Metamorphosis between field and museum: collections in the making.

Kurt Schmutzer[*]

Abstract

Millions of specimens assembled in museums for Natural History around the world represent the outcome of numerous historic scientific voyages. Before individual animals become part of an exhibition or collection as classic representatives of its species, the specimens undergo several transformations. The specimens shown at the museum are 'made' objects, produced by cultural practices. The collections of the Austrian zoologist Johann Natterer (1787–1843), gathered during his travels throughout Brazil in the years 1817 to 1835, give an excellent example to show how specimens are moved and changed on their way from 'field' to 'museum', between two spaces of knowledge.

Keywords: natural history, preservation, museum, Austria, Brazil

In 1817 an expedition of Austrian naturalists and painters set out in order to explore the interior of Brazil, which was at that time a region quite unknown and unexplored by European scientists.[1] Only a few reports existed, mostly concentrating on the eastern coastal areas of the former Portuguese colony.[2] A voyage to Brazil promised

[*] Österreichischer Rundfunk, ORF-Austrian Broadcasting Corporation, kurt.schmutzer1@chello.at

[1] For detailed information on the expedition and Natterer´s travels see Kurt Schmutzer, Der Liebe zur Naturgeschichte halber. Johann Natterers Reisen in Brasilien 1817 – 1836 (= Veröffentlichungen der Kommission für Geschichte der Naturwissenschaften, Mathematik und Medizin 64) (Wien: Akademie der Wissenschaften, 2011). The expedition, besides Natterer as zoologist, consisted of the following: Johann Christian Mikan (1769-1844) – professor for Natural History and botanist; Johann B. Emanuel Pohl (1782-1834) – botanist and mineralogist; Heinrich Wilhelm Schott (1794-1865) – gardener; Dominik Sochor (+1826) – hunter; Thomas Ender (1793-1875) – landscape-painter; and Johann Buchberger (+ 1821) – plant artist. By request of the Bavarian King Maximilian I. Joseph, the zoologist Johann B. von Spix (1781-1826) and the botanist Carl Friedrich Philipp von Martius (1794-1868) joined the group and Grand-Duke Ferdinand of Tuscany also sent the botanist Guiseppe Raddi (1770-1829) to Brazil. Natterer´s reports and letters, which are the prime sources for his travels, are kept mainly at the archives of the Museum für Völkerkunde in Vienna (MVK), the collection of autographs at the Wienbibliothek in Vienna and the Austrian State Archive – Haus-, Hof- und Staatsarchiv (HHStA).

[2] In 1807 the Portuguese royal family and a large part of the court fled to Brazil, seeking refuge from Napoleon´s troops as they invaded Portugal. In the following years Brazil went through a phase of modernization and social

an abundance of animals, plants and minerals to collect that were hitherto not already on display in European museums. The expedition was initiated by the Austrian emperor Francis I and carried out by and for the imperial cabinet for natural history, the *Naturalienkabinett*. Johann Natterer (1787-1843) (Figure 1) was the expedition´s zoologist and he returned to Vienna only in 1836, after he had spent more than 18 years assembling specimens for natural history. While all the other members of the expedition left Brazil within a few years, Natterer managed to cross the central plains of Brazil (via Goiás and Cuiabá) and the western province of Mato Grosso. Under difficult circumstances, suffering from several diseases, sometimes life threatening and sometimes sick almost to the point of dying, he contrived to reach the Amazon basin and even travelled several northern tributaries (Rio Negro and Rio Branco) as far as the borders to Columbia and Venezuela, thus covering several thousand miles throughout Brazil. His collections of Brazilian fauna are to this day a valuable part of the stock of the Museum of Natural History in Vienna. In collecting, Natterer and his superiors at the imperial cabinet saw the appropriate solution for their major scientific task, which was to bring order into the 'realms of nature' by taxonomy and classification.[3] Natterer was one of the many naturalists who made specimens available for scientific research and for display in the museum.[4] Natterer´s overall output included a significant 1146 mammals, 12293 birds, 1678 amphibians, 1621 fishes, 32825 insects und 1729 glass jars with 'wet' specimens of intestinal worms.[5]

improvement, and for the first time foreign scientists got access to this hitherto quite isolated colony. In 1815 Brazil was raised to the status of a kingdom and in 1822 independence from Portugal was declared.

[3] Anke te Heesen and Emma C. Spary, "Sammeln als Wissen", in: Anke te Heesen and Emma C. Spary (Ed.), Sammeln als Wissen. Das Sammeln und seine wissenschaftsgeschichtliche Bedeutung (Göttingen: Wallstein, 2001), pp. 7-21.

[4] Ilse Jahn, "Sammlungen – Aneignung und Verfügbarkeit", in: Andreas Grote (Ed.), Macrocosmos in Microcosmo. Die Welt in der Stube. Zur Geschichte des Sammelns 1450 bis 1800 (Opladen: Leske + Budrich, 1994), pp. 475-500.

