UNIVERSIDADE DE LISBOA
FACULDADE DE CIÊNCIAS

Taxonomy and Empire.

Zoogeographical research on Portuguese Africa, 1862-1881

" Documento Definitivo"

Doutoramento em História e Filosofia das Ciências

Catarina Marques Madruga

Tese orientada por:
Ana Isabel da Silva Araújo Simões

Documento especialmente elaborado para a obtenção do grau de doutor

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To my grandmothers,
Lúcia Ernesta Marques &
Isabel Rosa Madruga,
to whom I owe my name.

All things are defined by names.
Change the name, and you change the thing.
- Terry Pratchett

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Summary

Between 1862 and 1881, the director of the Zoological Section of the Museu Nacional de Lisboa, José Vicente Barbosa du Bocage, launched and consolidated a research program to study national fauna supported by the addition of new collections. The characteristic fauna of Portuguese land and seas should no longer be unknown in the rest of Europe neither misrepresented in the existing national collections. The scope of the national fauna considered metropolitan territories as well as imperial possessions and, according to Bocage, all of these geographical regions should be studied by "our own" instead of foreign naturalists and explorers. Lacking the resources of larger museums, Bocage leaned on the individual participation of collaborators both at home and distributed along the many distant outposts of the Portuguese empire.

The nationalistic tone set by Bocage gradually yielded results and the work with the new collections allowed for an active new museum which in turn enabled the publication of tens of new species, with a particular emphasis on Angolan vertebrate fauna. The zoological museum and its scientific publications were seen as active participants in the political legitimation of the Portuguese presence in Africa. The descriptive taxonomic work in the Lisbon museum relied on local information, indigenous names, and specimens gathered from Portuguese colonial officials and collectors on the field. Bocage and the museum naturalists managed the collections using index cards, specimen tags, and different manuscript catalogues; and their work was published in the format of periodical articles, catalogues, and illustrated books.

This dissertation considers this particular form of taxonomic and zoogeographical knowledge as a political field that substantiated the national rhetoric of appropriation and justification in the construction of the Portuguese African empire.

Keywords:

Zoological Section of the Museu Nacional de Lisboa

History of Taxonomy in Portugal

Zoological Nomenclature

Third Portuguese Empire

Resumo

Esta dissertação, com o título "Taxonomia e Império. Investigação Zoogeográfica sobre a África Portuguesa, 1862-1881," relaciona as práticas científicas desenvolvidas na Secção Zoológica do Museu Nacional de Lisboa e o contexto político da progressiva construção do império português em África. Durante as duas décadas estudadas, a ciência da zoologia em Portugal cresceu em torno das colecções nacionais organizadas neste museu da Escola Politécnica de Lisboa. A secção zoológica, sob a direcção de José Vicente Barbosa du Bocage (1823-1907), não foi apenas constituída por colecções para apoiar o ensino da zoologia na Escola, e assumiu-se gradualmente como um centro de investigação científica. Situado na capital de um império, o museu de Lisboa favoreceu a investigação sobre a fauna da África Portuguesa, em especial Angola, com enfoque no estudo da sua distribuição geográfica.

Dado que as colecções zoológicas deste museu desapareceram no fatal incêndio de 1978 da Faculdade de Ciências da Universidade de Lisboa, antigo edifício da Escola Politécnica de Lisboa, este trabalho foi desenvolvido a partir do rico material de arquivo existente no Arquivo Histórico dos Museus da Universidade de Lisboa, em particular no fundo do Arquivo Histórico do Museu Bocage. Deste espólio, analisei em especial o conjunto de manuscrito de correspondência, borrões, anotações, catálogos, e listagens que foi doado no século XX pela família de Bocage. Os materiais de arquivo foram confrontados com a informação disponível nas várias publicações impressas dos naturalistas do museu, donde se retirou a hipótese deste trabalho: que os estudos taxonómicos e zoogeográficos do museu zoológico de Lisboa revelam uma particular confluência entre expertise científico e agenda política.

A localização geográfica (latitude, longitude e altitude) onde determinada espécie tinha sido apanhada constituiu, durante o século XIX, uma das preocupações dos naturalistas. A zoogeografia, ou o estudo da distribuição geográfica das espécies animais, estabeleceu-se como uma agenda científica em simultâneo com a era das grandes viagens de exploração terrestres. Exploradores de renome assim como funcionários coloniais menos conhecidos colaboraram com os grandes museus de história natural europeus com o intuito de contribuir para a ciência desenvolvida no seu país. No caso português, o museu de Lisboa serviu de centro para onde vários colectores espalhados pelas colónias enviaram as suas remessas, e onde a primeira geração de naturalistas se especializou nas colecções de peixes, aves, répteis, mamíferos e insectos do império português.

Os vários capítulos desta tese desenvolvem-se cronologicamente entre as balizas cronológicas de 1862 e 1881. O primeiro capítulo "Um Museu Nacional em Lisboa" trata do contexto e objectivos da criação do Museu Nacional de Lisboa na Escola Politécnica. Em 1862, o governo português aprovou um novo regulamento e cria um novo nome para as colecções de história natural de Lisboa, reorganizando assim as colecções reais que tinham estado sob a alçada da Academia Real das Ciências de Lisboa e dos palácios reais. O novo museu, com duas secções de mineralogia e zoologia, passava a ter a sua direcção científica assegurada pelos professores da escola. O segundo capítulo "Convenções universais e ciência nacional: As *Instrucções praticas* de Bocage" é centrado na análise da publicação *Instrucções praticas sobre o modo de colligir, preparar e remetter productos zoologicos para o Museu de Lisboa*, publicado também em 1862. Nesta primeira publicação do museu, Bocage desenha a política de colecções que vai seguir nos primeiros anos e resume as técnicas de colecta e preservação de animais de todas as famílias para envio para Lisboa. Para o museu de Lisboa era particularmente interessante receber materiais dos vários pontos do império, como aliás faziam outros museus europeus. Outros textos de "instruções" já tinham sido enviados para os vários governos gerais das colónias, mas ainda não tinham surtido o efeito desejado. O livro de instruções de Bocage conseguiu finalmente criar o espaço social que permitiu que governadores e um grupo substancial de colectores se tornassem colaboradores do museu de Lisboa enviando remessas dos vários pontos do império. Neste capítulo examino a retórica patriótica usada por Bocage, que quase imediatamente resultou em colecções mais diversas e em espécies novas encontradas nos territórios do império português, e analiso os vários para-textos do livro "Instrucções praticas," que incluem passagens sobre a história das colecções, uma lista científica das aves de Portugal existentes no museu, e uma lista de *desiderata*, os animais mais pretendidos pelo museu.

O terceiro capítulo "Primeiras remessas das colónias" regista os envios de vários colaboradores que, sem terem formação específica em história natural, colectam e enviam remessas das várias colónias onde se encontram. Neste capítulo distingo três tipos de remessas: feitas pelos administradores e governadores gerais das colónias; por amadores que possuíam a sua própria colecção de história natural; ou por oficiais do exército e farmacêuticos que, por exemplo, pedem aos seus superiores, e a Bocage em Lisboa, para serem considerados como "colectores dos produtos locais de história natural" usando o seu tempo livre de modo oficial para a colheita e envio de materiais para Lisboa. Dou especial enfoque a dois colaboradores desta última tipologia, para melhor caracterizar a sua participação.

No quarto capítulo, "Prioridade Publicada," sigo o processo de nomeação da primeira espécie recebida pelo museu de Lisboa que constituía um novo género para a ciência, o mamífero insectívoro aquático *Potamogale velox*, encontrado e enviado por um dos colectores mencionados no capítulo anterior, Francisco Bayão (1833-1883). Em honra deste colector, Bocage quis distinguir esta nova espécie com um novo nome: *Bayonia angolensis*. Esta espécie tinha chegado pela primeira vez à Europa em 1861, nas colecções do explorador Paul du Chaillu (1831-1903) que foram compradas pelo museu de Londres. Nessa altura não foi correctamente identificada, embora tenha sido descrita e lhe tenham sido atribuídos vários nomes diferentes. De facto, identificar, catalogar e nomear é um processo complexo, e desde a primeira metade do século que a comunidade internacional de naturalistas se ocupou com uma grande reforma da nomenclatura zoológica e do processo de nomeação das novas espécies. A prioridade na atribuição de novos nomes era um dos tópicos mais salientes. No entanto, apesar da identificação de Bocage ser a primeira considerada como correcta, o nome *Bayonia* prevalece apenas na sinonímia da espécie, já que o processo de nomeação de uma nova espécie, neste caso, pode ser visto como uma negociação entre factores científicos e políticos.

No quinto capítulo, "Museu de papel," explora-se a relação entre a organização das colecções, a manutenção de catálogos e listagens manuscritas, a publicação de catálogos do museu, e a publicação de artigos no formato da revista científica. Os primeiros naturalistas do museu José Augusto Sousa (1837-1889) e Felix Brito Capelo (1828-1879) tinham como incumbência publicar catálogos actualizados das colecções do museu. Estes catálogos demonstram a riqueza e a variedade das colecções assim como a capacidade e o expertise acumulado para as estudar. Em 1866, a Academia das Ciências deu início à publicação do *Jornal das Sciencias Mathematicas, Physicas e Naturaes* e Bocage foi um dos editores desse periódico. Foi através dos seus catálogos, e sobretudo dos artigos periódicos publicados no *Jornal* que o museu de Lisboa deu a conhecer as suas colecções e afirmou a sua autoridade nacional e internacional sobre as colecções angolanas.

O último capítulo, "Os exploradores do Mapa Cor-de-Rosa," debruça-se sobre várias publicações do ano 1881. Relaciona-se o contexto de publicação de Bocage, *Ornithologie de Angola,* baseado no trabalho sistemático do naturalista-explorador José de Anchieta (1832-1897), com os livros dos exploradores portugueses da expedição organizada em 1877 às possessões africanas e o panfleto publicado pela Comissão Africana da Sociedade de Geografia de Lisboa, presidida por Bocage, destinado a angariar fundos para estabelecer estações civilizadoras no sertão entre a costa de Angola e a de Moçambique. Estas estações estavam planeadas e desenhadas num mapa apenso ao final desta publicação, que representou o

chamado Mapa Cor-de-Rosa, ou as ambições portuguesas de estabelecer uma presença efectiva nas suas colónias africanas.

Em suma, entre 1862 e 1881 Bocage lançou e consolidou um programa de investigação dedicado ao estudo da fauna nacional, nas suas palavras para "estudar o que é nosso." Como fauna nacional consideravam-se aqui os territórios metropolitanos assim como as possessões imperiais. Utilizando uma retórica nacionalista, Bocage conseguiu angariar uma série de colectores que colaboraram com o projecto de compilar a fauna de Angola. O trabalho descritivo dos naturalistas do museu dependeu das informações sobre os locais, os nomes indígenas, e os espécimes enviados pelos colectores no campo. Esta dissertação considera esta forma particular de acumulação de conhecimento taxonómico e geográfico como um campo político que coadjuvou a retórica de apropriação e justificação do chamado Terceiro Império Português.

Palavras-chave:

Secção Zoológica do Museu Nacional de Lisboa;

História da Taxonomia em Portugal;

Nomenclatura Zoológica;

Terceiro Império Português.

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List of Abbreviations

ACL *Academia das Ciências de Lisboa / Academia Real das Sciencias de Lisboa* [Royal Academy of Sciences of Lisbon]

AUC *Arquivo Histórico da Universidade de Coimbra* [Historical Archive of the University of Coimbra]

AHM *Arquivo Histórico Militar* [Historical Military Archive]

AHMB *Arquivo Histórico do Museu Bocage* [Historical Archive of Museu Bocage]

AHMOP *Arquivo Histórico do Ministério das Obras Públicas* [Historical Archive of the Public Works Ministry]

AHMUL *Arquivo Histórico dos Museus da Universidade de Lisboa* [Historical Archive of the Museums of the University of Lisbon]

AMNCN-CSIC *Archivo del Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Cientificas de Madrid* [Historical Archive of the Natural History Museum of Madrid]

ANTT *Arquivos Nacionais – Torre do Tombo* [National Archives, Portugal]

BHL *Biodiversity Heritage Library - consortium of natural history and botanical libraries*

BNP *Biblioteca Nacional de Portugal* [National Library, Portugal]

EPL *Escola Polytechnica de Lisboa* [Polytechnic School of Lisbon]

MfN *Museum für Naturkunde / Historisches Bild- und Schriftgutsammlungen* [Historical Archive Natural History Museum of Berlin]

MNL *Museu Nacional de Lisboa* [National Museum of Lisbon]

NHM *Natural History Museum, London*

SGL *Sociedade de Geografia de Lisboa* [Society of Geography of Lisbon]

Note on the conventions used in the text:

All translations to English of manuscript or printed sources are my own except if expressly indicated.

Book and periodical titles were italicised.

In this version of the manuscript I have included longer texts cited in their original form in the corresponding footnotes.

Introduction. A matter of names

> [F]oreign scientific societies and governments have sanctioned without hesitation foreign names given by foreign travellers to our territories, it is fair that the Portuguese claim with Portuguese names their passage through the lands of the fatherland, and that they sustain them loud and clear...
>
> Therefore, Y. Exc. we bestow the name of Porto Bocage, to a nameless part of the Fernão Veloso Bay, a point which we have long studied, and which is, without doubt, the best point of the African continent, and one of the best in the world. [1]

On the very last day of 1884, the Portuguese explorers of Portuguese Africa Alexandre Serpa Pinto (1846-1900) and Augusto Cardoso (1859-1930) wrote a letter to José Vicente Barbosa du Bocage (1823-1907), announcing the *new* Porto Bocage in his honour. At the time, Bocage was the Portuguese Minister for Foreign Affairs, responsible for the complex dossier of commercial tariff disputes with other European nations on the matter of the African territories Portugal claimed as its own.

[1] Transcript taken from the catalogue published by Burnay auction house in 2008, Luís P. Burnay, Rita Burnay (org.) *Catálogo de um seleccionado leilão de Manuscritos, Autógrafos e Fotografias, 13 de Dezembro de 2008* (Lisboa: Fotogravura União, Lda., 2008), Lote 263.Alexandre Serpa Pinto to José Vicente Barbosa du Bocage, during the Pinheiro Chagas Expedition, 1884.12.31. I wholeheartedly thank Conceição Tavares for sharing this catalogue with me. Original text from the catalogue transcript: "se as Sociedades Scientificas e Governos estrangeiros, sancionão sem exitar, nomes estranhos dados por estranhos viajantes a territórios nossos, justo é os portugueses vinculem com nomes portugueses a sua passagem nas terras da pátria, e que os apregoem bem alto (...). Assim Exmo. Sr. demos o nome de Porto Bocage, a uma parte sem nome da Bahia de Fernando Vellozo, ponto que estudamos detidamente, e que é sem contestação o melhor do continente africano, e um dos melhores do mundo. N'esta data enviamos ao Ministério da Marinha a Carta do Porto Bocage."

Serpa Pinto chose the Fernão Veloso bay in northern Mozambique (currently Nacala, in the Nampula region) to honour the name of the Portuguese Foreign Affairs minister, who was also his personal friend.[2] The event is not to be dismissed, after all, according to the explorers, this was "one of the best [places] in the world." However, for a new name to be acknowledged by "scientific societies," it took more than a private communication by letter and the explorers examined and charted the whole bay onto a map they sent to the Ministry in this date. Outside specific naval repositories and the charts drawn during this Portuguese expedition the name Porto Bocage has a limited existence. In the end, it is a rather small portion of the larger bay.[3] Even if it was not exactly an unknown part of the mysterious continent, the new name nevertheless asserted Portuguese rule over the region.

