

Invited article

Peter W. Lund, a naturalist of several sciences

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Peter W. Lund (1801-1880) graduated in Natural History at the University of Copenhagen. His solid and eclectic education included knowledge of medicine, philosophy and music. When Lund finished his undergraduate course in 1824, he published two pieces of his work, one on medicine and another on zoology (Lund-Paula Couto, 1950).

Lund was in Brazil from 1825 to 1829, where he carried out fieldwork on zoology and botany, collecting numerous specimens. On his return to Denmark he gave three presentations: one on the gastric morphology of a genus of birds; another on Brazilian ants; and a third one on the of mollusc egg shell. He settled permanently in Brazil in 1833 and from then on intensified his studies and sample collecting, especially the botanical ones, both in the outskirts of Rio de Janeiro and in the hinterlands. In 1838 he wrote and published a memoir including his observations, entitled "Notes on Brazilian roadside plants and weeds".

In 1835 a casual meeting with his countryman Peter Claussen on the plateau of Curvelo in Minas Gerais revived his interest in zoology. Consequently he embarked on a new field of activity, namely paleontological studies. During his final visit to Paris, he made the acquaintance of Cuvier, one of the founders of the new science, Palaeontology. This was an acquaintance which was to bear fruits.

Over the space of ten years, Lund gathered an excellent collection of fauna both recent and from the late Pleistocene era, which he had collected in the Velhas River Basin, a tributary of the São Francisco River. His collection was the object not only of his own studies, but also of other scientists. This indirect influence bore outstanding scientific results. Among others, it is worth mentioning the works by the Eugen Warming, J. T. Reinhardt and Herluff Winge.

Eugen Warming, a renowned botanist considered the founder of vegetal Ecology, was still a 21-year old student when he arrived in Lagoa Santa (MG) in 1863, where Lund had been living since 1835. Eugen Warming stayed there until 1866. He reports that "I had never taken much interest in Brazilian vegetation, I knew not even a single example of its characteristic plants, yet after a few months I saw myself transported into a nature which was thoroughly unknown to me. However, to have been acquainted with it so quickly, I owe solely to Lund, who during his first trip to Brazil had botanized in the province of Rio de Janeiro. He had also journeyed throughout the hinterlands together with another botanist, from where he had sent large collections because he planned to dedicate himself totally to botany." (Warming, 1973:10)

Reinhardt visited Lund in Lagoa Santa on two occasions and, aided by his mentor he acquired various zoological

collections, especially of fish from the River Velhas. This material was to be used by Lütken (2001) in his monograph "Fish from the River Velhas: a contribution to the ichthyology of Brazil."

Based on the zoological and paleontological collections Lund had acquired and sent to Denmark, Winge wrote his extensive and magnificent work between 1888 and 1915. This work is comprised of three volumes, totalling almost one thousand pages, in which he describes the living, and in particular the extinct fauna from the Lagoa Santa region (Lund-Paula Couto, 1950).

Lund's publications on his discoveries in Lagoa Santa date from 1836 to 1846, when his scientific activities ended. Lund dealt with four themes during this period of time: the description of caves, living fauna, extinct fauna and news on the fossil man. The material of his studies consisted in fossils of which he had collected in the caves and the living species both of them from the region of Rio das Velhas valley. Lund's scientific contributions were remarkable and are dealt with in the following summary.

1. The caves

Lund's major pieces of writing are composed of memoirs in which he refers to fossil fauna from different caves. The first two, written in Lagoa Santa (1837a and 1837b), refer to the Maquiné and Cerca Grande caves. In the first one there is also a scale cross-section of the New Maquiné cave. This publication is the first of its genre in the Americas.

On this magnificent piece of writing and even poetic description of Maquiné, there are plenty of references to a "diluvium", which is in accordance with Cuvier's catastrophic viewpoint. He had met Cuvier in Paris and given him an account of the results of his first paleontological excavation as well as of the finding of "a new species of Megatherium (= *Nothrotherium maquinense*) as large as a tapir" which turned out to be the smallest extinct terrestrial sloth.

In his second publication he described, with admiration, the Cerca Grande limestone massif complex, dotted with grottoes, and the discovery of another new species, this time a dog (*Protocyon troglodytes*). It was the first time a rupestrian painting had been included in such scientific work, and was attributed to indigenous nomads, who, "thrilled by the beauty of the landscape, tried to copy the objects that existed there" (Lund-Paula Couto, 1950:94). In addition to interpreting the genesis of the caves, recording the deposits or the stratigraphy, describing the chambers and speleothems, he also theorised on the preservation, the state of the bones and the reason why they had been inside the grottoes.

2. Living fauna

Throughout his work Lund compared and recorded, using lists of the fossil and living fauna of the region. He would also make comments, mark the characteristics and make comparisons with living species. For each species recorded in the lists, there is a specific identification he made. This was not easy in the scientific desert which were the uplands of Minas Gerais. Approximately one hundred and fifty species were recorded, but ten species he described figure in his "Lists of living mammals from the River Velhas" – two of Marsupials: *Didelphis albiventris* Lund, 1840 and *Marmosops incanus* (Lund, 1840), two of Carnivora: *Lycalopex vetulus* (Lund, 1842) and *Speothos venaticus* (Lund, 1842) and six of Rodents: *Bolomys lasiurus* (Lund, 1841), *Oryzomys laticeps* (Lund, 1842), *Rhipidomys mastacalis* (Lund, 1840), *Carterodon sulcidens* (Lund, 1839), *Phyllomys brasiliensis* (Lund, 1842) and *Trichomys apereoides* (Lund, 1839) (Fonseca et al., 1996; Musser, et al., 1998; Leite, 2001).