[5] Josef Natterer, Totalübersicht des Gehalts aller aus Brasilien während den Jahren 1817-1836 von den K.K. Naturforschern eingeschickten Sendungen, February 1837, MVK.

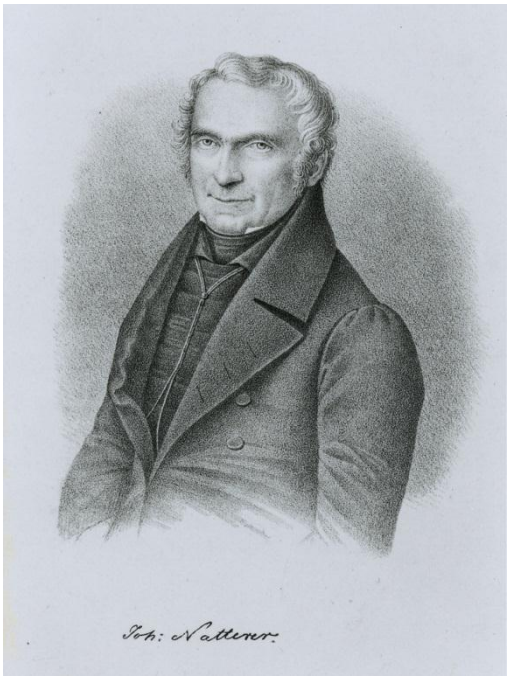

Figure 1 - Johann Natterer (Österreichische Nationalbibliothek / Bildarchiv / PORT-12690/01)

Long before Johann Natterer even touched American soil he was concerned with the collections he expected to make. While in Venice (Italy) waiting for his passage to Brazil he tried to organize the acquisition of large quantities of glass eyes for the imperial cabinet. Venice, as a centre of glass making, gave him the opportunity to select specially made glass eyes, composed of melted glasses in different colours, which he and his colleagues would use (after the voyage) to re-construct the bodies of the animals hunted in Brazil for display at the cabinet.[6] Glass eyes like these would add a more natural impression to the specimens than the simple glass semi-spheres coloured on the flat rear side that were being used at that time by many naturalists.[7]

Natterer´s interest in Venetian glass eyes points to some of the aspects which I am interested in: the specimens, as we can examine them at the museum today, are artificially made objects, created and designed with the help of a number of means of preservation. Fixing the glass eyes on a specimen is only one of the final transformations which convert an individual animal from its living existence in its natural environment to its appearance as exhibited in the museum. I will try to work

[6] Natterer reflects on the buying and the use of glass eyes several times in a letter to his brother: Johann Natterer to Josef Natterer, Chioggia / Venice, May 16/18/19, 1817, Wienbibliothek, H.I.N. 7860.

[7] Theodor Thon, Handbuch für Naturaliensammler oder gründliche Anweisung, die Naturkörper aller drei Reiche zu sammeln, im Naturalienkabinett aufzustellen und aufzubewahren. Frei nach dem Französischen bearbeitet und vervollständigt (Ilmenau: Voigt, 1827), pp. 454-460; Johann Friedrich Naumann, Taxidermie oder die Lehre Thiere aller Klassen am einfachsten und zweckmässigsten für Naturaliensammlungen auszustopfen und aufzubewahren. 2. Gänzlich umgearbeitete und vielfach vermehrte Auflage (Halle: Schwetschke, 1848; first published in 1815), pp. 21-25.

out a better understanding of what Natterer as a collector of zoological specimens was actually doing in the field with the help of his own reports and diaries. It might also be helpful to examine contemporary handbooks to see what they have to say on the naturalist´s practices of collecting and preserving. All the time while travelling, Natterer not only had to take care for every financial and practical detail of his expedition, but he was busily engaged in hunting and documenting his finds, preserving the specimens and packing and sending them to Europe on occasion. The space (and time) between 'field' and 'museum' is filled with a range of activities and practices.

Hunting and Documentation

Killing an animal is surely the most dramatic transformation of all, changing the animal from life to death. The collector´s goal is to cause as little damage to the corpse as possible. For hunting birds the use of a 'wind-gun' was Natterer´s choice to preserve an intact animal body. The 'wind-gun' was a kind of air rifle that operated with compressed air und shot. The appropriate container for compressed air had to be filled with 2500 pushes, and that allowed the hunter to fire 30 to 40 shots.[8] The efforts required to hunt with this 'wind-gun' were considerable. It took two mules to transport the whole equipment in large cases, but it was worth the trouble. Natterer successfully hunted birds with the help of this machine with less damage than usual when hunting with bullet rifles, and he had the advantage of firing silently so that other animals were not alarmed.[9] In the course of his voyages Natterer turned to a much easier way of hunting birds. When he reached the Amazon basin in the late 1820s he adopted local practises. Here he met with indigenous groups who used a blowpipe and poisoned arrows for hunting, a weapon that also allowed silent hunting practices and it too caused very little damage to the animal´s skin. Probably happy to have skilled hunters at hand, Natterer hired tribesmen to hunt birds.[10]