The moment the Portuguese explorers in their African campaign chose to proclaim their naming aspirations was far from innocent. Back in Europe, the winter of 1884-1885 was heated by the Conference of Berlin, where famously several European nations, as well as the United States of America, gathered to decide on the fates of the larger part of a whole continent, Africa. The diplomatic conference, also called Kongo Konferenz because it was initially organised to discuss the distribution of commercial rights on the Congo river, had originally been a request of the minister Bocage in the name of the Portuguese government.[4] It was meant to settle a dispute between Portugal and Britain; but it ended up assuring the interests in the Congo region of the International Association controlled by King Leopold of Belgium. For the Portugal delegation, led from Lisbon by Bocage, this international assembly was the targeted location for the determination of Portuguese political authority over African hinterland domains which were sought after by the British empire. Bocage further expected to negotiate a deal with both British and French that would recognise Portuguese "historical rights" over the hinterland region between Angola and Mozambique.[5] This vast strip of land was coloured in crimson on a map produced in 1881, and the whole idea of the Portuguese appropriation of the hinterland

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[2] In his turn, Fernão [Fernando] Veloso was a character in the national epic *Os Lusíadas* written by Luís Vaz de Camões. Veloso was a sailor who, in a humorous passage, assaulted this Mozambique bay all by himself ignoring the risks and, when confronted with a fierce indigenous attack, Fernão Veloso ran back to his ship to much amusement of his companions.

[3] The Library of the Society of Geography of Lisboa holds the hand-drawn album offered to Luciano Cordeiro by Serpa Pinto titled "Africa Oriental. Anno de 1884." In it, Serpa Pinto drew and coloured some of the maps from this expedition during the weeks the explorers were forced to postpone their advance to the interior due to lack of supplies and carriers. Although the name "Porto Bocage" was given to a small enclave in the bay and therefore does not feature in most maps of the region, the nautical instructions published by the United States Government mention it as "Porto do Bocage." See, United States Government, 'Mozambique. Baia de Inhambane to Cabo Delgado,' in *Sailing Directions (En Route). East Africa and the South Indian Ocean. Pub.171*, 13th ed., 2018, 57. (Publication 171 is correct through 5 January 2019).

[4] Charles E. Nowell, *The Rose-Colored Map. Portugal's Attempt to Build an African Empire from the Atlantic to the Indian Ocean* (Lisboa: Junta de Investigações Científicas do Ultramar, 1982).

[5] Valentim Alexandre, "A Questão Colonial no Portugal Oitocentista," in *O Império Africano, 1825-1890*, ed. Valentim Alexandre and Jill Dias, *Nova História da Expansão Portuguesa* 10 (Lisboa: Editorial Estampa, 1998), 21–132.

was dubbed as the "Rose-coloured Map" as a consequence. Unfortunately for Portugal's plans, this desire clashed with the British plan to extend communication lines "from Cape to Cairo."[6] For the public opinion in Portugal the fact that the Conference of Berlin was not, in the end, favourable to Portuguese claims in the region of south Africa, was ultimately perceived as a failure, and the rose-coloured dream vanished along with the hope for a profitable empire in Africa. With this dedication to Bocage, the explorers acknowledged a prominent figure in a context of diplomatic tensions. Serpa Pinto and Cardoso were keenly aware of the perceived authority of names and the act of naming in the construction of empires.

This dissertation will focus on the role of Bocage as the director of the Zoological Section of the Museu Nacional de Lisboa (National Museum of Lisbon, henceforth MNL), in the context of the Portuguese reappraisal of its colonial possessions in the African continent. The specimens of African fauna which were made into shipments of dead and alive animals that regularly arrived in Lisbon became part and parcel of a narrative of possession and appropriation of the distant boundaries of the Portuguese empire, its raw materials, landscape, and peoples. In the following chapters I argue that the specific scientific practices of the Lisbon zoological museum are best read under the light of the social, scientific and political circumstances.

Bocage and an overview of the political landscape

José Vicente Barbosa [Barboza] du Bocage was born in 1823 in Funchal, Madeira, and died in Lisbon when he was 84 years old, in 1907.[7] During the span of his lifetime, Portugal changed dramatically. He was born during one of the most significant events in the first half of the century – Brazil's independence from Portuguese rule and the subsequent reconfiguration of the imperial structure. He died almost one year before the assassination of the King in 1908, which led to the republican revolution in 1910 and to the transformation of institutions and society. He saw through the second half of the century Portugal's investment on the railway and witnessed the establishment of new liberal institutions, technical schools, and associations which rattled Portuguese and Lisbon's civic society. He had a reserved demeanour and was not keen to engage in public political dispute, or in typical social events of attending the opera or the theatre, but still Bocage was in tune with the political events of his time and a

[6] Eric Axelson, *Portugal and the Scramble for Africa, 1875-1891* (Johannesburg: Witwatersrand University Press, 1967).
[7] Bocage's son, Carlos Roma du Bocage (1853-1918), when revising a biographical study of his father claimed that his name should always be written down with a **z**, since his father always signed his name like that.

knowledgeable participant. He was a member of the scientific elite and was a promoter of one of the first Portuguese scientific periodicals. He published over 170 scientific papers on Portuguese fauna while he also, at times, administrated a copper mine and an oyster company, was a shareholder in colonial chartered companies, and invited to the inaugural committee constituted to create in Lisbon a Zoological Garden.[8] Bocage taught generations of army and navy officers who engaged with the colonial structure, as participants as well as critics, and who helped define the Portugal technopolitical landscape of the nineteenth century.

Brazil declared itself independent from the Portuguese Crown in 1822, and Portugal conceded it official independence in 1825. A crisis of succession ensued and a diatribe between two factions, liberals and absolutists, gave way to civil war. When Bocage was just a five-year old boy his family left Madeira to Brazil to escape an absolutist accusation of a group of liberals in Madeira, which included Bocage's father João José Barboza du Bocage.[9] Bocage is said to have spent some time in jail accompanying his parents. While they exiled in Brazil his older brother died. When troubles had passed, he and his family came back to Madeira. As a young man Bocage came to mainland Portugal to study Medicine at the University of Coimbra. The country entered a new cycle of civil unrest and, during his time in Coimbra, young Bocage joined the Academic Battalion to again uphold liberal values in the 1846-1847 Patuleia civil wars.[10]

In 1848, at twenty-five, Bocage was living in Lisbon and working as a medical doctor in the Hospital de S. José, the central hospital of the capital city. In the same year, he applied to work as substitute professor of Zoology and Compared Anatomy, at the recent liberal education institution of the Escola Politécnica de Lisboa (Polytecnic School of Lisbon, henceforth EPL). The EPL was created in 1837 together with the Academia Politécnica do Porto in a wave of various reforms in higher education.[11] Both the Lisbon and Porto new schools taught elementary science to future army and naval officers, engineers, and civil servants. As an alternative to the University of Coimbra, the EPL transformed the teaching of sciences in Lisbon. The students took a varied number of classes towards different types of courses. To all

[8] Fernando Emygdio da Silva, *História do Jardim Zoológico de Lisboa. Os movimentados oitenta anos da sua meritória existência, 1864-1964* (Lisboa, 1965), 5.
[9] Câmara dos Senhores Deputados, *Documentos para a historia das Cortes Geraes da Nação Portugueza*, vol. 5 (Lisboa: Imprensa Nacional, 1883), 478–84.
[10] Teresa Nunes, *Maria da Fonte e Patuleia 1846-1847*, Guerras e Campanhas Militares da História de Portugal (Matosinhos e Lisboa: Quidnovi, 2008).
[11] Rómulo de Carvalho, *História do Ensino em Portugal: Desde a fundação da nacionalidade até ao fim do regime de Salazar-Caetano*, 3rd ed. (Lisboa: Fundação Calouste Gulbenkian, 2001).

students, the EPL offered a general course of "Introduction to the Three Kingdoms," taught by the professors of Botany, Mineralogy, and Zoology. The EPL provided also a General Course, which included the more specific course of "Zoology and Compared Anatomy".[12] Since its inception, the EPL included several research facilities: a chemical laboratory and amphitheatre, a library, and natural history cabinets. The idea to include, within the school, two museums dedicated to each of the subjects of minerology and zoology, already hinted at the growing specialization within the sciences in this period. As the decades passed, the EPL also grew to manage its own botanical garden and a meteorological observatory. In 1843 the EPL had suffered a massive fire and the building underwent considerable renovations until it was finally totally rebuilt only in 1879.[13]

In 1851, Bocage was appointed the main professor of Zoology and, as such, he became the director of the Zoological Section of the Natural History Cabinet and Museum of the School. The museum was created as an educational resource, to provide teaching materials for the 8th course, but as time passed, this section of the EPL's museum became a relatively autonomous research facility. This thesis will address how this museum became the centre of management of the zoological collections previously existing in Lisbon, and of the production of increasingly more and new taxonomical data as the Lisbon collections grew in size and relevance.

In the same decade of the creation of the EPL, the Overseas Council, a structure which existed since the seventeen-century, was reorganised. In 1832 the designation of "overseas provinces" was created. These were managed by prefects and had equal standing as the metropolitan provinces, which meant they were also represented in parliament.[14] Finally, in 1835 a new Secretary of State for Overseas Affairs was created within the Ministry of Navy, in charge with the administration of overseas provinces and a proposal was made to create the office of governors for each of the provinces. However, these separated bureaucratical offices

[12] This course was the 8th in the school. Luís Miguel Carolino, "The Making of an Academic Tradition: The Foundation of the Lisbon Polytechnic School and the Development of Higher Technical Education in Portugal (1779-1837)," *Paedagogica Historica* 48, no. 3 (2012): 391–410; Daniel Marques, *Ensino e a Investigação em Zoologia e em Botânica na Escola Politécnica de Lisboa, 1837–1911* (Ph.D. dissertation, Universidade Nova de Lisboa, 2014).

[13] Fernando Bragança Gil and Maria da Graça Salvado Canelhas, "Ensino e Cultura No Monte Olivete Até à Faculdade de Ciências," in *Faculdade de Ciências da Universidade de Lisboa: Passado/Presente, Perspectivas Futuras. 150º Aniversário da Escola Politécnica / 75º Aniversário da Faculdade de Ciências*, ed. Fernando Bragança Gil and Maria da Graça Salvado Canelhas (Lisboa: Museu de Ciência da Universidade de Lisboa, 1987), 24.

[14] See Alexandre, "A questão colonial no Portugal oitocentista." The Portuguese empire at the time comprised territories in Africa, the archipelago of Cape Verde (which gained independence in 1975), which for most of the nineteenth-century also administered Guinea-Bissau (independent in 1974); the archipelago of São Tomé, coastal Angola, coastal Mozambique (all recognised sovereign in 1975); and in Asia, Goa (independent since 1961), Macau (handed over to the People's Republic of China in 1999) and East Timor (Democratic Republic of Timor-Leste since 2002).

still needed a state-level council, the Overseas Council, to manage, supervise and control overseas matters. Bernardo de Sá Nogueira de Figueiredo (1795-1876), best known as Sá da Bandeira, was the Ministry of Navy and Overseas in 1836, and considered the architect of Portuguese colonial policies. [15]

Most authors agree in stating the decade of 1850s as the launch of a modern colonial system which reconfigured the overseas interest of Portugal in Africa. New guidelines for the Overseas Council were drafted under the new political period of the so-called Regeneração (regeneration period), marked by a growing stability of a liberal order. Two main parties, the Progressista, and the Regenerador, took turns in the Portuguese constitutional monarchy system, until in 1876 a minority Republican Party was created.[16] Bocage was a member of the Regenerador Party, whose major figure was Antonio Maria de Fontes Pereira de Melo (1819-1887).[17] In 1853, new regulations addressed the political competences of oversight of all actions concerning the administration of overseas territories and the implementation of anti-slavery laws.[18] Between 1854 and 1867, the Council periodically published a *Bulletin* and the *Annals of the Overseas Council* containing copies of all legislation regarding its jurisdiction. Throughout the years the Council was seen to be too bureaucratical, and its autonomy and relationship with the government was often negotiated.[19] Although the "African Question," or the overseas administrative organisation was a recurring matter, the successive governments of the Portuguese constitutional monarchy were not able to create a stable and centralised structure independent from political transitions.[20]

Towards the end of the century, new institutions were crucial in the advancement of a sustained colonial agenda for Africa. The Sociedade de Geografia de Lisboa (Society of Geography of Lisbon, henceforth SGL), was created in the end of 1875 by Luciano Cordeiro (1844-1900) and became the main axis along which the political project for Portuguese Africa

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[15] Marcelo Caetano, *O Conselho Ultramarino. Esboço da sua história* (Lisboa: Agência Geral do Ultramar, 1967); Pedro Tavares de Almeida and Paulo Silveira e Sousa, "Ruling the Empire: The Portuguese Colonial Office (1820s-1926)," *Revista da História das Ideias* 27 (2006): 1–33; João Castro Fernandes, "Política Colonial Portuguesa 1870-1955," *Lusíada. Política Internacional e Segurança*, no. 1 (2008): 131–148.

[16] The Câmara dos Dignos Pares do Reino, House of the Peers of the Realm was the high chamber of the Portuguese Parliamentarian system, and the Câmara dos Senhores Deputados, House of Deputees, the low chamber. The legislature lasted in some years for only some months. The King also had a high council formed by appointed councilmen, the Conselheiros do Reino. The minutes of the parliament debates are available online at http://debates.parlamento.pt/. See also Maria Filomena Mónica, ed., *Dicionário Biográfico Parlamentar 1834-1910*, 3 vols (Lisboa: Imprensa de Ciências Sociais / Assembleia da República, 2004); Valentim Alexandre, *A Questão Colonial No Parlamento (1821-1910)* (Lisboa: Assembleia da República / Publicações Dom Quixote, 2008).

[17] Manuel Pinto dos Santos, *Monarquia Constitucional. Organizações e relações do poder governamental com a Câmara dos Deputados 1834-1910* (Lisboa: Assembleia da República, 1986); Maria Filomena Mónica, *Fontes Pereira de Melo. Uma Biografia*, 4th ed. (Lisboa: Alêtheia, 2009).

[18] *Regimento do Conselho Ultramarino* (Lisboa: Imprensa Nacional, 1853).

[19] Caetano, *O Conselho Ultramarino*, 67-68.

[20] Almeida and Sousa, "Ruling the empire."

was designed. The SGL was created as a civic gathering of experts from all areas, and the group of founders represented diverse social strata. Only a few weeks later, in early 1876, João Andrade Corvo (1824-1890) created the Comissão Central Permanente de Geografia, Central Permanent Commission for Geography, within the scope of the Ministry of Navy and Overseas. This was a council of learned men dedicated to the discussion of future projects of imperial dimensions. Barboza du Bocage was one of the personalities called in to serve on the Comissão Central and, weeks later, he was nominated for member, and then to serve as first vice-president of the SGL. By the end of 1876, Barboza du Bocage was elected president of the SGL, and of its African Commission. He was also at the time vice-president of the Academia Real das Ciências de Lisboa (Royal Academy of Sciences of Lisbon, henceforth ACL). Although in these cases the presidency was mostly a symbolic place of acknowledged respect, these were nonetheless markers of the growing social and political relevance Bocage occupied by then. During his presidency of the SGL, in 1879 he was also elected for the first time to the Câmara de Deputados, the lower chamber of Parliament, as member of the Regenerador Party. Although he had previously served in the Conselho de Instrução, the Education Board, in 1866, I have argued elsewhere that it was the position in the SGL that transferred Bocage's scientific expertise as professor of the EPL and director of the MNL and known zoologist into recognised political acumen which led him to finally accept a role that had been often before offered to him.[21]

The SGL was responsible for the organisation of the so-called first scientific expedition to Africa in 1877, led by navy officers Hermenegildo Capelo (1841-1917) and Roberto Ivens (1850-1898), and army officer Serpa Pinto, mentioned earlier. This eventually turned into two different expeditions which rattled the country's psyche and excited more participation in and critique of the debate over colonial administration and the so-called "civilising mission" of European nations, but in particular of Portugal's, in the African continent. In this context, the 1881 "Rose-Coloured Map" mentioned earlier was published by the African commission of the SGL, and Barboza du Bocage was a signatory of the "Civilising Stations" project.[22]

Between 1877 and 1881, Bocage was also busy publishing the first volume of his scientific project of a Fauna of Angola, the *Ornithologie d'Angola*. Still in 1881, Bocage retired

[21] Catarina Madruga, "Expert at a Distance. Barbosa du Bocage and the production of scientific knowledge on Africa," *HoST - Journal of History of Science and Technology* 11, no. 1 (2017): 57–74.
[22] Sociedade de Geografia de Lisboa, *Ao Povo Portuguez em nome da honra, do direito, do interesse e do futuro da patria. A Commissão do Fundo Africano creada pela Sociedade de Geographia de Lisboa para promover uma subscripção nacional permanente destinada ao estabelecimento de estações civilisadoras nos territórios sujeitos e adjacentes ao domínio Portuguez em Africa* (Lisboa: Imprensa Nacional, 1881).

as professor of the EPL, leaving his teaching obligations. A new professor was hired for the position, Fernando Mattozo [Matoso] dos Santos (1849-1921). However, the automatic link between professorship and museum directorship was exceptionally broken and Bocage was allowed to be the director of the Zoological Section of the MNL until his death. During the years Bocage served as minister, Santos took his place as director during his absence from the museum.