We consider Lund's lists of living species as the result of the first mast-zoological survey carried out in Brazil. His methodology in terms of collection was continuous, comprehensive and included different seasons over many years. We are therefore left with a precise and rare picture of the regional fauna from one and a half centuries ago.

3. Archaeological discoveries

Many were Lund's contributions to Archaeology. We have already mentioned the first printed register of rupestrian paintings (Lund, 1837b). It seems that Lund did not give much importance to these manifestations of art, considering them "as coarse as the mind that had created them" (Lund-Paula Couto, 1950).

Whilst excavating the Sumidouro cave in 1843, he found human bones together with those from extinct fauna in the "antediluvian" layers. Based on geological observations and the condition of the fossils, he raised the hypothesis that both were of the same age. European scientific societies did take his hypothesis into consideration because scientists of that time did not even suspect that the extinct fauna and man had the coexisted in "geological periods". This hypothesis was accepted just twenty later and only for Europe. The same theory on American man would only be accepted in the mid-20th century (Hoch & Prous, 1985).

For many years, human occupation of the Americas was considered as biologically homogeneous, one species of genetic monotony (Powell & Neves 1999; Neves & Pucciarelli, 1998). Today, the model of two mainly biological components is gaining more widespread acceptance. The first Americans known of were closely related to the Australian aborigines and to Africans. The morphology turned out to be Negroid and not Mongoloid, as had previously been thought. The Amerindians were of a different origin and had arrived during later migrations.

Lund (1842) noticed some peculiarities on the skulls of the "Lagoa Santa Man" he had discovered, which were different from those of the indigenous peoples (from the American or Mongolic race"). He thought that the race had degenerated. Later (Lund, 1844), he suggested another interpretation: instead of considering the Lagoa Santa Man as a degeneration, he supposed that the American man had lived before the Asian

from which the Mongolic population had originated. He justified this by claiming that according to the ordinary course of nature, the more perfect form descended from the imperfect one (Lund-Paula Couto, 1950:496). Although the explanation is not accepted, at that time Lund demonstrated a quick wit in his arguments and his initial observations that the skulls he had found were different from those of the Amerindians were correct. However, they went unnoticed by many researchers until very recently.

4. The extinct fauna

Lund's paleontological discoveries in the grottoes of the karstic region of Lagoa Santa made him well known. He provided scientific magazines with a series of articles, but they would not be much disseminated as they were written in Danish, a language of restricted use. Lund was tackling a science which was still taking its first steps. He was living in Lagoa Santa, a town where there was no updated bibliography in a time when great discoveries in Biology were taking place. He also lacked comparative material. For all these reasons, most of his accurate observations are rather remarkable. Some species would be identified through very restricted elements, which enhances Lund's assurance and ability. He recognised approximately eighty species of living fauna from fossils he collected and prepared. However, it is well worth mentioning the nineteen species of extinct fauna he defined, which we list below.

The complete list of Lund's work can be found in Warming (1973) and Lund-Paula-Couto (1950).

5. List of extinct species defined by Lund

a) Xenarthra:

Notrotherium maquinense (Lund, 1839), *Pampatherium humboldti* (Lund, 1839), *Hoplophorus euphractus*, Lund, 1839, *Catonyx cuvieri* (Lund, 1839), *Ocnotherium giganteum* (Lund, 1839), *Propraopus punctatus* (Lund, 1839), *Propraopus sulcatus* (Lund, 1842) and *Eremotherium laurillardii* (Lund, 1842)

b) Primates:

Protopithecus brasiliensis Lund, 1838.

c) Carnivora

Protocyon troglodytes (Lund, 1840), *Speothos pacivorus* (Lund, 1839), *Arctotherium brasiliense* (Lund, 1839) and *Smilodon populator* Lund, 1842.

d) Perissodactyla

Equus (Amerhippus) neogeus (Lund, 1840) and *Hippidion principale* (Lund, 1845)

e) Artiodactyla

Brasiliochoerus stenocephalus (Lund. In Gervais, 1867-9)
Rodentia

Neochoerus sulcidens (Lund, 1839), *Agouti major* (Lund, 1839) and *Coendou magnus* (Lund, 1839).

6. Conclusion

The summary we have so far presented here seems to us to justify the title of this work. It has, in some respects, also been somehow prophetic. We have focused on two aspects of Lund: the man as an active citizen in the village of Lagoa Santa and the man of science.

It is known that he used a large amount of money to buy

and enfranchise slaves during a time when no one was yet campaigning for abolition. Lund adopted a negro youngster who became his residuary legatee. As a lutheran, he founded the musical band (which has survived to this day) to play at the catholic religious feasts which were commonplace in those days. He also founded a school where he taught those interested in music.

Lund is considered the great early-19th century Brazilian naturalist, an activity in which he demonstrated a kind of "modern know-how": he developed extensive and systematic fieldwork and his work as a curator was remarkable, assembling magnificent collections and catalogues which have been preserved until today. Moreover, he wrote several scientific articles and gathered in his house, which became a laboratory, students and researchers who directly or indirectly produced a wealth of valuable scientific work.

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