Once the animal was killed the naturalist had to record his finds with the help of notes, diaries, pictures and reports. Documentation included date, location, local

[8] Friedrich Wilhelm Schembor, "Von der Windbüchsenpumpmaschine zum Kohlensäureverflüssigungsapparat. Ein Beitrag zur Technikgeschichte des 19. Jahrhunderts", *Blätter zur Technikgeschichte*, 1991/92, 53/54, pp. 59-123, on pp. 74-80.

[9] Natterer refers to hunting with the "wind gun" in several letters to his brother, e.g. Johann Natterer to Josef Natterer, Salto, October 26, 1822, Wienbibliothek, H.I.N. 7880; Johann Natterer to Josef Natterer, Ipanema, July 8/14, 1820, Wienbibliothek, H.I.N. 7874.

[10] Johann Natterer to Wenzel Philipp Leopold von Mareschal, Manaus, 19. September 1830, Archiv MVK; Johann Natterer to Francisco Ricardo Zany, Borba, 11. Jänner 1830, Archiv MVK; Johann Natterer to Karl von Schreibers, Borba, 29. Juni 1830, Archiv MVK.

name, measurements and scientific denotation of the specimen. One of Natterer´s water colours of a catfish may serve as an example for his practices. His annotations are barely visible today, but one can still discern a reference number ('No. 29'), a scientific name of the time ('Silurus Pintado'), location and date of acquisition (Cuiabá, January 1824), a measure and several measurements (in Viennese inch = ca. 26.34 mm) and a local, indigenous name ('Man joö') on the bottom of his sketch (see Figure 2).[11] Apparently this is one of several specimens, to which he referred in a letter to his brother Josef as 'large Silurus species, true showpieces',[12] that he caught in the region of Cuiabá, the capital of Mato Grosso, and depicted in water colour in early 1824. The reference number links together the painting, Natterer´s occasional remarks in his letters or field notes, inventories for transport and the label attached to the preserved specimen. As a reference Natterer used a numbering system based on different species, not on different specimens.[13]

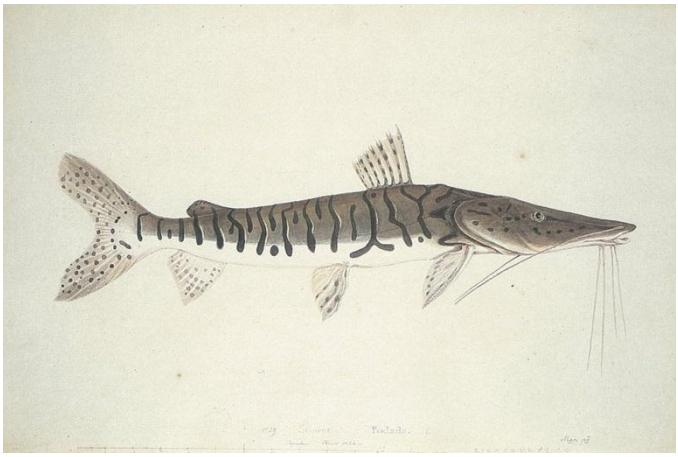

Figure 2 - Pseudoplatysoma fasciatum (Linn. 1766) (Naturhistorisches Museum Wien / Archiv für Wissenschaftsgeschichte)

Contemporary manuals for naturalists stress the importance of denoting all parts subject to change with the help of sketches, drawings or water colour paintings: e.g., the colour of eyes, feet, beaks and generally (for birds) all parts without feathers, even with numbered colour displays if possible.[14] When taking sketches of living animals the main issue was not to study the habits of the animals or their social life,

[11] Natterer´s paintings and sketches were published by Christa Riedl-Dorn, Johann Natterer und die österreichische Brasilienexpedition (Petrópolis 2000). The catfish is shown on p. 115.

[12] Johann Natterer to Josef Natterer, Cuiabá, December 16, 1824, Wienbibliothek, H.I.N. 7882: "grosse Silurus-Arten, wahre Kabinetsstüke".

[13] Simon Engelberger, Annotated catalogue of primate type specimens in the mammal collection of the Museum of Natural History Vienna, unpublished magisterial thesis (Wien 2010), p. 10.