In 1883 Bocage accepted to serve as the substitute for the resigning Minister of Navy and Overseas.[23] In practice, he left the seat of president of the SGL to become Minister which reinforced the role of the SGL as a crucial political platform with increasing power in Portuguese society. In October 1883, a new cabinet was elected and Bocage served a full term as Minister of Foreign Affairs between 1883 and 1886. He was responsible for the complex diplomatic negotiations of sovereignty and commercial rights in Africa that culminated in the Conference of Berlin. After that intense political and diplomatic work of international mediation, during which he also had to counteract internal politics and talks about a government overturn, he went back to his work in the zoological museum. Later in 1890 he would serve again, for a year, as Minister for Foreign Affairs, once again during a period of international conflict with England, about sovereignty of the Mozambique hinterland. Afterward he returned once again to his research and published his second monograph of the Angolan Fauna project, *Herpetologie d'Angola et Congo* in 1895, when he was already 72 years old. This thesis is also about how the colonial agenda bolstered, and was echoed by, the Zoological Section of the MNL and its specialisation in collections from Angola.

All these details are found in contemporary biographical accounts of Bocage's life and career.[24] His profile as the "father of zoology" has been explored multiple times as part of several works, including biographical notes that already pointed out the peculiar circumstances of Bocage's career as a prolific scientist and also a minister in times of great political significance.[25] Bocage's scientific correspondence was bequeathed to the Zoology Department

[23] According to the personal correspondence available in the Arquivo da Universidade de Coimbra, Bocage had been asked by his personal acquaintances and colleagues at the Regenerador Party to join the governments many other times before. Coimbra, Arquivo da Universidade, Fundo Pessoal Martinho da Fonseca, Cartório José Vicente Barbosa du Bocage, Correspondência enviada.

[24] Balthazar Osório, *Elogio histórico do illustre naturalista e professor J. V. Barboza du Bocage* (Lisboa: Imprensa Libanio da Silva, 1915); Alberto Rocha [Serpa Pinto], 'O Doutor Bocage,' *Diario Illustrado*, no. 3508 (1883): 1–2; Júlio Guilherme Bethencourt Ferreira, 'J. V. Barbosa du Bocage,' *Occidente* 30, no. 1040 (1907): 250–51; Eduardo Burnay, 'Conselheiro Barbosa du Bocage,' *Boletim da Sociedade de Geografia de Lisboa* 21, no. 7 (1903): 245–53.

[25] Carlos Almaça, *Bosquejo Histórico da Zoologia em Portugal* (Lisboa: Museu Nacional de História Natural – Museu Bocage, 1993); Catarina Madruga, 'José Vicente Barbosa du Bocage (1823-1907). A construção de uma persona científica' (M.Sc.

in the twentieth century, after his death. Bocage had already contributed to the establishment of a historical archive of the department, when he previously donated relevant documents on the eighteenth-century exploration of Brazil by Alexandre Rodrigues Ferreira, that he himself purchased, as is mentioned in David Felismino's book on the extant objects and collections from the Royal Museum of Ajuda.[26] I will use as my main source materials Bocage's published works and his manuscript correspondence, sent and received, taking into consideration his life and positions held in Portuguese nineteenth-century society in order to contextualise his political and scientific agenda.[27] His roles as museum director and vertebrate taxonomist will, however, be at the forefront of this thesis. With this emphasis I do not aim to separate political context from scientific practices, but rather to stress the importance of reading the scientific work in this particular museum as an outcome of the political set of circumstances of this period.

Natural History Collections, Taxonomy, and Empire

Shipments of goods and riches were circulated within the Portuguese and Spanish empires since the first Atlantic trade routes established in the fifteenth century. Shipments of natural history objects and curiosities from Africa and other imperial domains to Europe fuelled royal and princely cabinets that represented domain over nature and diversity in the world. Circulation of ideas, behaviours and objects is central to the understanding the history of scientific production and assimilation.[28] Centuries after, in the mid-nineteenth century, European nation-states developed side by side with the establishment of national museums and of national identities. Natural history objects were no longer commodified as princely symbolic

dissertation, Universidade de Lisboa, 2013); Luís Miguel Pires Ceríaco, 'A evolução da zoologia e dos museus de história natural em Portugal' (Ph.D. dissertation, Universidade de Évora, 2014); Catarina Madruga, 'Expert at a Distance.'

[26] David Felismino, *Saberes, Natureza e Poder. Colecções Científicas da Antiga Casa Real Portuguesa*. Lisboa: Museus da Universidade de Lisboa, 2014.

[27] Presently some Portuguese authors have made substantial contributions to the area of science, empire, and diplomacy is developing. See Miguel Bandeira Jerónimo, *A diplomacia do império. Política e religião na partilha de África (1820-1890)* (Lisboa: Edições 70, 2012); Magnus Roberto de Mello Pereira and Ana Lúcia Rocha Barbalho da Cruz, *Os Naturalistas do Império. O conhecimento científico de Portugal e suas colónias 1768-1822* (Versal Editores, 2017); Ian J. Kerr and Hugo Silveira Pereira, 'India and Portugal: The Mormugão and the Tua Railway Compared,' in *Railroads in Historical Context: Construction Costs and Consequences*, ed. Eduardo Beira et al. (Porto: Universidade do Minho / MIT Portugal / EDP, 2013), 167–96; Bruno J. Navarro, 'The "Miracle of the Locomotive" in the Construction of the Third Portuguese Empire: The Launch of Railways in Angola,' in *Railroads in Economic Context: Construction, Costs and Consequences*, ed. Anne McCants et al. (Vila Nova de Gaia, MIT Portugal – INOVATEC, 2013), 113–34; Maria Paula Diogo, Ana Carneiro, and Ana Simões, 'The Portuguese naturalist Correia da Serra (1751-1823) and his impact on early nineteenth-century botany,' *Journal of the History of Biology*, no. 34 (2001): 353–93.

[28] See for example, James A. Secord, 'Knowledge in Transit', *Isis* 95, no. 4 (2004): 654–72.

items but were now reifications of the romantic narrative of the origins of the nation.[29] As many authors have suggested, most nineteenth-century museums were also reliant on imperial trade and expansion to increase their collections.

This period saw the growth of ethnographic museums with representations of regional differences together with the development of zoological museums with regional faunas. The placement of natural history collections in museum spaces, organised into rooms, cabinets, or special displays like the dioramas in the end of the century, followed certain ideas about on the one hand the artificialization of systematic placement, or on the other hand on geographical variations and distinctive characteristics.[30] Usually, exhibition rooms either displayed a taxonomic arrangement (birds, mammals, insects, etc) or a geographical type of arrangement (national fauna rooms, colonial fauna rooms, or even more specific regions), and many zoological museums had both at the same time, like the Lisbon museum. Advancement in transportation logistics brought more and more exotic specimens to Europe, and colonial nations increased their investment in the research on exotic animal groups. These gatekeepers of collections with provenance from colonial settings have recently received exposure under current debates on the role of museums in society as evidence bearers and discourse makers.[31] In the case of natural history collections, either on public display for large audiences or in academic catalogue form, they were meant to represent nature, possess natural specimens and interpret natural knowledge. When it came to colonial collections, to accumulate specimens (or other type of data), was to accumulate knowledge and to "own" it.

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[29] Tony Bennett, *Pasts beyond Memory: Evolution Museums Colonialism* (London: Routledge, 2004); Mary Pratt. *Imperial Eyes. Travel Writing and Transculturation* (London and New York: Routledge, 1992); Robert Aldrich, *Vestiges of the Colonial Empire in France: Monuments, Museums and Colonial Memories* (London: Palgrave Macmillan UK, 2005); Arne Bugge Amundsen and Andreas Nyblom, 'NaMu Making National Museums: Comparing Institutional Arrangements, Narrative Scope and Cultural Integration (NaMu) National Museums in a Global World,' *NaMu III National Museums in a Global World*, 2007, http://www.ep.liu.se/ecp/031; Paula Findlen, *Possessing Nature. Museums, Collecting and Scientific Culture in Early Modern Italy* (London: University of California Press, 1994); Pascal Gielen, 'Museumchronotopics: On the Representation of the Past in Museums,' *Museum and Society* 2, no. 3 (December 2004): 147–60; Eillean Hooper Greenhill, *Museums and the Shaping of Knowledge* (London: Routledge, 1992); Ludmilla Jordanova, 'Objects of Knowledge: A Historical Perspective on Museums,' in *The New Museology*, ed. Peter Vergo (London: Reaktion Books, 1989), 22–40; Irina Podgorny and Maria Margaret Lopes, 'Filling in the Picture: Nineteenth-Century Museums in Spanish and Portuguese America,' *Museum History Journal* 9, no. 1 (2016): 3–12; Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge, Massachussetts, and London, England: Harvard University Press, 1999).

[30] See for example, Mary P. Winsor, *Reading the Shape of Nature. Comparative Zoology at the Agassiz Museum* (Chicago and London: The University of Chicago Press, 1991), and, by the same author : 'Museums,' in *The Cambridge History of Science. Volume 6: The Modern Biological and Earth Sciences* (Cambridge: Cambridge University Press, 2008), 60–75; Lynn K. Nyhart, 'Publics and Practices,' in *Worlds of Natural History*, ed. Helen A. Curry et al. (Cambridge: Cambridge University Press, 2018), 335–47.

[31] Robert R. Janes and Richard Sandell, eds., *Museum Activism* (London: Routledge, 2019); Wayne Modest and Robin Lelijveld, eds., *Words Matter. An Unfinished Guide to Word Choices in the Cultural Sector* (Amsterdam: Tropen Museum, Afrika Museum, Museum Volkenkunde, Wereld Museum, 2018).

The historian Valentim Alexandre described the context of the Portuguese colonial discourse in its Third Empire as constructed around two shared ideas he calls "myths."[32] He identified (a) the myth of the "El Dorado," the idea that African territories were economically viable and strategically relevant; and (b) the myth of a "Sacred Heritage," the idea that the Portuguese empire had an historical responsibility to the peoples and land of Portuguese Africa. The latter relates to the construct of the "civilising mission" that European powers were using to justify their occupation and colonisation of the African continent. Economic feasibility was still a part of the endeavours and investments of the "civilising mission" for several nations. Both these myths informed the action of the Portuguese Crown as well as the SGL.[33] Several authors have contributed of late to a more detailed picture of the actions and rhetoric of the Portuguese African empire. The Portuguese nineteenth-century is now under scrutiny from the point of view of the history of collections, colonial technology and medicine, and media and visual culture.[34]

Colonial collections were formed, studied and displayed as part of the overarching movement of the "civilising mission" that Western imperial powers used to connect their technical and scientific advancements with a moral stance over other peoples, thus connecting science and empire.[35] When a zoological museum organised field expeditions abroad the results of its efforts resulted in an increase of expert knowledge on a specific region of the globe and a claim of authority over any other such endeavour.[36] In the 1840s, for example, the Berlin museum sent Prussian naturalist Wilhelm Peters (1815-1883) to collect fauna and flora in the Eastern coast of Africa, which resulted in his publishing multiple volumes on the flora and fauna of the region in his *Reise nach Mossambique*.[37] The Lisbon museum, lacking the means

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[32] Valentim Alexandre, "O Império Português (1825-1890): Ideologia e Economia," *Análise Social* 38, no. 169 (2004): 959–79; Valentim Alexandre, "A África no imaginário político português (Séculos XIX-XX)," *Penélope* 15 (1995): 39–52.

[33] Ângela Guimarães, "A questão colonial. Introdução a um debate," *Análise Social* 19, no. 77-78–79 (1983): 1083–89; Maria Emília Madeira Santos, *Viagens de exploração terrestre dos portugueses em África* (Lisboa: Junta de Investigações Científicas do Ultramar, Centro de Estudos de Cartografia Antiga, 1978).

[34] Ricardo Roque, *Headhunting and Colonialism. Anthropology and the Circulation of Human Skulls in the Portuguese Empire, 1870-1930* (London: Palgrave Macmillan, 2010); Ricardo Roque, 'O Trigo e o Joio: Segredos e botânica médica em Goa, c. 1840-1930,' *Revista Crítica de Ciências Sociais* 115 (2018): 113–36; Miguel Bandeira Jerónimo, *Livros Brancos, Almas Negras. A «missão civilizadora» do colonialismo português, c.1870-1930* (Lisboa: Imprensa de Ciências Sociais, 2010); Isabel Maria Amaral and Maria Paula Diogo, eds., *A outra face do império ciência, tecnologia e medicina (Sécs. XIX-XX)* (Lisboa: Edições Colibri, 2013); Leonor Pires Martins, *Um Império de Papel*, 2ª edição (Lisboa: Edições 70, 2014); Filipa Lowndes Vicente, *O Império da Visão. A fotografia no contexto colonial Português (1860-1960)* (Lisboa: Edições 70, 2014); Navarro, 'The "Miracle of the Locomotive"'; Pereira and Cruz, *Os Naturalistas do Império*.

[35] Suman Seth, 'Putting knowledge in its place: science, colonialism, and the postcolonial,' *Postcolonial Studies* 12, no. 4 (2009): 373–88.

[36] Katharine Anderson, 'Natural history and the scientific voyage,' in *Worlds of Natural History*, ed. Helen A. Curry et al. (Cambridge: Cambridge University Press, 2018), 304–18.

[37] Wilhelm Peters, *Naturwissenschaftliche Reise Nach Mossambique. Zoologie*, 5 vols (Berlin: Reimer, 1852); Wilhelm Peters, *Naturwissenschaftliche Reise Nach Mossambique. Botanik*, 2 vols (Berlin: Reimer, 1862). See also Kraig Adler, 'Peters, Wilhelm (1815-1883),' in *Contributions to the History of Herpetology*, vol. 1 (revised and expanded), 2014, 37–38. Peters and

to promote a strictly zoological expedition, contracted a "naturalist-explorer" to make a long research stay in the Angolan hinterland and, as a result, proposed the project of writing and publishing a vertebrate fauna of Angola, in much the same way as Peters did for Mozambique (also a region under Portuguese imperial aspiration). Peters' project was mentioned as an extra motivation to pursue this, testifying to the cumulative nature of all these processes of gathering knowledge – and collections.[38]

Taxonomic work, albeit underappreciated in terms of contemporary biological teaching and practices, holds successful characteristics if measured by the longevity of some, if not most, of the practices and techniques. The action of naming has permeated the history of taxonomic practices and many authors have started their texts with references to the classical allegory of Adam naming the beasts, or to Michel Foucault and his book *Les Mots et les Choses*. Foucault's contribution generated a very important framework for later historians of collections, museums, and naturalists to examine further the consequences of the act of naming in the domain of natural history.[39] The biogeographical agenda, or animal and plant distribution studies in the nineteenth-century, connects nowadays with ecological and biodiversity research and many collection-based data have proven crucial. Not only for the historical and biological value of centuries old collections, but also as new species are added to the catalogues of science as a result of the close inspection of understudied storage rooms and shelves.[40] Species delimitation is a matter of taxonomy, not of nomenclature, but taxonomic work requires such a specimen to make an objective link between a name and a natural population, without which the allocation of the name remains uncertain.[41] Conservation and taxidermic techniques have also remained virtually unchanged. Even if today there are new materials and chemical compositions, the performative work is today still very similar to the nineteenth century and even to the eighteenth century.[42]

Bocage corresponded at least between 1865 and 1872, while the specimen exchange between Berlin and Lisbon continued, the access to Bocage's sent letters was a courtesy of Museum für Naturkunde Berlin / Historische Bild- und Schriftgutsammlungen.

