
ARTICLES

SOME REMARKS ABOUT THE ORIGIN AND HISTORY OF BOJANUS' *ANATOME TESTUDINIS EUROPAEAE*

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THE monograph *Anatome Testudinis Europaeae* on the European Pond Tortoise *Emys orbicularis* by Bojanus is undoubtedly one of the more important works of comparative anatomy and herpetology in nineteenth century zoology. The work immediately came to the attention of zoologists. Such scientific journals as the 'Edinburgh Medical and Chirurgical Journal' or the 'Gottingische gelehrte Anzeigen' gave it enthusiastic reviews. After reading it, George Cuvier declared: 'I find it admirable. No animal will now be better known'. Victor Carus (1880) a nineteenth century historian of zoology said: 'The same Bojanus showed his capacity in a small isolated work, and his treatment of questions relative to morphology and embryology was distinguished by a great clarity and confidence of judgement. His anatomy of the European Pond Tortoise is a model of a monograph, such as hitherto there has been none on any animal'. Even today, the work of Bojanus astonishes us by its quality: '*Anatome Testudinis Europaeae*, published in two parts (1819, 1821; reprinted 1902, again in 1970), arguably the best atlas of any submammalian vertebrate ever published (...). The result was a magnificent atlas whose value continues to endure after more than a century and a half' (Adler, 1989). This work is also significant for the history of comparative anatomy. On several occasions, for example, Bojanus notices and describes the homology of the organs. All this notwithstanding, we actually know very little

about the origins and circumstances surrounding this work.

The work of Bojanus on the European Pond Tortoise

Why did Bojanus choose the European Pond Tortoise as the subject of his anatomy? Ludwig Heinrich Bojanus (1776-1827), an Alsatian zoologist who worked at Vilna University, published some 70 titles on anatomy and veterinary medicine. Only seven of these dealt with the anatomy of turtles, lizards and snakes. Herpetology was not his principal field of research. Moreover, his contract and function of professor of veterinary medicine at Vilna University rather pointed him towards the study of domestic animals. He was also director of the zoological cabinet, and thus in charge of enlarging its palaeontological and faunistics collections. None of this seemed to direct his interest towards the European Pond Tortoise, however. It seems that Bojanus' interest in the anatomy of the tortoise is in fact related to his ideas about the origin of the cranium. He considered the cranium as the result of the evolution of the vertebra, a point of view that was hotly debated by the German Naturphilosophen. Bojanus was a representative of this nineteenth century school of biology. He also voiced rather special views concerning the osseous fish head, considering the opercular bones as parts of the mandibles, moved and modified. In this he went along with an

assumption formulated previously by Trévirianus and later taken up by Blainville. To establish this conception he continued his research on reptiles and amphibians, authoring a number of highly interesting descriptive documents in the process (Chaine, 1925).

Another reason for his interest in the tortoise may have been the facility it offered to obtain material for dissections. It seems that in the first half of the nineteenth century, the European Pond Tortoise was very frequent in the Vilna area. French naturalist and physician Jean-Emmanuel Gilibert (1741-1814), who spent a fruitful eight years (1775-1783) in Lithuania in the service of the Polish king, wrote that European Pond Tortoises were 'very common in Lithuania'. This opinion, formerly very widespread, is difficult to verify today for lack of sufficient documentation concerning the population of these animals. What is certain however, is that the tortoise was the reptile easiest to obtain in the markets of Vilna and in the surrounding countryside.

We know that in various parts of Europe the tortoise was an 'edible animal'. Contemporary natural science dictionaries described this consumption. The *Nouveau Dictionnaire d'Histoire Naturelle* (1819), for example, stated that 'its flesh is very good to eat; so that in southern Germany enough are captured to be sold in the markets'. Also 'One eats them in the countries to which they are native; but as far as I am able to judge, their flesh is inferior in quality to that of the American tortoises'. 'It appears however, that the flesh of individuals fed for some time on grass and roots is rather good'. (Duméril & Bibron, 1825). 'One feeds it in fish ponds or gardens, with bread, lettuce, vegetables etc.'. J.C. Wulff (*Ichtyol. Regni Borussici*) knew that *Prussian peasants keep some in the troughs, sometimes for two years to fatten them*' (Cloquet, 1828). We have archaeological evidence showing that the tradition of eating tortoise is very ancient in Europe (Cheylan & Courtin, 1976). Old dictionaries also inform us that: 'one frequently keeps them in the gardens of southern France, because they eat slugs,

terrestrial snails, harmful insects and other pests' and 'one always finds live tortoises in several apothecaries in Paris, who import them from the Provence to make a potion considered very useful against chest complaints, and to repair forces exhausted by excess of the pleasures of love'. We do not know if this species was eaten in Lithuania. Old cook books make no mention of it. We know only that in certain areas of Poland the peasants kept these tortoises as charms against misfortune, especially 'to protect milk and cows' (Samek 1992).

It is certain that Bojanus must have often encountered tortoises on his wanderings around Vilna. Most likely he also saw them in the town markets. Perhaps he simply wanted to get better acquainted with a species so common and often used by man? We know that this desire was not rare at the time. Louis Agassiz, for example, wrote to Lucien Bonaparte: 'It is quite astonishing that the greatest confusion reigns in the classification of indigenous European fishes that we see and eat every day (for example the trout) and that they were the last to interest the naturalists'.