[14] Thon, *Handbuch*, pp. 5-6.

but their movements. Manuals for collectors of the time repeatedly demanded meticulous observations and drawings in order to be able to imitate a 'natural' or 'true to life' display of the animals at the museum.[15]

Certainly Natterer also followed these practices. In a letter to his brother, he explained his work, assuring him that he had carefully noted the measurements of length and breadth of all the birds, mammals, amphibians and fishes he had gathered, together with descriptions of those parts of the body that were subject to change after death, and of many even the colour of the body. He also had made watercolour paintings and sketches.[16] Before the invention of photography the ability to draw was a necessary prerequisite for the naturalist to document his finds, or else he had to find the help of an artist. Consequently, in the beginning two professional artists took part in the Austrian expedition: Thomas Ender (1793–1875) was an expert in landscape painting, and Johann Buchberger († 1821) was hired to paint plants.[17] Natterer had skills and education enough to do the job for the zoological collections by himself. This was all the more important as Natterer for the most part travelled on his own, separated from the other Austrian naturalists and artists who came to Brazil with him, accompanied only by his assistant Dominik Sochor as a hunter and Brazilian servants and slaves (who did most of the daily work such as attending the mules which carried the expedition´s equipment and supply or putting up encampments, and occasionally they helped in hunting and preserving the zoologist´s catch).[18]

When Natterer describes his proceedings, he tries to testify that his work is done properly and according to accepted general standards. Letters, reports, diaries, notes, inventories, labels, sketches and paintings, all aiming to record information and data as precisely as possible, were at the time regarded as essential to guarantee the authenticity and identity of the specimens in order to create reliable scientific knowledge.[19] The scientific value of the specimens collected depends not exclusively on the naturalist´s individual intellectual qualities, but also on the accuracy of

[15] Thon, *Handbuch*, p. 5; Naumann, *Taxidermie*, p. 4.

[16] Johann Natterer to Josef Natterer, Borba, December 21/28, 1829, Wienbibliothek, H.I.N. 7883: "Von allen Vögeln habe ich Längen- und Breitenmass, die Beschreibung der nach dem Tode veränderlichen Theile des Körpers, von vielen selbst die Farbe des Körpers. Dasselbe gilt von Säugethieren, Amphibien und Fischen. Von Säugethieren habe ich viele kleinere gezeichnet, besonders viele Fledermäuse, von Amphibien und Fischen habe ich viele kolorirte Abbildungen und Skitzen."

[17] Schmutzer, Der Liebe zur Naturgeschichte halber, pp. 26-28.

[18] Like many of his contemporaries Natterer bought and employed slaves, obviously without any doubt or concern about the slave system. See Schmutzer, *Der Liebe zur Naturgeschichte halber*, pp. 119-122.

[19] Lorraine Daston, "Die Kultur der wissenschaftlichen Objektivität", in: Michael Hagner (Ed.), *Ansichten der Wissenschaftsgeschichte* (Frankfurt/Main: Fischer, 2001), pp. 137-158, on pp.147-154.

observations, data and measurements, which could then move and circulate among scientists. 'Scientific data are judged valid to the extent that they can travel beyond the limits of a laboratory or the exotic site, be reproduced elsewhere, and collated with other precise and calibrated data.'[20]

But in following Natterer´s practices we will find that there were more and different principles and ideas of natural history involved, which influenced his work. Producing reliable and exact data and measurements was only one aspect of collecting specimens for the museum.

PRESERVATION AND THE ART OF TAXIDERMY

The key problem for naturalists in the field was to preserve the specimen in a condition as close to nature (size, colour and structure) as possible, to prevent decay and keep away insects.

In all probability Johann Natterer, who had enjoyed academic training only to a limited extent, learned the art of preservation from his father Joseph Natterer senior (+1823), who was a falconer at the imperial summer residence in Laxenburg near Vienna and privately also a passionate collector of birds.[21] Apart from scattered short notes there are no detailed information about the means and methods Natterer used. But with the help of contemporary manuals we can try to illustrate how a zoologist at the beginning of the 19th century worked 'in the field'.

Until the mid-18th century it was only possible to store bones, shells or other hard parts for a longer period of time. Small fishes, amphibians or molluscs could be immersed in alcohol in glass jars (wet specimens), or one could achieve quite good results with smaller vertebrates like birds by drying them and hoping that a treatment with alum, herbs, pepper, tobacco, cinnamon or camphor would prevent insects from devouring the specimens. To create dry specimens of the skins of larger animals (mammals, amphibians and fishes) was, for a long time, an unsolved problem, especially in a tropical climate. It was only with the improvement of taxidermy, the art of preserving animals, in the late 18th century, that museums for natural history acquired the necessary means of assembling and storing large, stable and lasting collections of large vertebrates as we know them today.