[38] Madruga, "Expert at a Distance."

[39] Michael Ohl, *The Art of Naming*, trans. Elisabeth Lauffer (Cambridge, Massachusetts, and London, England: The MIT Press, 2018); M. Eulàlia Gassó Miracle, 'On Whose Authority? Temminck's Debates on Zoological Classification and Nomenclature: 1820-1850,' *Journal of the History of Biology* 44, no. 3 (2011): 445–81.

[40] Luís M. P. Ceríaco, "Lost in the middle of the sea, found in the back of the shelf: a new giant species of Trachylepis (Squamata: Scincidae) from Tinhosa Grande Islet, Gulf of Guinea," *Zootaxa* 3973, no. 3 (2015): 511–27.

[41] Luís M. P. Ceríaco et al., "Photography-based taxonomy is inadequate, unnecessary, and potentially harmful for biological sciences," *Zootaxa* 4196, no. 3 (2016): 435; Dalton S. Amorim et al., "Timeless Standards for Species Delimitation," *Zootaxa* 4137, no. 1 (2016): 121–28.

[42] Paul Lawrence Farber, "The Development of Taxidermy and the History of Ornithology," *Isis* 68, no. 244 (1977): 550–66; Rachel Poliquin, "The Matter and Meaning of Museum Taxidermy," *Museum and Society* 6, no. 2 (2008): 123–34.

As Janet Browne and Harriet Ritvo already put it, the naming of new species from a hitherto unexplored region of the world was part of a process of appropriation that is akin to colonial occupation.[43] I am interested in identifying the ways through which nature was understood and dealt with in the second half of the nineteenth century. Since 1865, Portuguese naturalists working on African fauna gave new names to species and genera honouring the presence of Portuguese settlers, military, and geographical explorers. Many of the contributors to the Lisbon museum's scientific collections were in fact celebrated in the names of new species. The progressive building of the Portuguese Third Empire, allowed for an opportunity for the development of a particular scientific agenda, that matched the burgeoning field of zoogeographical studies, while also contributing for the political justification of the Portuguese presence in East and West Africa (Angola and Mozambique). This thesis offers a window to research practices of collection, shipment, identification, and publication of scientific knowledge on the fauna of the territories identified as Portuguese Africa. Cape Verde, Guinea, São Tomé, Angola, and Mozambique had varying links with the Portuguese Crown. I will be looking into the taxonomic practices and research results on the zoological collections as a part of the knowledge production of the Portuguese imperial machine.

Structure and summary of chapters

This thesis is about names. *Taxonomy and Empire. Zoogeographical research on Portuguese Africa, 1862-1881* addresses the negotiation of nomenclature and taxonomical organisation of knowledge in a specific historical situation of scientific and political appropriation of nature, landscape, and territory. It is also about the complex process of conception of scientific names, the underlying negotiation of authority, and the convoluted relationship between specific names and actual specimens. With this title, I presuppose a conjunction between the development of scientific expertise and the colonial appropriation. The selected case-studies and documents under analysis will offer a reflection on the place of scientific knowledge regarding national identity and colonial administration, not as separate activities but rather as supporting and sustaining each other. In the context of nineteenth-century nation building efforts, the mechanisms of exactly how exotic nature was domesticated and transformed into dusty museum displays and translated into disputed scientific nomenclature were also an act of

[43] Janet Browne, J. 'Biogeography and Empire.' In: Jardine, N., Secord, J. & Spary, E. (eds.) *Cultures of Natural History*. Cambridge: Cambridge Press, (1996): 305-321; Ritvo, H. (1990) The Power of the Word: Scientific Nomenclature and the Spread of Empire. *The Victorian Newsletter*. 77, 5-8.

conquest with close relation with imperial structure and ambition. Science in this period had an intimate relationship with the colonial agenda, simultaneously depending on it and using it to increase its own visibility and power.

Taxonomy will be used as a shorthand for the practices involved in zoological collection management and the production of zoological knowledge. These were collection-based research programs that included identification by morphological comparison side by side with the tradition of compared anatomy. Amassing, organizing, identifying, and naming were all procedures that required expertise, authority, as well as networking and international collaboration. Challenges to the naming of new species came from regional differences and the attempt to create a universal foundation for zoological nomenclature, but also from imperial networks and the arrival of new species unknown to Europeans. And by *Empire,* I am referring specifically to the establishment of the Portuguese Third Empire, when Portugal turned its attention to its African colonial possessions. Since Portugal's presence in Africa dated back four centuries, Portugal's position was conservative, upholding its perceived historical rights. This was a different background than most European powers which wanted to confirm and claim the bountiful resources of southern Africa. Contrarily to other powers which were aiming for commercial control of the main rivers and lake systems, Portugal was, in the first half of the nineteenth century, certain that its claim to Angola and Mozambique's hinterland was assured. Internationally, the game changed in the second half of the nineteenth century. All eyes were turned to Africa and the age of scientific exploration in Africa was announced. The world-famous David Livingstone (1813-1873) and Henry Morton Stanley (1841-1904) had scientific counterparts in naturalist-explorers like Wilhelm Peters (1815-1883) or Édouard Verreaux (1807-1873). Now the Portuguese had also their heroes in the African explorers Serpa Pinto, Cardoso, Hermenegildo Capelo, Roberto Ivens, and Henrique de Carvalho, and the Lisbon museum received the bulk of its African collections from naturalist-explorers José de Anchieta (1832-1897), Francisco Newton (1864-1909), and many others who followed.

This dissertation aims to contribute to studies of zoological collections, their meanings and uses, as well as to the new literature on this specific political period in Portugal and how this particular museum contributed to it. The two decades I propose to focus on are delimitated by the definitive establishment of the structure of an autonomous scientific institute within the EPL and the publication of the first volume of Bocage's fauna of Angola. In fact, the new regulation published in 1862, together with the publication in the same year of a manual handbook for the collection, preparation and shipment of new specimens mark a new organisation within the zoological section of the MNL. The 1860s decade was punctuated by a

dramatic increase in purchases, donations, and the arrival of shipments from numerous contributors in various geographical locations. In 1866 two events again dominate the development of the museum work: the contract with José de Anchieta as the first naturalist in the field, the Angolan hinterland, shipping collections consistently to Lisbon; and the foundation of a new scientific periodical of the Academy of Sciences, which would become a conduit for all the research produced in the museum. The 1870s were marked by the creation of the SGL, and the preparation of Bocage's publishing project of a catalogue of the known vertebrate fauna of Angola. The years 1880-1881 set the stage for a series of crucial events that tied geography, zoology, and the politics of empire and international representation. The commemoration of the tricentenary of the death of Camões, the literary genius of the nation, the publication of Serpa Pinto's journals of his cross-continental expedition, *How I crossed Africa*, and the inclusion in the museum of Lisbon of the several collections gathered by the explorer. It was the year the Society of Geography promoted a leaflet to raise funds for "Civilising Stations" in the area between the Angolan and the Mozambican coasts, which was accompanied by a map of the African continent with the Portuguese imperial possessions painted in with crimson colour. As president of the SGL, Bocage led in 1881 the Portuguese delegation to the Third International Geographical Congress in Venice, possibly his last journey abroad.

I have planned the chapters chronologically and following Barbosa du Bocage's different roles. Chapter 1, "A national museum in Lisbon," looks into the constitution of the new name for the Lisbon zoological and mineralogical collections, the *Museu Nacional de Lisboa*, the organization, staff and goals stated in the new regulations. Chapter 2, "Bocage's *Instrucções praticas*: universal conventions and national science," analyses the MNL's publication of a set of instructions for the preparation and shipment of collections to the new museum, where I argue Bocage's collections' policies are presented in a systematic way for the first time. The *Instrucções* created the necessary social space that advertised the museum as a recipient of the shipments and donations of outside collaborators. It did so by providing a guide of materials and a manual of methods; however, in order for the instructions to generate enthusiasm its peritexts were filled with calls for national pride. The *Instrucções* were not intended only for a metropolitan audience and were also distributed among the high-ranking officers of the extensive Portuguese empire at the time. As a result, former students of the EPL as well as pharmaceutical personnel working in the different colonies responded with new additions to the Lisbon colonial collections. Hence, in chapter 3, "First Shipments from the Colonies," I identify and compare different types of collectors who, while neither amateur collectors nor

professionally dedicated to natural history, proficiently positioned themselves as representatives of the metropolitan museum in the colonies. My aim is to compare their agendas in order to provide a better picture of the organization of colonial administration at the time, as well as to look into the scientific results of their collaboration with Bocage.

Following the portrayal on the crucial albeit more invisible role of colonial collectors, chapter 4, "Priority in Print," is a special case study where I follow the multiple scientific names given to one particular African animal, the *Potamogale velox*, or the giant otter-shrew. This aquatic animal provided an interesting case of negotiation of authorship and authority that the multiple revised versions of the International Code of Zoological Nomenclature Code were not able to settle in an objective manner. Determining who published a name first was much more difficult than it seemed and politics of national affirmation and international competition undermined claims for priority. Chapter 5, "A Museum on Paper," provides a glimpse behind the scenes of zoological publications, where museum curators were tasked to organise the incoming boxes, jars, and crates into catalogues, lists, and taxonomic hierarchies. Publishing the results of this work was paramount to the museum's visibility as scientific results became more and more significant. Not only in the case of new species for science but also when it came to new zoogeographical knowledge, that helped build an increasingly more complex and complete picture of the geographical distribution of animal species. I analyse a sample of the catalogues of the MNL alongside the periodical articles that were published in the *Jornal de Sciencias Mathematicas, Physicas e Naturaes* of the ACL. Chapter 6, "Explorers of the Rose-Coloured Map," presents the role as field collector and naturalist of Bocage's right-hand man in Angola, José de Anchieta. Beginning his contract with the museum in 1866, Anchieta studied the Angolan hinterland for just over thirty years continuously writing to Bocage and shipping new materials. This systematic work allowed Bocage to propose a project for a Fauna of Angola, where the MNL could exert its expert authority in this biogeographical region. Another type of collectors, the geographical explorers are also discussed in this chapter. I address the symbolic and political context of the explorations of Serpa Pinto and Capelo and Ivens, and how their shipments of meteorological and cartographic data, as well as their botanical and zoological collections were turned into scientific knowledge legitimised by the various institutions in Lisbon.

With this work I also want to call attention to the rich materials held at the Arquivo Histórico do Museu Bocage, AHMB, the historical archive of the zoological department of the current Museu de História Natural e da Ciência da Universidade de Lisboa. This thesis is a proof of concept of the possibilities of historical research based on further study on the large

documental archive that was bequeathed to the Zoological Museum by Bocage's family. In his personal archive of drafts, index cards, and received correspondence one finds a valuable time capsule of nineteenth century practices of a museum director and a zoologist. The historical manuscripts cited here, some from Bocage's personal papers and other materials produced in the department of Zoology, support a portrayal of his work that goes beyond his published work. Bocage's scientific correspondence is a treasure trove of information on scientific practices and protocols while logbooks for the management of glass eyes for taxidermy corroborate the relevance of the material culture that allowed accumulation and administration of data that lead to scientific results.

1.
A national museum in Lisbon

In the first half of the nineteenth century, Museu de Lisboa was a short hand for the museum of the Academia Real das Ciências de Lisboa (Royal Academy of Sciences of Lisbon, henceforth ACL), which held mineralogical and zoological collections.[1] These collections were augmented in 1836 with the transfer of the royal collections from the Real Museu e Jardim Botânico in the Ajuda Palace (Royal Museum and Botanical Garden of Ajuda), often called simply Museu da Ajuda. The collections in the royal palace were the remainders of a wealth of eighteenth-century collections brought from the overseas empire during the wave of exploring

[1] The ACL museum was also associated with the didactical collections for the Aula Maynense, a weekly public class started in the eighteenth-century by Father Joseph Mayne (1723-1792), where an Introduction to the Three Kingdoms of nature was taught. The rich history of Portuguese zoological collections in the long nineteenth-century was the focus of Luís Ceríaco's Ph.D. dissertation, see Luís M.P. Ceríaco, *A evolução da zoologia*; Rómulo de Carvalho, *A História Natural em Portugal no Século XVIII*, vol. 33 (Lisboa: Instituto de Cultura e Língua Portuguesa Ministério da Educação, 2004).

missions launched in 1783 and led by Domenico Vandelli (1735-1816), the director of the Lisbon museum and the Botanical gardens and museum at the University of Coimbra.

The name *Museu Real* was sometimes used to describe the ACL Museum as well – the Academy was also the Royal Academy, because the collections had been merged. Royal collections were indeed stored and studied in the Academy. The interchangeability of the nomenclature for these collections is a possible sign for the vague public representation of the museum.[2] George Stocking has shown how contentious a name of an institution can be in relation with the construction of specific disciplinary communities. Discussing the institutional name of the Anthropological Society, he showed how disputed boundaries and social meanings – like the perceived difference between ethnology and anthropology, in the name of the institute proved to be more challenging than anticipated.[3] In a similar way, a national museum should be *of Portugal* and not *of Lisbon*. In this case, the epithet *national* can be read as a substitute for *royal* in the context of the creation of institutions under the new liberal regime of the Portuguese constitutional monarchy. And *of Lisbon* as a distinguishing designation to separate these collections and its scientific administration from the zoological Museum of the University of Coimbra, which was also called Museu da Universidade (Museum of the University) or Museu de Coimbra (Museum of Coimbra). In the 1865 report, for instance, the appellation of *national* was reinforced by director Bocage as a means of increasing the urgency of his concerns with the museum's meagre budget.[4] The custodial responsibility, representational value, and scientific relevance of the MNL derived from its name (Figure 1.1).

This chapter presents the institutional context which laid the ground for the development of a research program in zoology at the MNL, formally created in 1862.[5] The institutional change that provided a new research structure for zoological collections in Lisbon became increasingly visible also after the publication of a set of instructions in the same year (see next chapter).[6] Both 1862 documents, the statutory regulations for the MNL and the *Instrucções praticas*, I argue, highlighted the prominent role that José Vicente Barbosa du Bocage assumed as the director of the Zoological Section of the museum.

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[2] On the description of the Ajuda museum as a cabinet of curiosities, see Madruga, 'José Vicente Barbosa du Bocage,' 37

[3] George W. Stocking, 'What's in a Name? The Origins of the Royal Anthropological Institute (1837-71),' *Man (New Series)* 6, no. 369–390 (1971).

[4] José Vicente Barbosa du Bocage, *Relatorio ácerca da situação e necessidades da Secção Zoologica do Museu de Lisboa, apresentado a Sua Ex.ª o Ministro e Secretario d'Estado dos Negocios do Reino* (Imprensa Nacional, 1865).

[5] 'Regulamento do Museu Nacional de Lisboa,' in *Collecção Official da Legislação Portugueza Por José Maximo de Castro Neto Leite e Vasconcellos. Anno de 1862* (Lisboa: Imprensa Nacional, 1863), 6–8.

[6] José Vicente Barbosa du Bocage, *Instrucções praticas sobre o modo de colligir, preparar e remetter productos zoologicos para o Museu de Lisboa* (Lisboa: Imprensa Nacional, 1862).

