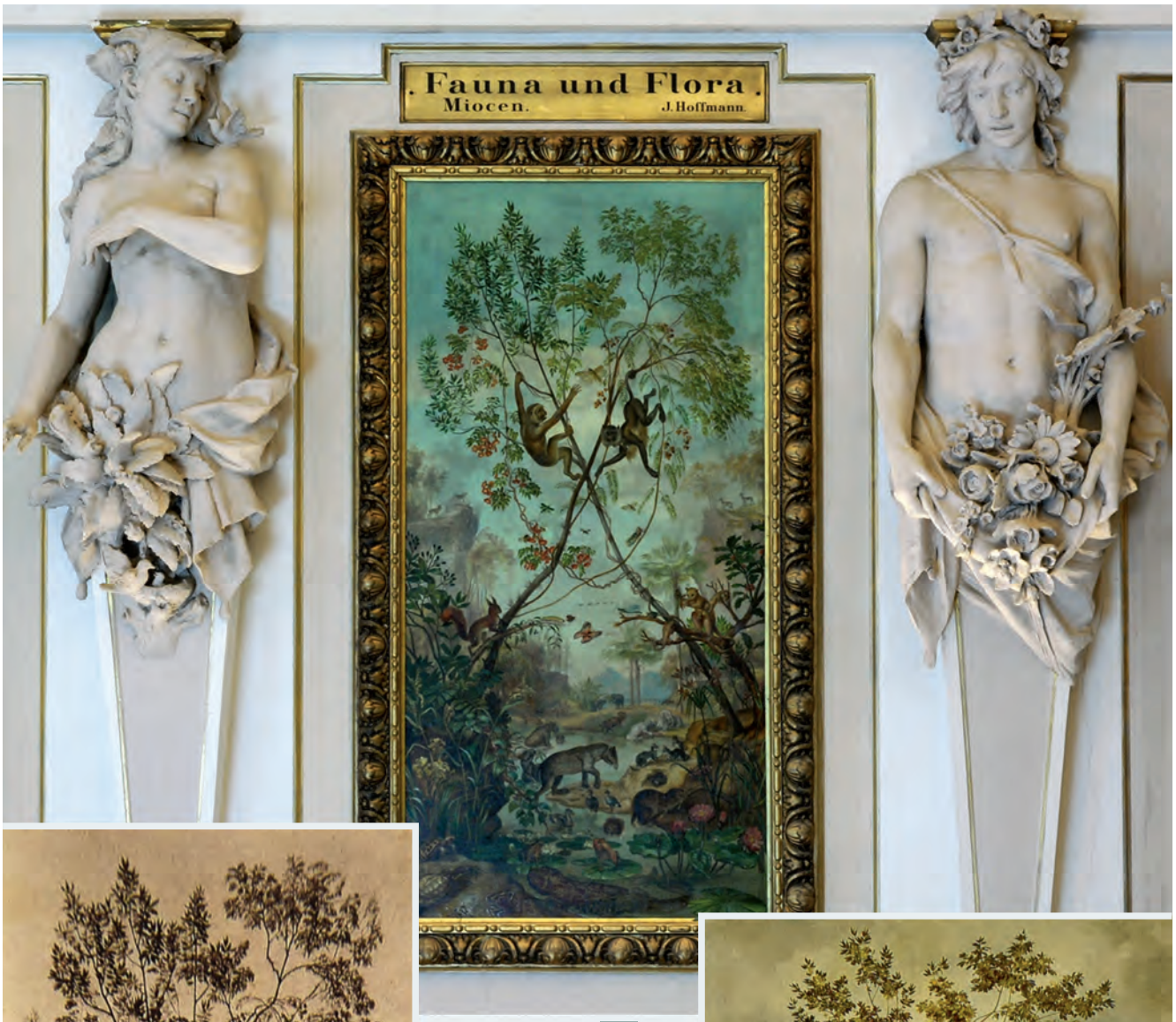

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Plate 6

Fig. 1: Josef Hoffmann: Idealized scene Late Cretaceous period, Alps in Lower Austria, NHMW, Hall X (photo: Alice Schumacher).

Fig. 2: Josef Löwy: Josef Hoffmann, Characteristics of the Chalk period in Lower Austria: Hohe Wand near Wiener Neustadt, ca. 1885–1886, 9 x 14 cm, Velasco's family archive (reproduced from ALTAMIRANO PIOLLE, 1993: 450).

Fig. 3: José María Velasco: Characteristics of the Chalk period in Lower Austria: Hohe Wand near Wiener Neustadt, ca. 1905, Oil on canvas, 260 x 154 cm, Museo de Geología, UNAM.

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Plate 7

Fig. 1: José María Velasco: Characteristics of the Trias period: the northern and southern chalk Alps [sketch], ca. 1905, oil on cardboard, 23 x 15 cm, Museo Nacional de Arte.

Fig. 2: José María Velasco: Characteristics of the Trias period: the northern and southern chalk Alps, ca. 1905, oil on canvas, 260 x 110 cm, Museo de Geología, UNAM.

Fig. 3: José María Velasco: Animal and plants of the coal period, ca. 1905, Oil on canvas, 260 x 136 cm, Museo de Geología, UNAM.

Fig. 4: José María Velasco: Marine fauna and flora in the Jura period, ca. 1905, Oil on canvas, 260 x 152 cm, Museo de Geología, UNAM.

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Plate 8

Fig. 1: Lancelot Speed: "*Machairodus*" (reproduced from KNIPE, 1905: 162.)

Fig. 2: José María Velasco: Flora and fauna of Quaternary Pliocene-Pleistocene, ca. 1905, Oil on canvas, 260 x 110 cm, Museo de Geología, UNAM.

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Plate 9

Fig. 1: Lancelot Speed: “Pithecanthropus” (reproduced from KNIPE, 1905: 165).

Fig. 2: Anonymous: “Cave-men (Hunter-artists)” (reproduced from KNIPE, 1905: 162).

Fig. 3: José María Velasco: Scene from the Quaternary Inferior Paleolithic, ca. 1905, Oil on canvas, 260 x 136 cm, Museo de Geología, UNAM.

Fig. 4: José María Velasco: Scene from the Quaternary Superior Paleolithic, ca. 1905, Oil on canvas, 260 x 140 cm, Museo de Geología, UNAM.

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