[20] Marie-Noëlle Bourguet, Christian Licoppe and H. Otto Sibum, "Introduction", in: Marie-Noëlle Bourguet, Christian Licoppe and H. Otto Sibum (Ed.), *Science, Scientific Instruments and Travel: Itineraries of precision from the seventeenth to the twentieth century* (London, New York: Routledge, 2002), pp. 1-19, on p. 3.

[21] Schmutzer, Der Liebe zur Naturgeschichte halber, pp. 16-18.

It was the Frenchman Jean-Baptiste Bécoeur (1718-1777), apothecary and naturalist from Metz, who invented an effective mixture for the preservation of animals in a dry state. He never published the recipe, but passed it on to the taxidermists at the *Muséum national d´Histoire naturelle* in Paris. The new method must have reached public knowledge at least after its publication in Louis Dufresne´s *Nouveau dictionnaire d´histoire naturelle* (Paris 1803–1804). According to this, after the removal of all internal organs and soft parts the animal bodies had to be treated with a mixture of white arsenic powder, salt of tartaric acid, camphor, soap and quicklime powder. Even though several formulas existed before, only Bécoeur´s use of poisonous arsenic – much debated for its dangerous effects for the user – created a means by which a permanent durability of pelts and hides was guaranteed. The enhancement of taxidermy had a major impact on zoological research and on the practicability of collecting. Stable and permanent collections facilitated new scientific questions. With large quantities of specimens to hand one could intensify comparison, one could specialize in certain groups of animals, classification and systematics could be improved.[22]

Bécoeur´s successful recipe was copied and transmitted in the following decades in several manuals for naturalists.[23] It was around the same time, in the second half of the 18th century, that manuals began to spread the use of certain methods, tools and materials, thus establishing standards for the taxidermist´s work and making them accessible not only to professional naturalists, but also popular for everyone interested in natural history.[24] Early examples of such treatises were Etienne-François Turgot´s *Mémoire instructif* (Lyon 1758)[25] and John Coakley Lettsom´s *The Naturalist's and Traveller's Companion* (London 1774).[26] While Lettsom dispensed with images, Turgot used illustrations to stress the importance of certain practices of preservation, for example the preservation of birds, the tools needed and where to cut the skin for a proper treatment of the specimens (Figure 3).

[22] Paul Lawrence Farber, "The Development of Taxidermy and the History of Ornithology", *Isis*, 1977, 68, pp. 550-566, on pp. 557-566.

[23] See for example Thon, *Handbuch*, p. 166.

[24] Marianne Klemun, *Werkstatt Natur. Pioniere der Forschung in Kärnten.* Katalog zur Ausstellung anlässlich des 150jährigen Bestehens des Naturwissenschaftlichen Vereines für Kärnten (Klagenfurt: Verlag des Naturwissenschaftlichen Vereines für Kärnten, 1998), p. 206.

[25] Etienne-François Turgot, Mémoire instructif sur la manière de rassembler, de preparer, de conserver, et d´envoyer les diverses curiosités d'histoire naturelle (Lyon: Bruyset, 1758).

[26] John Coakley Lettsom, The Naturalist's and Traveller's Companion, Containing Instructions for Collecting and Preserving Objects of Natural History, and for promoting inquiries after Human Knowledge in General (London: E. & C. Dilly, 1774).

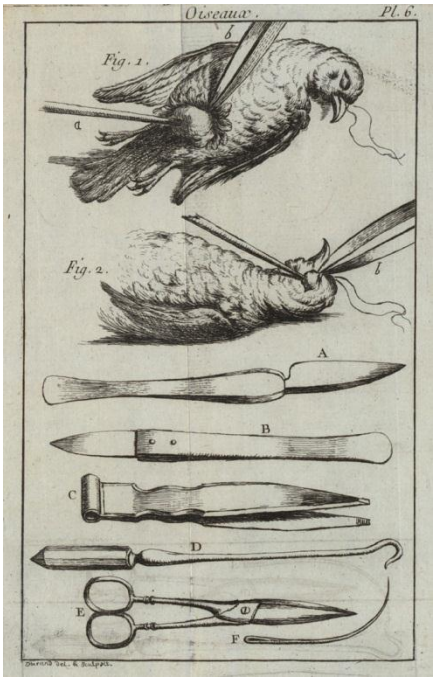

Figure 3 - Turgot, *Mémoire instructif*, pl. 6

But compared to botany or entomology there seems not to have been a rich supply of instruments and tools for vertebrate zoology. A small knife, tweezers and tools to scratch the fat off the skin were considered to be sufficient for the zoologist in the field.[27] The illustration from Turgot´s book also refers to the fact that birds were very popular among naturalists and as examples for handbooks, because they were easier to preserve than other animals, and since their plumage did not bleach, the preservation of birds guaranteed satisfying results. With the improvement of preservation new kinds of specimens became available for museums and scientists in large quantities. And accordingly in the course of the 19th century new images entered the guidebooks: mammals, amphibians and fish (Figure 4).