Nineteenth-century colonial collections

As a result of the eighteenth-century successful expeditions to Brazil, Cape Verde, and Angola, collected materials were brought to Lisbon and enriched Portuguese collections in colonial products. Collections of minerals, plants and animals reflected the Portuguese investment in colonial territories and the pursuit for more knowledge urged by colonial appropriation. Just like Portugal's empire bias towards Brazil in the late eighteenth-century, so to the royal scientific collections favoured Brazilian provenance. The richness of Brazilian collections in Lisbon resonated in the French museum and were appealing to the Paris museum naturalists and Napoleon's army. When Étienne Geoffroy Saint-Hilaire (1772-1844) visited Lisbon in 1808 he had complete discretion from the French empire and from the Portuguese museum administration to select the most interesting and scientifically relevant objects which then the French army took possession of and shipped to the Paris museum. This gave rise to a famous case of plunder of natural history collections, and a diplomatic malaise that would only be settled by D. Pedro V and Bocage decades later.[7] A lack of skilled man power, and institutional disarray hindered the research and the publication on these collections.

Later, in 1836, the surviving Royal collections of the Ajuda palace were transferred to the custody of the ACL. The teaching collections of the *Aula Maynense*, a natural history class open to the public, were also housed at the ACL. When the EPL was created it in 1837 the new school intended to house a zoology and a minerology cabinet with teaching natural history collections as well.[8] The secondary schools, *Liceus,* created in this period also planned to have teaching models and natural history collections.[9]

In 1849, and possibly as a result of the uncertainties in scientific curatorship, the Academy's collections were regarded as an unfit representative of the nation in a speech in the high chamber by the Duke of Palmela, Pedro de Sousa Holstein (1781-1850). Amidst the discussion about a budget increment for the Academy's library and museum, Palmela reinstated that the Portuguese government ought to request colonial governors for regular shipments from the colonies so that "foreigners can see in Portugal many natural history collections of Africa

[7] Filipa Lowndes Vicente has looked into this case comparing it with Welwitsch's Angolan herbarium taken to London as two cases of circulation of specimens in Portuguese history of natural history that carried huge diplomatic consequences, see Filipa Lowndes Vicente, 'Travelling Objects: The Story of Two Natural History Collections in the Nineteenth Century,' *Portuguese Studies* 19, no. 1 (2003): 19–37.

[8] Ceríaco, 'A Evolução da Zoologia'; Carvalho, *História do Ensino.*

[9] For more on the natural history collections, models, and herbaria of the Portuguese secondary education schools, see Inês Gomes, 'Observation versus Experimentation in Natural-History Teaching in Portuguese Secondary Schools: Educational Laws from 1836 to 1933,' *BJHS Themes* 3 (2018): 147–65; and Inês Gomes, *Os Museus Escolares de História Natural. Análise Histórica e Perspectivas de Futuro (1836-1975),* CIUHCT 6 (Lisboa: Edições Colibri, 2018).

and Asia equal and superior to the ones in the Museums of London, Paris, Berlin, and other cities."[10] It was clear by then that, although the investment in budget and personnel was scarce, these collections formed an external and internal image of the nation.

During the first part of the nineteenth century, Portugal underwent through several moments of political upheaval, a sovereignty crisis, civil wars and various liberal reforms and counter reforms. Institutionally there were significant reforms proposed in 1836 and in 1851 that changed the scene for higher education, scientific teaching and research, and the administration of natural history collections. Liberal ideas for the nation's transition from absolutist rule to a parliamentarian monarchy were behind this set of reforms in education that afforded Lisbon with greater control over higher education. Created in 1836, the polytechnic inspired EPL, and the Academia Politécnica do Porto, as well as the medical school Escola Médico-Cirúrgica de Lisboa, countered the academic monopoly of the University of Coimbra.[11] The EPL functioned mostly as a propaedeutic school whose students could prepare for, or complement their studies in the military academy, the medical school, or the industrial institute. It provided Lisbon with a more structured general course of introduction to the sciences.

In March 9, 1858, the EPL took the custody of the ACL collections and, with them, was now in charge of the royal collections of the Cabinet of Ajuda. The sudden death of King D. Pedro V in 1861, brought yet another iteration to the management of public zoological collections in Lisbon. D. Luis I, the brother and successor of D. Pedro V, donated his brother's rich collections, most relevant of which was the ornithological collection, previously housed in the Necessidades Palace to the museum directed by Bocage at the EPL. David Felismino and Luís Ceríaco have both written on nineteenth-century natural history collections of Ajuda and the Royal Palaces, and on the transferral of the royal collections to the EPL.[12]

In 1859, Bocage requested a leave-of-absence to the EPL's council in order to go on a European trip to visit other zoological museums and purchase important materials.[13] Bocage

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[10] 'Sessão 1849.06.25,' *Diário da Câmara dos Pares do Reino* 080, no. 2 (25 June 1849): 1020. Original text: "a fim de que os Estrangeiros podessem vêr em Portugal muitas collecções de Historia natural de Africa e Asia iguaes ou superiores ás que se encontram nos Museus de Londres, Paris, Berlim e outras Cidades."

[11] Carolino, 'The Making of an Academic Tradition'; Ana Simões et al., *Uma História da Faculdade de Ciências da Universidade de Lisboa (1911-1974)* (Lisboa: Faculdade de Ciências da Universidade de Lisboa, 2013).

[12] Ceríaco, 'A Evolução da Zoologia'; David Felismino, *Saberes, Natureza e Poder. Colecções Científicas da Antiga Casa Real Portuguesa*. Lisboa: Museus da Universidade de Lisboa, 2014. Felismino also wrote a chapter on the collections of the royal *Palácio das Necessidades* for the forthcoming book edited by Marta Lourenço on the Portuguese eighteenth-century scientific Royal Collections, an output of the research project "On the instruments' trail."

[13] From 1859 onwards the EPL was managed by the same ministry as the university of Coimbra, and a greater emphasis was made on the equivalence of both educations. In 1866, João Andrade Corvo, a parliamentarian and a graduate of the EPL,

argued before the council that such an educational trip would favour the administration of the school's museum, arguing that the incorporation of the ACL collections into the EPL's museum had increased the responsibilities of the 8th chair professorship with new curatorial duties. Plus, the council agreed, it was "indeed of the greatest convenience that the museum may be opened to the public as soon as possible, which may not take place before everything is in order."[14] The zoological collections finally had scientific oversight and it was clearly important for the EPL that they were shown to the public.

In April 1859, Bocage's travel plan was approved and he was authorised to travel by train to Madrid, Paris, Strasbourg, Brussels, Leiden, Bremen, Dresden, Stuttgart, and London. He was given a budget for travel expenses and for the purchase of collections, books, and supplies for the zoology cabinet. In his travel report Bocage mentioned the importance of increasing the collections as much as possible in order to gain a position of leverage with other European museums. His goal was to get to a point of "mutual advantage" so that the Lisbon museum should have as many "specimens from our fauna" as were "desired abroad."[15] Bocage was happy he found abroad "the best dispositions to establish relationships with our Museum."[16] In fact, Bocage's report lists the purchases made and also the names of his newly made acquaintances with suppliers and other museum directors. Bocage travelled with his wife and his young son, and his scientific correspondence bears witness to the various degrees of familiarity Bocage had with some naturalists and their respective spouses.

Significant personal relationships were first established during this trip. Two outcomes endued: Bocage felt now a part of the international community and could write to his colleagues and friends about his work, something he often complained he could not do in Lisbon; and this network with specimen dealers and other museums asserted the new relative position of Lisbon in the European landscape of zoological collections. During his stay in Paris in the summer of 1859, Bocage not only was introduced to the naturalists of the Muséum but also to the Verreaux brothers, Jules Verreaux (1807-1873) and Édouard Verreaux (1810-1868) and their trading

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defended equal status between both educations. In the same year Barbosa du Bocage, professor at the EPL, but graduate from Coimbra, became a member of the Superior Council for Instruction.

[14]AHMUL/EPL/Copiador de correspondência enviada, p.82, 1862.10.04. Signed by the director of the EPL, José Rodrigues Coelho do Amaral, and sent to the government [Ministério do Reino] referring to the school year 1862/1863.

[15] José Vicente Barbosa du Bocage, 'Relatorio apresentado ao Conselho da Escola Polytechnica pelo Lente da 8ª Cadeira ácerca das collecções scientificas recentemente adquiridas para o Gabinete Zoologico e Museu de Lisboa e de alguns outros resultados da sua viagem scientifica ao estrangeiro,' *Diario do Governo* (1860.01.02). Original text: "Em todos os Museus que visitei e designadamente nos de Madrid, Strasbourg, [...], Francfort e Leyde achei as melhores disposições para se relacionarem com o nosso Museu; caso essas relações possa se tornarem effectivas, para que o nosso Museu possa propor-lhes permutações de muitas vantagens é indispensável que se empreendam e se realize a exploração zoológica do nosso paiz de modo que o museu de Lisboa possa levar os especimens da nossa fauna que sejam [...] desejados no estrangeiro."

[16] AHMUL/AHMB/DIV 069, 1859, manuscript report signed by Bocage.

house. He made various purchases of collections and taxidermy supplies to them, and he maintained a long-lasting correspondence with the brothers while they were alive and with Édouard's widow, while she was in charge with the trading business.[17] Furthermore, with this trip Bocage also had a diplomatic agenda. He was charged with contacting with the Paris museum and coordinate with the Portuguese attaché in Paris in order to work on the retribution of the 1808 plunder with a "donation" of doubles to the Lisbon museum.[18] Bocage also had a leave-of-absence from his teaching duties in 1861, and it is possible that this extra available time was behind the organisational advances of 1862.

A "permanent establishment."[19] The museum organisation, staff and director

On January 13, 1862 the government led by Duque de Loulé finally published the new regulations and the natural history collections in the EPL were given a new name, the Museu Nacional de Lisboa (see Figure 1.2). The new name and regulations materialised a reform that brought a different structure to natural history teaching and research. A natural history cabinet was included in the creation of the EPL in 1837, alongside a library, a physics cabinet and a chemical laboratory. Furthermore, the new institution was custodian of the Royal Navy Astronomical Observatory, and the Botanical Garden of Ajuda.[20] The EPL was since its inception a hub of scientific institutions. However, whereas before collections supported teaching of natural history, after 1862 cabinets of mineralogy and zoology were organised as quasi-autonomous research institutes operating inside the school. This was also the case of the new meteorological observatory of the EPL, which was built in 1853. Restructured in 1863 with royal support, it inaugurated a new building and received a new name, the Observatório Meteorológico – Instituto Dom Luiz (Meteorological Observatory – Institute Dom Luiz).[21] With the following years, the EPL became progressively equipped with state-of-the-art laboratories, observatories, a natural history museum and its own botanical garden built on the grounds of the building. Its professors developed full research programs from within this institutional structure.

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[17] According to several documents of purchases and correspondence in the AHMB.
[18] AHMUL/AHMB/DIV 3-8 refer to the official donation of natural history products from the Paris Museum to Lisbon. See also, the director's report José Vicente Barbosa du Bocage, *Relatorio ácerca da situação e necessidades da Secção Zoologica do Museu de Lisboa, apresentado a Sua Ex.ª o Ministro e Secretario d'Estado dos Negocios do Reino,* 1865, and Ceríaco, 'A Evolução da Zoologia'; Vicente, 'Travelling Objects.'
[19] AHMUL/AHMB/DIV 070, s/d. Bocage, draft manuscript.
[20] Gil and Canelhas, 'Ensino e Cultura,' 18–19.
[21] Josep Batló et al., 'Observatório do Instituto Dom Luiz: Um Século e Meio de História,' *Gazeta da Física* 37, no. 2 (2014): 22–26.

The scientific supervision of the MNL was divided into two sections, mineralogy and zoology, under the responsibility of the professors of, respectively, the "Principles of mineralogy, geology, and metallurgy (7th chair)" and the "Compared anatomy and physiology, and zoology (8th chair)."[22] Bocage occupied the Chair of Zoology since 1851 and, therefore, was appointed the first director of the Zoological Section of the MNL.[23] In the capacity of director of the museum Bocage had to organise the collections as teaching materials. However, he started also to do original research on the collections he was in charge with. In fact, some years later in 1857, after he became full member of the ACL in 1854, Bocage presented publicly and published his first taxonomical work on Portuguese fauna. It was a study on the *Capra Pyrenaica*, the Iberian ibex, or Cabra do Gerez.[24] For this first work Bocage verified stuffed specimens existing in Portuguese collections and compared their morphologic characteristics not just in order to identify them; his first findings while reviewing the existing literature was that it was possible to distinguish a new autochthonous variety, specific to Portugal. Under Bocage, the zoological section of the MNL would become a research museum and the place where the national fauna was determined.

The regulations of the museum defined the role of the director of each section. The director of the zoological section was compelled to organise "the regular zoological exploration of the country, as well as to study and coordinate the zoological products thus obtained, and to prepare the necessary elements to publish our fauna."[25] Zoological exploration and publication of results were both acknowledged as urgent tasks of the renewed Lisbon museum.

The exploration of the country should be organised or carried out by the director himself, who could ask for travel expenses. Collecting campaigns should only take a maximum of three months per year, during the summer break, in order to safeguard teaching obligations. After all, the director of the museum was still primarily a professor of the EPL. Bocage was often described as an archetypal cabinet naturalist, as most of his research and achievements were

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[22] Carlos Almaça, 'A Zoologia e a Antropologia na Escola Politécnica e na Faculdade de Ciências da Universidade de Lisboa (Até 1983),' in *Faculdade de Ciências da Universidade de Lisboa: Passado/Presente, Perspectivas Futuras. 150º Aniversário da Escola Politécnica / 75º Aniversário da Faculdade de Ciências*, ed. Fernando Bragança Gil and Maria da Graça Salvado Canelhas (Lisboa: Museu de Ciência da Universidade de Lisboa, 1987), 293–312.

[23] In the EPL, the title of Full Professor was "Lente Proprietário da Cadeira," and the substitute Professor was "Lente Substituto."

[24] José Vicente Barbosa du Bocage, 'Memoria sobre uma espécie nova do genero Capra L., a Cabra-Montez da Serra do Gerez, em Portugal apresentada e lida a 1ª classe da Academia real das sciencias pelo socio J. V. Barbosa du Bocage na sessão de 16 d'outubro de 1856,' *Memorias da Academia Real das Sciencias de Lisboa. Classe de Sciencias Mathematicas, Physicas e Naturaes*, Nova Série, no. 2 (1857): 3–19; Madruga, 'José Vicente Barbosa du Bocage.'

[25] "Regulamento do Museu Nacional de Lisboa", 8. Original text: "Capitulo IV. Da exploração zoológica e trabalhos para a publicação da fauna de Portugal. Art. 17º O director da secção zoológica do museu é incumbido de dirigir a exploração zoológica regular do paiz, e bem assim de estudar e coordenar os productos zoológicos que se forem alcançando, e de preparar os elementos necessários para a publicação da nossa fauna."

more concerned with work done inside the museum walls.[26] However, and keeping with his obligations, he did in fact lead some field excursions in rural Portugal. In a letter to his friend Hermann Schlegel (1804-1884) whom he had met in 1859, when he visited the Leiden museum, Bocage described the travel plans for his first excursion as director of the Zoological Section of the MNL:

> I have been travelling for a month now. I have visited a great number of localities between Lisbon and Coimbra; I have collected a certain number of reptiles, some freshwater fishes, many land and fluvial shells, a few birds and mammals (it is hunting offseason). … I have the intent to go to Oporto and I expect to return to Lisbon by July.[27]

Bocage planned his 1862 excursion in a report published in February.[28] His exploration plan comprised several towns in the Atlantic west, the localities around Coimbra and the central highest mountain range of Serra da Estrela, and many of the coastal towns in the north where he hoped to do "some drainage trials, first step for the knowledge and study of our maritime shells."[29] At this point, Bocage seemed focussed on maritime and fluvial shells and molluscs, possibly because there were already private collections of the same typology in the museum, and therefore comparison materials existed that provided something to build upon. For example, a malacological collection had been incorporated into the Academy museum collected in Madeira by João de Andrade Corvo, Bocage's fellow EPL professor.[30]

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[26] Osório, *Elogio*; Madruga, 'José Vicente Barbosa du Bocage'; Madruga, "Expert at a Distance."