The Alsatian Bojanus was a naturalist at home in two cultures, the French and the German. Before coming to Vilna he had absolved a part of his studies in Paris, and he was well acquainted with the works of French naturalists in Poland. It is noteworthy that the work of these naturalists on the tortoise had a certain tradition. For example Jean-Emmanuel Gilibert writes, 'On July 7, 1776, not being able to continue my research on botany, since I was retained in my room by disease, I forced myself, to dissipate the trouble, to dissect some land tortoises that are very common in Lithuania'. He was also the author of *Observation sur les parties génitales des tortues* (Observations on the genitals of tortoises), where the genitals and the mating habits of these reptiles were probably described for the first time. Jean-Etienne Guettard (1715-1786), a naturalist and traveler, spent two years (1760-62) in Poland. The Muséum National d'Histoire naturelle in Paris has several of this scientist's manuscripts, among others the

Mémoire sur les écailles qui couvrent la peau de certains animaux (Report on the scales which cover the skin of certain animals); *Mémoire sur les tortues* (Report on the tortoises); *Mémoire sur les tortues de terre et tortues de mer* (Report on land tortoises and turtles). Doubtless Bojanus knew this work. As for Gilibert, who preceded him at Vilna University, one may even say that Bojanus continued his research program. Both naturalists shared an interest in the tortoise, as well as in the European Bison and certain other animal species.

From the technical point of view, *Anatome Testudinis Europaeae* is a considerable feat. It includes 40 folio plates with 213 drawings depicting the detailed anatomy of the European Pond Turtle, *Emys orbicularis*. Bojanus began working on this atlas soon after his arrival in Vilna and devoted ten years to the project before the first part was published. He used almost all the anatomical techniques that were known at the time, maceration and boiling in various solvents, injection of dyes, colouring with mercury and gelatin. Bojanus' anatomical preparations were preserved for a long time in Darmstadt, where he died, and in Kiev where the libraries of the science collections of Vilna University and of the Imperial Surgical and Medical Academy were transferred after Polish universities and academic institutions were closed in 1841 as a repressive measure. These anatomical preparations were often viewed and favourably remarked upon by nineteenth century zoologists. Bojanus made most of the original drawings, paid himself for the printing, purchased paper of the highest quality to hold the fine lines of the plates. The copper plates were engraved by the famous German illustrator Ferdinand Lehman, who came from Darmstadt to Vilna especially to make these engravings. The original edition was limited to only 80 copies and cost 5000 rubles, the equivalent of two years of Bojanus' wages. Thus it comes as no surprise that this splendid work was the cause of serious financial problems for its author. Bojanus was also the author of a work on the anatomy of the ewe (with 600 illustrations), which for economic reasons was

never published. Certain specialists claim that its scientific value was comparable only to his anatomy of the tortoise. The manuscript was preserved in Darmstadt for a long time; its present owner is unknown.

Some new data about

Anatome Testudinis Europaeae

The correspondence between Georges Cuvier and Ludwig Bojanus: The Muséum National d'Histoire naturelle and the Institut de France preserve the correspondence between Ludwig Bojanus and George Cuvier. Most of these letters, which are new to us, deal with *Anatome Testudinis Europaeae*. In the letter dated 23 December 1821, Bojanus wrote that his first thought had been to dedicate this work to George Cuvier in homage to Cuvier's contributions to natural science, and in particular for his work in the field of comparative anatomy. However, since he found it overly daring to put Cuvier's name on the first page of a work that did not yet enjoy recognition by the scientific world, Bojanus initially decided to ask for Cuvier's permission. The letter also informs us that he had succeeded in completing the work in spite of great difficulties, and had sent two copies of *Anatome* to Paris. The first was intended for Cuvier, and is currently in the Central Library of the Muséum. The second was for the Academy of Sciences. Bojanus insisted that dedicating his work to Cuvier had been problematic for political reasons. He recognised Cuvier's scientific merit, but found it difficult to forget the sufferings he had to endure because of the French. Bojanus fled from the French army twice, once after the occupation of Alsace in 1789, and for the second time in 1812 during the offensive by Napoleon's army. Cuvier, although a man of two cultures - German and French - like Bojanus, became a high-ranking civil servant of the empire, and a close adviser to Napoleon Bonaparte. In his second letter Bojanus expresses joy at the high esteem in which Cuvier holds his work. He stresses the fact that he worked upon it in Vilna, far from the great university centres. Apart from the letters,

the Archives of George Cuvier contain nine pages of drawings and anatomical descriptions made by Ludwig Bojanus. Some of these drawings were published in *ISIS* (*Isis oder Encyclopadische Zeitung vorzüglich für Naturgeschichte, vergleichende Anatomie und Physiologie*). Bojanus again took an interest in the anatomy of the tortoise shortly before his death. He wrote and published *Über das Schulterguste der Schildkröte*, a work in which he described the bones and muscles of the acromiale part. Bojanus saw it as a complement to *Anatome Testudinis Europaeae*. One hundred and eighty years have passed since the publication of this work. Nobody has published the handwritten work of Bojanus, such as the monograph of the ewe, and for a long time the history of his anatomical preparations was obscure. Finding these documents and preparations, which were the foundation of one of the major works of nineteenth century herpetology, would be an undertaking of considerable interest and merit.

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