[27] Naumann, *Taxidermie*, p. 8.

Figure 4 - Thon, *Handbuch*, pl. IV

Natterer was not only an experienced preserver of specimens in the dry state, he also produced wet specimens of molluscs and amphibians. The methods applied influenced the knowledge derived from its objects. There is certainly a relationship between practices of collecting and classification in natural history. Since, for example, French naturalists widely used alcohol to preserve animals as a whole they advanced in anatomical studies more than others at that time.[28]

Both methods had their advantages and disadvantages. The use of alcohol for wet specimens in glass jars hardened the tissue, it bleached the colours and the results were generally not very attractive to show, but the animal was preserved as a whole. For animals with fur or feathers preservation in alcohol was not applicable. Transforming an animal into a 'dry' specimen inevitably created a rigid torso and prevented further anatomical examination.

In fact Johann Natterer himself conducted many anatomical examinations, not to examine the internal organs, but to bring something from the inside to the outside, namely intestinal worms (roundworm, tapeworm and the like). By this means Natterer acquired one of the largest collections of parasitic worms (helminths) of the time. This special interest answered the demands of Karl von Schreibers (1775–1852), director of the *Naturalienkabinett* in Vienna and Natterer's superior, and his

[28] Anne Larsen, "Equipment to the field", in: Nicholas Jardine, James A. Secord and Emma Spary (Ed.), *Cultures of natural history* (Cambridge: University Press, 1996), pp. 358-377, on pp. 359-360; see also Klemun, *Werkstatt Natur*, pp. 206-207.

colleague Johann Gottfried Bremser (1767–1827), who tried to establish a systematic description of helminths.[29] But when later on Natterer and his colleague at the museum in Vienna, Leopold Fitzinger (1802–1884) discussed the nature of the South American lungfish (*Lepidosiren paradoxa*), first discovered by Natterer in Brazil, whether it was a reptile (Fitzinger) or a fish (Natterer), Fitzinger complained that he had no internal organs available for anatomical investigation because Natterer had removed them while searching for helminths, thus limiting the possibilities of scientific research.[30]

TRANSPORTATION AND SHIPPING

Johann Natterer´s reports are full of accounts of his travels, but the remarks on hunting, collecting or preserving are few. When working most intensively on his collections during a longer residence in one place, he is telling least of all about it. Periods of longer stays are covered only by short accounts and lists or enumerations of acquired animals. The travelling naturalist composed his reports as 'diaries' of movements throughout Brazil, but the making of his collections is 'a space in between', a space between movements, scarcely mentioned. Addressing most of his reports to Karl von Schreibers, his director, or to his brother Josef, who was curator of the Viennese museum zoological collection, and thus writing to experts, Natterer obviously felt no need to go into detail on preservation. In many other letters, like those to the Austrian embassy in Rio de Janeiro, there was also no reason to discuss any specific subject of natural history. Information on his practices of preservation is limited to several short remarks about minor difficulties in getting the specimens dry or keeping them in their original size and shape. Consequently Natterer has a lot more to say about his specimens, when they are on the move again, on their way to Europe.

The preserved specimens were usually packed in large cases or trunks. These cases were filled with a mixture of glass jars, drawers with insects and butterflies, animal skins, fish and amphibians wrapped in cotton, indigenous weapons and crafts, each piece labelled and numbered, accompanied by inventories, reports, notes, and additional information for the curator receiving them at the museum. Glass jars with wet specimens had to be wrapped up in cotton; tin boxes for smaller animals had to be

[29] Schmutzer, *Der Liebe zur Naturgeschichte halber*, p. 18 and p. 123-124.

[30] Leopold Joseph Fitzinger, „Vorläufiger Bericht ueber eine hoechst interessante Entdeckung Dr. Natterer´s in Brasilien", *Isis von Oken*, 1837, Heft III, pp. 379-380.

soldered (with lead and tin) and covered with wax. The large cases were protected with ox hides against water and humidity. [31]

Transportation of these cases was not easy, the distances from Rio de Janeiro to remote provincial towns like Cuiabá or Goiás were enormous, the roads were difficult to travel, the danger of losing the cases through accidents or shipwreck was high, the outcome insecure. While travelling throughout Brazil Natterer usually moved along established trade routes. For the transportation of his collections he could use this network of commerce and communication, but he was forced to put his valuable specimens in the hands of people whom he met by chance. Military personnel, travelling merchants or anybody who was willing to do so would be engaged to carry the cases hundreds of miles across Brazil by land and waterways, on the back of stubborn mules, with clumsy ox-carts or aboard tiny river boats.