[27] Leiden, Naturalis Biodiversity Centre Collection Correspondence Archives u. Museum Lissabon, J. V. Barbosa du Bocage to H. Schlegel, 1862.05.27. Original: "Je suis en voyage depuis un mois. J'ai visité un grand nombre de localités comprises entre Lisbonne et Coïmbre ; j'ai recueilli un certain nombre de reptiles, quelques poissons d'eau douce, plusieurs coquilles terrestres et fluviatiles, très peu d'oiseaux et mammiféres (nous sommes dans la saison ou la chasse est deffendue) &c. J'ai rencontré quelques espèces assez curieux [sic] de reptiles – le *Pleurodales Whathhi*, l'Acanthodachylus vulgaris, la vipera ammodytes, et parmi les coquilles une espéce nouvelle de plamorhe. J'ai l'intention d'aller encore que[que?] á Oporto, et je pense être de retour á Lisbonne en juillet."

[28] José Vicente Barbosa du Bocage, "Relatorio apresentado ao Conselho da Escola Polytechnica em sessão de 1 de Fevereiro de 1862, ácerca do plano geral dos trabalhos de exploração zoologica, e approvado na mesma sessão," *Diario de Lisboa*, no. 46 (1862).

[29] Bocage, "Relatorio [1862]," 604. Original text: "onde desejâmos tentar alguns ensaios de dragagem, primeiro ponto de partida para o conhecimento e estudo das nossas conchas marinhas."

[30] The 1854 report already mentioned several private donations to the Academy Museum: see António Joaquim de Figueiredo e Silva. 'Relatorio dos trabalhos da Classe de Sciencias Mathematicas, Physicas e Naturaes da Academia Real das Sciencias de Lisboa' *Memorias da Academia Real das Sciencias de Lisboa. Classe de Sciencias Mathematicas, Physicas e Naturaes*, 1 (1854): 1-29. Original text, page 26: "Diversas pessoas tem, alem disso, concorrido para se augmentarem as collecções do Museu; entre essas pessoas devem principalmente notar-se pela importancia dos donativos que tem remettido, S. M. El-Rei D. Pedro V e o Senhor Infante D. Luiz, e os Srs Francisco Rodrigues Batalha, Visconde de Sá da Bandeira, Duque de Palmella, L. J. Moniz, e Fernando Emygdio da Silva; o Sr. J d'A Corvo trouxe uma collecção de conchas e outra de rochas da Ilha da Madeira, e o sr Grande offereceu alguns exemplares zoologicos que lhe foram enviados de Argel." A study on one of these collections was published by Bocage in 1857: José Vicente Barbosa du Bocage, 'Noticia sobre uma collecção de conchas das Ilhas da Madeira e Porto-Santo, offerecidas ao Museu de Lisboa pelo sr. João d'Andrade Corvo,' *Annaes das Sciencias e Lettras* 1, no. 1 (1857): 204–11.

In their correspondence in 1862, Schlegel encouraged Bocage to request more means from the Portuguese government for the study of its colonies. Schlegel approximated Leiden's to Lisbon's museum and said that even a "nation of 4 million" had given due attention to colonial zoological products. This clearly struck a chord in Bocage, who replied complaining that whenever he needed specimens from Africa for comparison or for the augmentation of his collections, he had to "request them from London or Paris!" [31]

Further along, regulations also determined that correspondents should be established in diverse localities to "permanently collect and ship to the museum," as a means to corroborate the mission of the museum with regard to the national fauna.[32] Independent of the director's excursions, collaborators should be procured in the national territory in order to secure a systematic growth of the collections. For this purpose Bocage announced that he had prepared and was about to publish a booklet of instructions that would "perhaps stimulate the good will of the people who want to help us."[33]

The regulations further stated that the director assumed the responsibility over the work of his assistant naturalists. Not only in terms of management, but also in terms of enforcing the coherence of the nomenclatural "system" used in the coordination of the collections.[34] The nineteenth century, even if dominated by Linnaean binomial system, saw several organisational and nomenclatural paradigms still in use. Making sure that coherence was established and maintained as more specimens arrived at the museum was the most important part of the naturalist's work.

The change of scale in the quantity of the collections required increasingly more of the Director's time. With all the incorporations from the royal and academic collections, the museum was clearly outgrowing its minimal staff of two naturalists, including the director who also had teaching duties in the EPL. The first MNL regulations accommodated only the following scientific staff for each of the two sections: one director and one assistant naturalist. In addition, there should be one "conservador" (keeper) who oversaw both sections. Plus, one preparator for the mineralogical section and two for the zoological section. There was also place for an indefinite number of helpers and servants, whose fees should be taken from the

[31] Both naturalists were away from the centres of Paris or London. Correspondence between Bocage and Schlegel in Leiden is especially interesting since they were both directors of small museums, although Leiden's museum was already by 1862 not only considerable larger but much more influential. Schlegel described to Bocage how he planned to get large series of European birds in order to understand geographical variation, he was interested in studying specific species in its entirety: meaning seasonal variation, sex and age variations. Leiden, Naturalis Biodiversity Centre Collection Correspondence Archives u. Museum Lissabon, J. V. Barbosa du Bocage to H. Schlegel.
[32] This idea resonated from the ACL's project in 1854, see especially Article §17.
[33] Bocage, 'Relatorio [1862],' 604.
[34] 'Regulamento do Museu Nacional de Lisboa [1862],' 8. Article §17.

remainder of the museum's budget. The compared annual earnings, in the 1862 document, were as follows:

2 Directors	200$000 (each, gratification extra to the income as professor)
2 Assistant Naturalists	400$000 (each)
1 Keeper ("Conservador")	300$000
1 Preparator Mineralogy	300$000
2 Preparators Zoology	270$000 (each)[35]

As was mentioned before, in the early years of Bocage's directorship the museum in the EPL grew with the incorporation of two large collections. The so-called "Collecção Antiga" (old collection), of the Royal Palace of Ajuda and that was earlier in the century transferred to the ACL, was since 1859 under the direction of the EPL; and the royal collection of the Palácio das Necessidades, which was officially incorporated in the EPL museum in 1863. King D. Pedro V had amassed relevant collections, particularly of shells and birds, in the royal cabinet and aviaries in the gardens of his residence in the Tapada das Necessidades in Lisbon. After his untimely death, his brother D. Luís I bequeathed the collections to the EPL zoological museum.[36] Unlike the ACL collections which seemingly had no designated scientific staff, the Natural History Cabinet of the Necessidades Palace was managed by Florindo António de Sousa, the "conservador" (keeper) and preparator, with the assistance of his son José Augusto de Sousa (1837-1889).[37] With the bequeath, Bocage negotiated to benefit from an extra assistant who could insure stability in the transition of the collections between locations in Lisbon. Necessidades workers José Augusto de Sousa, and later also Florindo António de Sousa (and Manuel António de Sousa, presumably also from the same family) were thus incorporated in the MNL. Although the available information only gives a partial image of the organigram of the museum staff there is a sense that the MNL staff increased over the various decades (see Table 1.1). In specific years, however, Bocage described personnel deficiencies in his reports, where he compared the Lisbon staff and budget with other museums and claimed the growth in the collections (actual and foreseeable) as an urgent reason to hire more preparators and, at least, two more naturalists.

[35] 'Regulamento do Museu Nacional de Lisboa [1862].'
[36] See Ceríaco, 'A Evolução da Zoologia'; and Bocage, *Relatorio* [1865].
[37] In a publication of acclimation results of the ailanthus silkmoth, *Samia cynthia*, Sousa described his position as ajudante do conservador do Museu d'El Rei, assistant to the keeper of the Royal Museum. See José Augusto de Sousa, *Noticia do resultado da primeira tentativa de acclimação do Bicho de Seda do Aylanto executada por ordem de El-Rei o Senhor D. Pedro V precedida de uma succinta historia da sua acclimação em França* (Lisboa: Typographia de Castro & Irmão, 1862).

Assistant naturalists should assist the director of their respective section in the study and classification of the museum collections. They were also to write catalogues as well as the labels of individual specimens. The regulation already considered that assistant naturalists had to take a public examination before a jury of EPL professors and got a definite position only after two years of provisional work.[38] In Portugal in 1862, much as today, to be a curator of a collection is a responsibility of your paid position, rather than a professional career. The career

The "conservador," or keeper, was someone in charge of safeguarding the collections, and the regulations allowed for only one such person for the whole of the MNL. They stated that the keeper was responsible for all the scientific collections, books, manuscripts, and illustrations of both MNL sections; he should also oversee cleanliness of the collections and supervise the preparators, apprentices and other workers.[39] Bocage further defined the keeper as someone assigned to care "efficiently for the conservation of specimens, supervision of the work of preparators and workers" and be responsible for the scientific collections and "all objects of the materials of the museum."[40] The regulation also mentioned that it was up to the keeper to oversee the attendance and efficient services of preparators, any apprentices or other servants. He should also ensure guard duties when the establishment was opened to the public.[41]

Preparators of zoology were responsible for the preparation of the specimens as commissioned by directors and assistant naturalists; help with the conservation of collections and with guard duties; teach apprentices and other helpers; and aid the professors in class demonstrations. The museum would also later hire one "escrevente" (clerk), to take on the tasks of manuscript catalogue copying and label writing and updating.

Bocage's assistant naturalists were directed into specialities within zoology. José Augusto de Sousa became responsible for the bird collection while Felix Antonio de Brito Capelo (1828-1879) was the custodian for the fish collections. Specialisation was encouraged by the natural characteristics of taxonomic practices and the overflow of specimens in all animal groups.[42] Their specialities were visible in their publications (see chapter 5). Contrarily to the director's position, being as assistant naturalist was not yet a career. Sousa and Capelo

[38] 'Regulamento do Museu Nacional de Lisboa [1862],' Chapter II, Article 10.
[39] 'Regulamento do Museu Nacional de Lisboa [1862],' Chapter II, Article 11.
[40] Bocage, *Relatorio* [1865], 25. Original text: "Cuidar efficazmente da conservação dos exemplares, fiscalisar o rerviço dos preparadores e serventes, responder pelas colelcções scientificas e por todos os objectos do material do museu, são funcções de grande importancia e responsabilidade, que exigem a presença constante e assidua do empregado a quem incumbem. A secção de zoologia precisa pois, evidentemente, de um conservador especial."
[41] AHMUL/AHMB/DIV 451. Copy of the 1862 regulation: Chapter II, Article 11.
[42] Madruga, 'Expert at a Distance.'

were not faculty of the EPL and had therefore no representation in the school's council, and as museum employees had a comparably much lower income.[43] Nevertheless, their work was extremely significant. Both published extensively in ictiology and ornithology, respectively. Their many scientific publications were based on their work on the Lisbon collections, and geographically covered Portugal's mainland as much as its colonies. Both authors were known internationally, and they maintained their own networks of correspondents.[44]

[43] Even decades later, when Bocage's nephew did an internship at the museum and considered becoming a fulltime naturalist, he decided against it because he wanted to get married and provide for his family instead. Story told in Maia, *Memórias da Villa Roma.*

[44] Although the historical archive holds few letters addressed to either of them, in Bocage's letters there are many references to direct contact between foreign naturalists and Sousa or Capelo.

Table 1.1. Staff of the Zoological Section of the MNL according to available sources.

Year (*source*)	**Zoological Section of the Museum Staff mentioned**	**EPL Zoology Professors**
1859 (AHMUL/EPL/Orçamento Escola Politécnica (Budget) 1859/60)	J.V.B. Bocage, *Director*; António Martins, *Preparador*; Luiz Eliseu Candido de Menezes, *Preparador*.	J.V.B. Bocage, Lente Proprietário; Francisco Pereira de Figueiredo, *Lente Substituto*
1865 (AHMUL/EPL Minutes Lv. 6, 1865.04.15)	J.V.B. Bocage, *Director*; Felix de Brito Capelo, *Auxiliar do Director*; José Sebastião do Couto, *Aprendiz de Preparação*; Manuel António de Sousa, *Escrevente*.	
1868 (AHMUL/EPL Minutes Lv. 6, 1868.10.14)	J.V.B. Bocage, *Director*; Felix de Brito Capelo, *Naturalista Adjuncto*; Florindo António de Sousa, *Naturalista Adjuncto*; José Augusto de Sousa, *Naturalista Adjuncto*;* Manuel António de Sousa, *Preparador*; João Nunes Lobo, *Preparador*; Júlio César Leiros de Andrade, *Preparador*.	
1879 ("Personal-Notizen", *Zoologischer Anzeiger*, 1879, p.288)	J.V.B. Bocage, *Directeur*; Felix de Brito Capelo, *Aide-Naturaliste*; Sabino Teixeira Coelho, *Aide-Naturaliste*; José Augusto de Sousa, *Conservateur*.	J.V.B. Bocage, *Professeur*; Francisco Pereira de Figueiredo, *Professeur*.
1881 (AHMUL/EPL/ Orçamento da Escola Politécnica (Budget), 1881.06.01)	J.V.B. Bocage *Director*; António Roberto Pereira Guimarães, *Naturalista Adjuncto*; Sabino Maria Teixeira Coelho, *Naturalista Adjuncto*; José Augusto de Sousa, *Conservador*; António Martins, *Preparador*; Joaquim José Gomes, *Preparador*.	Fernando Mattozo dos Santos, *Lente Proprietário*; Sabino Maria Teixeira Coelho, *Lente Substituto*; Manuel António de Sousa, *Preparador da Cadeira*.
1892 (AHMUL/AHMB/Div/273 Budget requisition (copy), 1892.02.15)	J.V.B. Bocage, *Director*; Fernando Mattozo Santos, *Nat. Adjuncto*; Balthazar Osorio, *Nat. Adjuncto*; Alberto Girard, *Conservador*; José Augusto de Sousa, *Conservador*; José Maria de Lima e Lemos, *Conservador do Museu d'El-Rei*; Anthero Frederico Seabra, *Aprendiz de Preparação*; Júlio Guilherme Bettencourt Ferreira, *Tirocínio*; António J. Vianna Soares, *Escrevente*.	Fernando Mattozo dos Santos, *Lente Proprietário*; Balthazar Osório, *Lente Substituto*.

Key: Director / Directeur = Museum Director; Auxiliar do Director = Director's Assistant; Naturalista Adjuncto / Aide-Naturaliste = Assistant Naturalist; Preparador = Preparator; Aprendiz de Preparação = Apprentice Preparator; Conservador / Conservateur = Keeper; Conservador do Museu d'El-Rei = Keeper of the Royal Cabinet; Tirocínio = Internship; Escrevente = Clerk; Lente Proprietário / Professeur = Professor; Lente Substituto / Professeur = Substitute Professor; Preparador da Cadeira = Preparator for the Course.

* José Augusto de Sousa was keeper ("conservador"), and this was probably a typo of the secretary of the meeting. The nomenclature of the positions occupied is also inconstant due to the variable nature of the sources.

According to the obituary written by Bocage, although Sousa did not have any formal scientific training, he was his most "diligent, mindful, and intelligent" collaborator.[45] As keeper he became responsible for all the museum's collections, but was mostly occupied with the ornithological collections.[46] Although he did not receive the title of naturalist, José Augusto de Sousa was an accomplished author of taxonomical works. Sousa published eighteen papers on the Lisbon collections in the *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, and in the *Boletim da Sociedade de Geografia de Lisboa*, over the period between 1870 and 1889. He was also the scientific author of the two catalogues of the ornithological collections published by the museum in 1869 and 1873.

In 1861, Capelo was hired by the EPL zoological museum, after a budget approval for an assistant to the director.[47] Felix was the oldest of four brothers who distinguished themselves in the scientific and colonial sphere in Portugal. He was born in Peniche, a coastal town, in March 8, 1828. His father Felix Antonio Gomes Capelo, and his mother Guilhermina de Brito Capelo had another three sons: João Carlos (1831-1901), who became director of the Meteorological Observatory in the EPL and published on solar spots and magnetic fields; Guilherme Augusto (1839-1926), a high ranking officer of the Portuguese Navy who led many African expeditions and was Governor of Angola; and Hermenegildo (1841-1917), a Navy Officer and African scientific explorer and hydrographer. The most well-known brother was the youngest, Hermenegildo, due to the success of high-profile African scientific explorations of 1877-1879 and 1884-1885 with his companion Roberto Ivens (1850-1898).