As an example: in May 1825 a certain capitão Sabino José de Mello Breuner took over 24 trunks filled with specimens from Johann Natterer in Cuiabá. Sabino was made personally responsible for bringing the cases either to the British consul in Porto Feliz (SP) near São Paulo, or to Rio de Janeiro, as circumstances would allow. Despite his obligation capitão Sabino delayed his departure from Cuiabá until March 1826 and Natterer, who in the meantime had travelled to the western parts of Mato Grosso, had no control over what was going on with his cases.[32] The treatment of the cases was a point of the highest consideration for Natterer. In a letter to Sabino he instructed him to take care, that the trunks should be exposed to the sun in order to keep them dry, except those two cases with glass jars, containing wet specimens, immersed in alcohol, which were to be kept in the shade. Each case also bore a mark, indicating which side was to be held upside.[33] The Austrian charge d´affaires in Rio was obliged to send the cases by ship either to London or to Trieste. There the ambassador or certain merchants organized further dispatch to Vienna. It took more than two years before the trunks of Sabino´s transport finally reached their destination in September 1827. In his letters Natterer frequently urged his confidants that the transport of his trunks had to continue without interference and the boxes should not be opened. It was not only damage to the specimens themselves that

[31] Johann Natterer to Josef Natterer, Ipanema, July 8/14, 1820, Wienbibliothek, H.I.N. 7874; see also Karl von Schreibers, *Nachrichten von den kaiserlich-österreichischen Naturforschern in Brasilien und den Resultaten ihrer Betriebsamkeit*. Vol. 1 (Brünn: Traßler, 1820), pp 23-25 and Maximilian zu Wied-Neuwied, *Reise nach Brasilien in den Jahren 1815 bis 1817*. Vol. 2 (Frankfurt/Main: Brönner, 1821), pp. 296-301.

[32] Johann Natterer an Wenzel Philipp Leopold Baron von Mareschal, Caiçara, 16. Juni 1826, HHStA, Staatskanzlei, Brasilien, Karton 13, Konv. 2 (alt Fasz. 13), Varia 1826, fol. 8r-11v.

[33] Johann Natterer to Sabino José de Mello Breuner, [Cuiabá, June 1825], MVK.

worried him, but the fear that this would happen uncontrolled and unauthorized by an expert, and through the actions of ignorant customs officials.[34] In a letter to his superior von Schreibers, Natterer expressed his deep concern to prevent any opening of his trunks at the customs houses, 'because this could hardly happen without any apparent damage'[35] to the specimens. He also tried to secure the support of the Austrian ambassador in London, arguing that if the cases were opened the British customs certainly would be missing 'that accuracy and care'[36] necessary to avoid any loss. With perceptible anxiety Natterer received the news that some of his carefully packed boxes had been opened by customs officials in Belém, although he had even asked the provincial president to take proper care for his valuable transport.[37]

Transportation without interference is the necessary precondition to ascertain a continuous transmission of specimens. Opening the boxes would break the continuity and put the authenticity of the specimens in danger. In the context of these boxes the specimens do not stand for themselves alone, they are embedded in a 'set' of information (texts, drawings, numbers, lists) to document their identity. With this continuous transmission the 'specimens acquired authority in matters of identity and authenticity'.[38] Therefore, the success of an expedition that aimed to send natural history collections from overseas depended upon effective methods of preservation, which made it possible that zoological specimens could withstand even a journey of several years by land and sea without constant attention and care.

[34] Schmutzer, *Der Liebe zur Naturgeschichte halber*, pp. 135-138; for example Johann Natterer to Wenzel Philipp Leopold von Mareschal, Cuiabá, December 20, 1824, MVK; Johann Natterer to Wenzel Philipp Leopold von Mareschal, Vila Bela de Santissima Trindade, May 28, 1827, MVK; Johann Natterer to Nathan Mayer Rothschild, Borba, December 24, 1829, MVK; Johann Natterer to Nathan Mayer Rothschild, Borba, June 24, 1830, MVK.

[35] Johann Natterer to Karl von Schreibers, Borba, December 20,1829, MVK: "… weil dies wohl schwerlich ohne offenbaren Schaden geschehen könnte."

[36] Johann Natterer to Nathan Mayer Rothschild, Borba, November 30, 1829, MVK: „… mit jener Genauigkeit und Behutsamkeit …". Diplomatic personnel were frequently involved in the organization of scientific expeditions, for Austria see Marianne Klemun, "Austrian botanical collection journeys (1783-1792). Network-patterns in expeditions: Global intentions interwoven with local dimensions", *Archives internationales d´histoire des sciences*, Vol. 56, 2006, 156/157, pp. 235-240.

[37] Johann Natterer to Karl von Schreibers, Marabitanas, February 1831, MVK.