Unlike his younger brothers who would have careers in the navy, Felix initially followed a career in the army, like their father. Between 1849 and 1853 he studied in the Army School and the EPL.[48] He left as *alferes* to pursue his career overseas in 1854, heading first to Cape Verde where he took different administrative and scientific positions. When he was commissioned to visit the volcano in the island of Fogo, he published a report on the official bulletin of the colony. He also helped fight the cholera morbus in the islands, having himself barely survived. He returned to Lisbon in 1857.[49]

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[45] José Vicente Barbosa du Bocage, 'José Augusto de Sousa. Esboço biographico e breve noticia dos seus escriptos,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes (2ª Serie)* 1, no. 2 (1889): 145–46.
[46] In 1869 he is mentioned as Assistant Naturalist (Naturalista Adjunto) by Bocage; and Keeper (Conservador) in the personnel budget for 1881, in AHMUL/EPL/Orçamento Escola Politécnica, 1881.06.01.
[47] AHMUL/EPL, Minutes of the EPL council, *Actas da sessão do Conselho da EPL*, Livro 5, pp. 213-214, 1861.04.19.
[48] According to the notes available in the AHMUL from the prosopography study of the research project led by Luís Miguel Carolino: *Ciência, educação técnica e a construção do Liberalismo em Portugal: o caso da Escola Politécnica de Lisboa (1837-1911)*, HC/0084/2009, 2010–2013.
[49] José Vicente Barbosa du Bocage, 'Felix Antonio de Brito Capelo,' *Occidente* 2, no. 34 (1879): 76–78.

After becoming the museum's naturalist, he was put in charge of the ictiological collections, an example of how Bocage instructed the museum's workers to specialise in a certain zoological group.[50] Capelo was elected member of the ACL in 1866.[51] And in the same year published an illustrated monograph on cartilaginous fish of Portugal's coast, which he signed together with Bocage.[52] Early on he published together with Bocage who, besides those collaborations, did not otherwise publish on fish taxonomy.

Capelo published in Portuguese periodicals as well as in the *Proceedings of the Zoological Society of London*. His twenty-six published titles reflect a research specialisation on ictiology and, later, crustacea. He was responsible for the museum's catalogues of the fish collections. Posthumously, the museum published his final updated *Catalogo dos Peixes de Portugal*, a work later continued by the naturalist and assistant professor of the EPL, Baltasar Osório (1855-1926) who became responsible by the research into the ictiological and crustacean collections, and decades later became the museum's third director.

Felix Brito Capelo was additionally a very good draughtsman and produced all the illustrations for his own scientific works, plus most of Bocage's. He was proficient in drawing from nature, and he also lithographed some of his own illustrations. Described by Bocage as a "honoured man, modest and distinct naturalist, whose name was more well known around Europe than in his own country," he died in 1879 a victim of a persistent brain condition.[53]

The museum as "an archive of facts"[54]

The first half of the century in Portugal was far from eventful. However, from 1851 onwards significant institutional changes gave rise to a new generation of scientific professionals. Technological novelties brought to the fore the relevance of agronomical investment and agronomical knowledge, engineering and technological infrastructure.[55] Big data sciences such as meteorology would create their own institutional space, and specific individuals would be paramount in developing new disciplines, as well as their new institutional support. As the last

[50] Madruga, 'Expert at a Distance.'
[51] Felix de Brito Capelo was elected member of the Academy of Sciences on 1866.11.08, according to the Academy's records.
[52] José Vicente Barbosa du Bocage and Felix Brito Capelo, *Peixes Plagiostomos. Primeira Parte, «Esqualos»* (Lisboa: Typographia da Academia Real das Sciencias, 1866).
[53] Bocage, 'Felix Antonio de Brito Capelo,' 78. Original text: "ao homem honrado, ao naturalista modesto e distincto, cujo nome era mais conhecido no resto na Europa, do que na sua patria."
[54] Bocage, *Relatorio [1865]*, 8.
[55] Amaral and Diogo, *A outra face*; Marta Macedo, *Projectar e Construir a Nação: Engenheiros, Ciência e Território Em Portugal No Século XIX* (Lisboa: Imprensa de Ciências Sociais, 2012).

section has shown, important changes occurred in the management of zoological collections in Lisbon in the decade between 1851 and 1861.

The new name MNL represented a centralisation of the existing zoological collections and, more significantly, pushed the agenda for their public display. Neither the collections from the Academy nor the teaching collections of the school guaranteed this aspiration of the liberal elite. The creation of the MNL and of its Zoological Section established the place and conditions for a zoological research museum under the scientific direction of the EPL. The centralisation of the collections and their progressive augmentation by purchase, exchange, and shipments from collaborators, allowed for the Lisbon museum to finally represent the perceived progresses of science, taking its place in the European context and gathering interest by naturalists worldwide.

The development of the nation-state in Europe in the nineteenth-century had a strong representation in national museums.[56] Research in national fauna was paramount in the building of a national museum. The building of a national identity in relation to other European identities was reflected in the scientific agenda of the museum. The fact that the museum would also focus attention in colonial collections should not be interpreted as a personal or institutional circumvention of the establishment of the national museum in 1862. Rather, it should be analysed as a natural extension of the national science agenda. At the time, the Portuguese colonial possessions were also taken as distinctive characteristic of the Portuguese nation. The museum's public rooms, for example, were projected to display side by side "zoological collections of Portugal and the overseas possessions."[57] In this sense, I argue, as the museum grew in importance, size of the collections, and number of public rooms, the national agenda was echoed throughout the collections, and in all its rooms, be they dedicated to Portuguese or colonial fauna. (See figure 1.3)[58]

[56] In the same way, regional identities can be based upon a scientific project or object. For example, the autonomy project of the Azorean archipelago and the scientific projects of Afonso Chaves studied in Conceição Tavares, 'Do Naturalismo às Ciências Modernas nos Açores. Ensaio Biográfico de Francisco Afonso Chaves (1857-1926)' (Ph.D. dissertation, Universidade de Lisboa, 2017). Other examples are the juxtaposition between research on the political administration of the French Rhone valley and the scientific agenda of the director of the Lyon museum Claude Jourdan studied by Déborah Dubald, in 'Capital Nature. A history of French municipal museums of natural history 1795-1870' (Ph.D. dissertation, European University Institute, Florence, 2019); and the national collecting programs to form Serbian nineteenth-century geological teaching collections, studied by Dejan Lukić, in 'A Strong Class of Serious Scholars: The Power Dynamics of Knowledge Production in the Earth Sciences in Serbia, 1880-1914' (Ph.D. dissertation, Central European University, Budapest, 2019).

[57] AHMUL/AHMB/1860.

[58] By 1871 Bocage already wanted to dedicate a new gallery solely to colonial products. Archives of the Berlin Museum für Naturkunde, Berlin, MfN, ZM_S_II_BocageJV_000-112, Letter from Bocage to Peters, 1871.04.10. Original text : "la nouvelle galerie que j'ai fait construire exprès pour les collections de colonies portugaises."

The creation in 1862 of the MNL was evidence of a renewed awareness of the relevance of scientific knowledge, and its usefulness. In this context, national zoological collections were also to be read as a national and governmental requisite, as Bocage put it:

> The National Museum is a permanent establishment where the state of the culture of the Natural History in the country is regularly exhibited to the public. It is a place where natural history is taught, and where, by institutional duty, all of those who officially, or by predilection, dedicate themselves to this Science and its applications are welcome. Therefore, it is of general interest that this establishment deserves the name it was given. To achieve that, it is indispensable that we are able to maintain what we have and that it be enlarged by every means possible upgrading successively to the conditions that may represent the current state of the science in all its branches and applications.[59]

When Bocage wrote that it was important that the new establishment deserved "the name it was given," he was reinforcing what the "national" epithet meant for him. For this museum to be successful, the Portuguese government had to be involved and interested in its upkeep. Bocage repeated in his several reports how it was not because of himself, but because of national honour that the museum should be empowered and endowed with a fitting budget. A national museum should be, in Bocage's eyes, a "permanent establishment," meaning that it can be independent from political change.

[59] AHMUL/AHMB/DIV 070. Bocage, draft manuscript, s/d. Original text: "O Museu Nacional é um estabelecimento permanente, onde se faz a exposição ao público regularmente do estado de cultura da História Natural no Paiz, onde se ensina, e se recebem, por dever da sua instituição, todos os que officialmente ou por gosto se dedicam a esta Sciencia, e suas aplicações, é portanto do interesse geral que este estabelecimento mereça o nome que se lhe deu, e para isso é indispensável que nele se conserve o que já tem e que se engrandeça por todos os modos possíveis aproximando-se sucessivamente das condições em que represente o estado actual da sciencia em todos os seus ramos e aplicações."

2.

Universal conventions and national science: Bocage's *Instrucções praticas*[1]

The final line in *Instructio Peregrinatoris* written by Carl Linnaeus in 1759 was the exhortation *Nulla dies sine linea*, a reference to the classical work on natural history by Pliny the elder, who used the example of a painter who practiced every day in order to instil the idea of hard work and practice.[2] Linnaeus wrote for his student collaborators, who came to be known as his apostles, it was a traveller's guide of conduct, a digression on the ideal traveller and the model conditions for observation. It listed on the various topics the travellers should report on: geography, fauna, flora, economy, commerce, curiosities, local diets, etc.[3] This was written with the idea of extending his range of botanic and zoologic specimens using a vast network of collectors who could replicate the same epistemological system for identification and classification. The Linnaean procedure informed the outline of the role of collecting from nature and of its complementary task of handling huge databases of information in a natural history museum or a large-scale herbarium.

[1] I have discussed the topic of this chapter in several oral presentations and described it briefly in my 2013 master dissertation. This chapter however develops a much more in-depth reading of the booklet, not yet published elsewhere.
[2] *Nulla dies sine linea* means no day without a line, or: to write every day. Carl Linnaeus and Erik Andreas Nordblad, *Instructio Peregrinatoris* (Uppsala, 1759).
[3] Bernd Rolling, 'Impartiality in the Matrix of Taxonomy: Carl von Linné and Folklore,' in *The Emergence of Impartiality*, ed. Kathryn Murphy and Anita Traninger (Leiden, Boston: Brill, 2014), 379–407.

This chapter focusses on the 96-page book *Instrucções praticas sobre o modo de colligir, preparar e remetter productos zoologicos para o Museu de Lisboa* (Practical instructions on the ways to collect, prepare, and transport zoological products to the Museum of Lisbon, henceforth *Instrucções praticas*), published by Bocage in 1862.[4] With this publication the newfound museum called for the collaboration of individuals, already amateurs of natural history or not, to contribute for the expansion of the Lisbon collections. The suggestive title of this publication was deceiving. Inside its pages the reader would find much more than a procedure manual for collection, preservation, and shipment of natural products. Instead, a set of para-texts completed the book and provided different layers of significance and interpretation, which will also be analised. In the following sections I offer a brief overview of the institutional changes that concluded with the MNL's new name and a detailed analysis of the main features of the *Instrucções praticas*.

Questionnaires, instructions, and imperial control

To publish instructions from a fixed point of accumulation of large data sets aimed to engage the collaboration of a network of data collectors as large as possible was crucial to the work done in natural history museums. Geographical dispersal of the network of traveller-collectors engaged was of great scientific importance for it insured a global scope to this endeavour. It was also of great political importance for it determined the available knowledge on specific territories, national, international, or colonial.[5] The publication of instruction manuals was a central part of natural history collection management. They worked as a mechanism to facilitate the transformation of an individual idiosyncratic experience into shared knowledge, building a sense of shared identity.[6] Disseminating these recommendations was a way to insure standardisation not only of collecting practices and methods for observation in the field; but it was also a way to convey a specific way of understanding the role of natural history as a broad subject connected with an individual ethos as well as with national rhetoric.[7]

[4] Bocage, *Instrucções praticas*.
[5] Koerner, *Linnaeus: Nature and Nation*.
[6] Catarina Madruga, 'O Museu Nacional de Lisboa como Centro e como Periferia,' *Mobilidade e Circulação. Perspectivas em História da Ciência e da Tecnologia* (Lisboa: CIUHCT / CHAM, 2014).
[7] As Patricia Fara has demonstrated Linnaeus preoccupations were not about disvalued and disinterested collection of data, but rather were directed towards national sovereignty. Data gathering often has a specific purpose or agenda. Patricia Fara, *Sex Botany & Empire. The Story of Carl Linnaeus and Joseph Banks* (Cambridge: Icon Books UK, 2003).

Bruno Latour famously coined the phrase "centres of calculation" with an example from the history of natural history explorations and collections.[8] In his account, the 18th century exploration of *La Pérouse* succeeded because it returned its collected data home to Paris. To paraphrase Latour, natural history specimens are not simply dislocated to European museums from around the world. If they are to contribute to build and maintain such centres of calculation, which have the ability to perform control and action at the distance, it is required that those natural objects are charged with three different symbolic statuses, mobility, combination, and stability. "Mobility" is the feature that allows collections of material objects, with their required logistics to actually be displaced. Their successful displacement into a place of authority such as a museum collection can legitimise the credibility of the traveller-collector. "Combination" is a characteristic to combine, relate, compare, and distinguish, which allow certain objects to contribute to certain narratives. These are the building blocks for museum's reference collections. In Leiden, Hermann Schlegel's European bird species was composed of multiple specimens of the multiple stages of the same species.[9] "Stability" is the participation in a shared vocabulary between the field and the museum. A certain cultural performance that derives from the type of norms suggested by *Instructio Peregrinatio*. It is produced from routines, regulations, and standards. Texts of instructions are a fundamental part of the creation and upkeep of such stability.[10]

Instructions published by scientific societies to be sent to travellers abroad served, according to some authors, a clear purpose to standardise and format the information and to classify in order to compare readily the collected data.[11] The fixed point, in this case the museum of natural history, was the authority bearer, and the peripheral nodes, the collectors spread around the distant field, were willing participants who amassed information locally, translated it into normalised data to be sent to the museum. Because the museum asserts itself as the centre for the production of knowledge, the collectors have to negotiate their authority as direct observers of discrete facts in relation with the authority of the producers of universal

[8] Although he didn't focus on the publication of instructions, Bruno Latour's notion of "centre of calculation" was based on the dynamic between a permanent fixed institution that controls and manages big data and the suppliers of the information. Natural history museums and herbaria seem to function exactly like that. See Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Massachusetts: Harvard University Press, 1987), especially chapter 6.
[9] L.W. van den Hoek Ostende, R.W.R.J. Dekker, and G.O. Keijl, 'Type-Specimens of Birds in the National Museum of Natural History, Leiden. Part 1. Non-Passerines,' accessed 14 February 2019, https://www.repository.naturalis.nl/document/44313.
[10] Madruga, 'O Museu Nacional de Lisboa.'
[11] Mathilde Leduc, 'Les Sociétés Savantes et les Images Rapportées par les Explorateurs du Bassin du Congo 1870-1899,' *La Ricerca Folklorica* 54 (2006): 57–66.

knowledge, the museum naturalists. However, issuing questionnaires from the metropole to the colonies with the purpose of access information from distant realities was not new and not limited to natural history museums. Instructions were used to modulate observations and control from afar what and how was collected. Since the dawn of globalisation empires relied on this mechanism. The history of the production of instructions as a means for imperial control is a long one and, as observed by Irina Podgorny, its timescale transcends national empires, administrative reforms, revolutions and political order ruptures.[12]

In the nineteenth century the increment of circulation of goods, merchandise, people, and news, happened side by side with new forms of communication and transportation. Scientific travelling was also transformed by new transport logistics and newfound audiences for travel literature. The typology of scientific literature, *instructions*, were a common feature of many natural history museums in the nineteenth century, presenting with ever more specific and detailed procedures, differentiating from the more general inquiries in earlier centuries.[13]

In order to normalise procedures for information gathering imperial structures developed questionnaires since the first era of globalisation in the 16th century. The fifty questions questionnaire issued by Filipe II in 1577, titled *Instrucción y memoria de las relaciones que se han de hazer para la descripción de las Indias, que Su Magestad manda hazer para el buen gobierno y ennoblecimiento dellas*, produced the impressive *Relaciones Geográficas de Indias* that chartered ethnographical, social, religious, and natural details from the New World, and set the tone for imperial bureaucratical management and long-distance control. Certain routine practices were progressively established to centralise and accumulate information effectively and they would contribute to imperial design.