[38] Staffan Müller-Wille, "Walnuts at Hudson Bay, Coral Reefs in Gotland: The Colonisation of Linnean Botany", in: Londa Schiebinger and Claudia Swan (Ed.), *Colonial Botany. Science, Commerce, and Politics in the Early Modern World* (Philadelphia: University of Pennsylvania Press, 2005), pp. 34-48, on p. 47.

SPECIMENS ON DISPLAY

It is this 'set' assembled in transport trunks that finally enters the holdings of a museum and forms the basis for scientific research and for the display of a once single, unique individual animal as a representative of a whole species in the museum´s exhibition. Manuals of that time frequently insisted on a display 'true to life' or 'true to nature'. Detailed instructions on the best materials and methods to form the animal´s body or how to use wire to bring head or wings of a specimen into a 'life-like' posture would help collectors to achieve a 'true' representation (see Figure 5).

Figure 5 - Thon, *Handbuch*, pl. III

This is where Natterer´s Venetian glass eyes come into place. Made of melted glass of different colours they were supposed to create a more 'natural' appearance than glass semi-spheres simply painted on the flat rear side. Therefore they play a key part in creating an illusionistic image of an animal, the claim of which is to represent its species in a 'true to nature' manner.

In the early 19th century it was considered to be essential to preserve an authentic impression of the individual animal, first, in order to give reliable evidence for classification and, second, to enable the museum to put a representation of a species on display in its exhibition 'true to nature'. The epistemic ideal of 'truth-to-

nature'[39] does not concentrate on the 'true' description and understanding of a single, individual animal, but on the representation of an ideal 'type', which should represent all the qualities and distinctive features of a certain species. This goal of achieving 'truth-to-nature' in images or representations of 'nature' includes the employment of artistic means to create a more 'accurate' information of an animal´s appearance than the authentic, unrestored remains of the body of one single individual alone could offer.

The treatment of fishes and amphibians may highlight this aspect. A major problem in preservation in the attempt to create a 'life-like' display occurred with those animals the colours of which fade immediately after death, as is the case with these lower vertebrates. As the demand for 'true to life' presentation is so prominent and persistent, it seems to be quite obvious that watercolours, paint brush and oil-varnish belong to the museum´s laboratories as customary and necessary aids for giving back to these animals their 'natural' colouring.[40]

CONCLUSION

These metamorphoses, produced by cultural practices like the art of taxidermy, altered the animals´ physical composition, and their appearance could only be maintained with the help of artificial means (preservatives, colours, artificial parts). Therefore specimens are not a mere image of nature, but 'artificial things designed and constructed by naturalists to answer various scientific needs'.[41] Despite all transformations and their artificial construction as cultural objects the specimens were regarded as authentic representations of a species and – together with other information (sketches, reports, notes) – accepted as valuable and reliable sources for certain scientific questions. The *Naturalienkabinett* in Vienna at that time was still devoted to taxonomy and classification based on the description of external distinguishing features whereas other scientists had turned their interest towards anatomy and physiology. The 'scientific needs' of the Viennese museum depended on the collector´s skills to preserve the physical appearance of an animal as close to its natural condition as possible.

[39] Lorraine Daston and Peter Galison, *Objektivität* (Frankfurt/Main: Suhrkamp, 2007; engl. orig.: *Objectivitiy*, New York: Zone Books, 2007), pp. 59-119.

[40] Naumann, *Taxidermie*, pp. 144-148; Thon, *Handbuch*, pp. 268-272 and pp. 460-461.

[41] Larsen, "Equipment to the field", p. 358.

Contemporary critics of the Austrian expedition remarked that collecting and classification alone would not be sufficient and that scientific research had to go further into anatomy and biology.[42] Others favoured science as a literary business and as a 'Humboldtian' science of description, measurement, observation and writing, and therefore criticised the fact that the enterprise of collecting was too expensive, too complicated and too dangerous in comparison with its doubtful worth.[43] But for an understanding of natural history based on 'truth-to-nature' objects, which were the necessary basis for scientific denotation and classification of animals by their external features, the availability of large collections of specimens was indispensable.

All in all, it cost a great deal of effort and expense, trouble and risks, to bring these objects into the museum, and it even cost lives. Johann Buchberger (+ 1821), artist for plants to the Austrian expedition, suffered until his early death from the consequences of a riding accident in Brazil, and Dominik Sochor, Natterer's assistant, died in Mato Grosso in 1826 of fever. But bringing back only descriptions, reports, notes or sketches would not have been sufficient for the museum. The quest to 'discover' new animals was tempting for the naturalists and vital for the aims of natural history committed to 'truth-to-nature', since the acknowledgement as the authentic evidence of a species and its existence was only awarded to those specimens that really and physically crossed the vast space between 'field' and 'museum'.

[42] Isis von Oken, 1823, Heft VII, p. 714.

[43] Schmutzer, *Der Liebe zur Naturgeschichte halber*, pp. 96-100.