When seen under this genealogical light, the many instruction manuals issued by natural history museums in the nineteenth century take on a double role. Not only were they producers of stability and standardisation of observation as well as taxidermy techniques, they also worked as rhetorical devices for the establishment of colonial collections in European museums. Many of such instructions resulted in the collaboration between scientific experts and colonial administrators.

[12] Irina Podgorny, 'Las Instrucciones y Las Cosas,' *Revista Hispânica Moderna* 71, no. 1 (2018): 23–38.

[13] In 1997 an international meeting was organised around the topic of scientific instructions which opened room to identify and interpret such texts as scientific productions, see Silvia Collini and Antonella Vannoni, 'Introduction,' in *Les Instructions Scientifiques pour les Voyageurs (XVIIe-XIXe Siècle)* (Paris: L'Harmattan, 2005), 15–51. See also Lorelai Kury, 'Les Instructions de Voyage dans les Expéditions Scientifiques Françaises (1750-1830),' *Revue d'histoire des Sciences* 51, no. 1 (1998): 65–91.

The connections between a particular scientific practice and imperial networks and colonial officials is visible in the suggestive titles of some of these manuals. Take the French example, *Instruction pour les voyageurs et pour les employés dans les colonies, sur la manière de recueillir, de conserver et d'envoyer les objets d'histoire naturelle* issued by the *Muséum Royal D'Histoire Naturelle* and the French Ministry of Navy and Colonies. Directly aimed at the employees in the French colonies, these instructions were first published in 1818, then reprinted in 1824, 1827, 1829, 1845, with a fifth edition in 1860. Reissuing and resending copies reveals the importance of a permanent link with the colonies that could engage with more and more officials in different generations. The introduction to the 1845 edition declared that "these are not simply instructions but a call to all those interested in science and in their country."[14] The incitement to collaboration linked the progress of science with the development of the nation, a discourse which underlined the whole of the colonial administration.[15] Furthermore, in England in 1849 the Lords Commissioners of the Admiralty published *A Manual of Scientific Enquiry; prepared for the use of Her Majesty's Navy: and adapted for travellers in general*. The volume was edited by none other than John Herschel and included contributions of specialists for each scientific area, and the eminent Richard Owen (1804-1892), responsible for the natural history department of the British Museum, wrote the section on Zoology.

The publication of museum instructions was part of a literary typology and a tradition of questionnaires typical of empire building. Centralised control over distant territories was built on information that needed to be standardised and formatted. Large scale zoological collections such as the ones in London or Paris were built over an existing colonial network of people and logistics already in place. The typology of such texts provides a study of the existing tension between the creation of standards acceptable and used in the international community, and the production of national faunas and national museums, and the building of the nation-state. The following section provides the background circumstances of the first publication of the Zoological Section of the MNL and relates it with the general tradition of natural history museums' publications of manuals of instructions for prospective collectors.[16]

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[14] Muséum Royal d'Histoire Naturelle, *Instructions pour les voyageurs et les employés dans les colonies sur la manière de recueillir de conserver et d'envoyer les objets d'histoire naturelle*, 4th ed. (Paris: A. Sirou, Imprimeur-Librairie, 1845), 2. Original text: "Ce n'est pas seulement une instruction que nous faisons ici, c'est un appel à tous ceux qui s'intèressent à la science et au pays."

[15] Lorelai Kury pointed to the composite nature of these texts, how they could be read by high or lower representatives of the empire, see Kury, 'Les Instructions de Voyage,' 84.

[16] In several conference presentations and in my 2013 M.Sc. dissertation, I have described and characterised the main features of this text, albeit very concisely. I have described it as a programmatic text for the consolidation of Zoology as a scientific

In Portugal, the eighteenth-century and nineteenth-century reforms in higher education progressively provided new structures for natural history research as was previously mentioned. Consequently, both museums in the University of Coimbra and in the Academy of Lisbon published instructions that reflected such decisive moments of improvement. In 1781, following the creation in December 1779 of the Royal Academy of Sciences of Lisbon, a set of instructions was issued by the Academy of Lisbon targeting its correspondent members in order to "create a national museum."[17] The Academy followed this publication with a program for overseas philosophical explorations which resulted in the eminent explorations by Vandelli's students Alexandre Rodrigues Ferreira (1756-1815), João da Silva Feijó (1760-1824), Manuel da Silva Galvão, and Joaquim José da Silva who led what were called "philosophical-voyages" to, respectively, Brazil, Cape Verde, Mozambique, and Angola.[18]

In the nineteenth century, both in 1836, and 1850, other sets of instructions were issued (Figure 2.1). In 1836, Francisco Assis de Carvalho (?-?), professor in Coimbra, and member of the Academy and of Parliament, wrote instructions aimed at colonial employees.[19] The full title (*Instructions on how to prepare and preserve the different zoological specimens that should be brought from the Portuguese overseas possessions until its definitive preparation*) suggested some separation in roles between collector and the definitive preparation of the specimens once

(and professionalised) discipline in Portugal. I also contextualised the 1862's text within the earlier instructions issued by the University of Coimbra and the Academy of Sciences in previous attempts to gather collaboration for the previous institutions of Coimbra's Zoological Cabinet and the Royal Cabinet of Ajuda (Lisbon). See also Ceríaco, 'A Evolução da Zoologia'.

[17] [Vandelli], *Breves instrucções aos Correspondentes da Academia das Sciencias de Lisboa sobre as remessas dos productos, e noticias pertencentes á historia da natureza, para formar hum Museo Nacional* (Lisboa: Regia Officina Typographica, 1781). The full title can be translated as "Brief instructions to the Academy of Sciences of Lisbon correspondents on the shipment of products and information of natural history, to create a national museum." The publication does not have an author however it has been previously attributed to Vandelli, cf. Ceríaco, 'A Evolução da Zoologia,' 78; João Brigola, *Colecções, Gabinetes e Museus em Portugal no Século XVIII* (Coimbra: Fundação Calouste Gulbenkian / Fundação para a Ciência e a Tecnologia, 2003).

[18] Ermelinda Moutinho Pataca and Rachel Pinheiro, 'Instruções de viagem para a investigação científica do território Brasileiro,' *Revista da SBHC* 3, no. 1 (2005): 58–79; David Felismino, 'O estudo do mundo natural de Portugal, da Madeira e dos Açores em finais do século XVIII,' in *Os Naturalistas do Império: O Conhecimento Científico de Portugal e Suas Colônias (1768-1822)*, ed. Magnus Roberto de Mello Pereira and Ana Lúcia Rocha Barbalho da Cruz (Rio de Janeiro: Versal Editores, 2016), 177–95; Ana Cristina Roque and Maria Manuel Torrão, eds., *De Cabo Verde para Lisboa: Cartas e Remessas Científicas da Expedição Naturalista de João da Silva Feijó (1783-1796). Volume I - Documentação do Arquivo Histórico Ultramarino* (Lisboa: IICT- Instituto de Investigação Científica Tropical, 2013); Ana Cristina Roque and Maria Manuel Torrão, eds., *De Cabo Verde para Lisboa: Cartas e Remessas Científicas da Expedição Naturalista de João da Silva Feijó (1783-1796). Volume II - Documentação da Biblioteca Nacional de Portugal e do Arquivo Histórico do Museu Nacional de História Natural e da Ciência da Universidade de Lisboa* (Lisboa: Instituto de Investigação Científica Tropical, 2013).

[19] Translated title: *Instructions on how to prepare and preserve the different zoological specimens that should be brought from the Portuguese overseas possessions until its definitive preparation*. Francisco de Assis de Carvalho, *Instrucções sobre o modo de preparar, e conservar accidentalmente os differentes exemplares zoologicos que houverem de ser conduzidos das Possessões Portuguesas Ultramarinas até à sua definitiva preparação* (Lisboa: Typographia da Academia, 1836); Joaquim José da Costa de Macedo, 'Breves instrucções sobre a maneira de colher conchas, busios, ouriços, estrellas, e plantas marítimas para a collecção das produções naturaes de Portugal do Museu da Academia Real das Sciencias de Lisboa,' *Actas das Sessões da Academia Real das Sciencias de Lisboa* 1, no. 2 (1849): 93–96, and José Maria d'Abreu, 'Instrucções para a colheita, preparação, acondicionamento, e transporte dos productos e exemplares dos três reinos da natureza,' *Boletim Official da Provincia de Angola* 246 (1850).

finally arrived in the metropole. This division may have derived from the eighteenth-century lack of scientific supervision for the coordination and systematic identification work on the large amounts of specimens amassed in philosophical journeys in Portugal.[20] A new set of instructions followed, this time issued directly to the Portuguese colonies and their governments. They were again written by a University of Coimbra professor, José Maria d'Abreu (1818-1871).[21] These had a more general character and sought for natural products in all three kingdoms. Its full title was *Instrucções para a colheita, preparação, acondicionamento, e transporte dos productos e exemplares dos três reinos da natureza*. In 1850 there was a reiteration of the metropolitan request with a new recommendation for the shipment of natural products from the colonies since there were no resulting shipments attributed to "negligence and lack of zeal." The reiteration with the written basic instructions declared that "in view of the abundance in the province of products of nature in its three kingdoms" this should be considered officially as a "useful service, much recommended." [22]

As soon as 1858, Bocage begun direct contact with, for instance, the governor general of Mozambique. Bocage's pleas were distributed among the colonial administration network and, overtime, colonial collaborators proved strategic for the visibility of the scientific appropriation of Portuguese Africa. Because he had no reply from the Mozambique government, he insisted with a second letter, a year later, to which he added "manuscript instructions."[23] Again, he had no feedback from Mozambique. In 1862, with the new book *Instrucções praticas* ready from the publisher, he wrote again "appealing to the patriotism" of the governor and asking for the support of a metropolitan establishment that was "in every cultivated country one of the most assured criteria of civilisation and scientific progress."[24]

The *Instrucções praticas* created a new social space wherein the museum of Lisbon was publicly welcoming shipments of zoological specimens. Before Bocage's instructions there was no clear destination for such offers and most specimens were directed to the museum of

[20] Ceríaco, 'A Evolução da Zoologia.'
[21] Abreu, 'Instrucções,' 1850.
[22] Luiz Antonio Figueiredo, *Indice do Boletim Official da provincial d'Angola compreendendo os anos que decorrem desde 13 de Setembro de 1845, em que foi publicado, o 1º Nº até 1862 inclusivé* (Loanda: Imprensa do Governo, 1864), 129. Original text: "Repetida a recomendação feita na Port. Circ. de 26 de maio de 1848 accompanhada d'instrucções, para se remeterem alguns exemplares zoológicos para o gabinete d'Historia natural e para os musêos do reino; aonde havia grande escacez de produtos da natureza nos trez reinos, quando n'outro tempo havia grande abundancia d'elles remetidos das províncias ultramarinas. Port. Circ. de 18 de fevereiro de 1850."
[23] This possibly refers to an unknown first draft of the *Instrucções praticas*.
[24] Bocage to the Governor General of Mozambique (sent 1862.08.12, received in 1863.03.08), letter and reply transcribed in *Boletim Official do Governo Geral da Provincia de Moçambique*, 1863(13), 58-61 [1863.03.28]. Original: "um estabelecimento que é em todos os paises cultos um dos criteriums mais seguros de civilisação e adeantamento scientifico [...] apellando para o patriotismo de v. Exª pedia-lhe que se dignasse promover a acquisição e remessa de alguns animaes proprios do interessante região subjeita ao seu governo."

colonial products of the Minister of Navy and Overseas. For example, in 1861, a keen colonial pharmacist stationed in S. Thomé, António Gomes Roberto, dispatched to Lisbon a shipment of birds and shells. In March 1861, his shipment was directed not to the museum but to the royal collections in the Necessidades Palace.[25] Roberto followed a tradition of natural history products and collections offered to the royal collections by colonial officials and governorsin exchange for recognition and favour. At the time, the Necessidades collections were being incorporated in the MNL, and among them Gomes Roberto's offers. After 1862, when the MNL was established, and the *Instrucções praticas* had been published and circulated, Gomes Roberto's shipments of mineralogical, botanical and zoological items to Lisbon from his post in Goa, were now all directed to the Lisbon Museum.[26]

Although one of the main tasks of the MNL was to represent the Portuguese fauna, Bocage's instructions were distributed all over the Portuguese empire, and not just in continental Portugal. Although the exact number of copies made in 1862 is unknown, several copies were dispatched overseas. Immediately in 1862, twenty copies were sent to Angola and another twenty to Mozambique, the larger African territories. The Angolan official colonial bulletin mentioned that the Governor should "distribute them by the people he finds apt, recommending that they employ all diligence into finding and shipping to the Lisbon museum the different zoological products of the various localities where said individuals reside."[27]

Two decades later, in 1880, Bocage replied to a request for instructions from a captain based in Timor, Raphael das Dores. He sent him the 1862 instructions "published many years ago with the purpose of eliciting the solicitude of our overseas compatriots." Bocage took the opportunity to complain that "alas, the ministry of navy has let that book grow old in its archives, without dispatching it overseas." [28] This lament supposes that numerous copies had

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[25] AHMUL/AHMB/Rem 58 "Catalogo das Aves da ilha de S. Thomé e do continente de Africa, off[erecidas] a Sua Magestade, El-Rei, O Senhor D. Pedro 5, pelo Sr. Antonio Gomes Roberto, 1º Pharmaceutico graduado do Estado da India, em 18 de março de 1861." 1861.03.18. AHMUL/AHMB/Rem 352 (1861) 'Shells."

[26] And again in 1863 from Goa, AHMUL/AHMB/Rem 393 through to 404 (1863-1870) from 'India." In a letter that accompanied a new shipment in 1865 [AHMUL/AHMB/DIV 109 Letter from Ministério da Marinha e Ultramar to José Vicente Barbosa du Bocage, signed by Manuel Jorge d'Oliveira Lima, 1865.07.27] mentioned that a case containing various products of natural history and medicinal plants from India was offered by Antonio Gomes Roberto to the Lisbon Museum. Roberto was one of the museum collectors to receive a Medal of the Order of Christ for his collaboration.

[27] *Boletim Oficial do Governo Geral da Província de Angola*, Nº869 (31.05.1862), N.60 (31.03.1862). Original text: "afim de que o mesmo Governador Geral as faça distribuir por aquelas pessoas que julgar aptas, recomendando-lhes que empreguem toda a diligencia para alcançar e remeter para o museu de Lisboa os diferentes produtos zoologicos das diversas localidades em que os referidos indivíduos se encontram."

[28] Letter from Bocage, to Dores (1880.12.09), transcribed in Raphael das Dores, *Como Se Adquire a Fama Ou História dum Calumniado*, 1907, 173–74. Original text : "Quanto ao Directorio que V. Ex.ª me pede, remetto-lhe n'esta occasião umas instrucções que publiquei ha bastantes annos, com o fim de desafiar a solicitude dos nossos compatriotas do Ultramar; porém, infelizmente, o ministério da marinha tem deixado envelhecer esse opusculo nos seus archivos, sem se dar ao trabalho de o expedir para o Ultramar."

been made and that they were stored in the navy ministry instead of being steadily distributed along the years. There is no indication that the museum has ever issued new instructions, although it maintained a vast network of collectors, decades after the first print in 1862.[29]

Bocage's *Instrucções praticas* included five divisions: i) a twelve page *Introduction*, where the program and purpose of these instructions was delineated; ii) the actual *instructions* manual on how to obtain, prepare, and ship specimens to the museum of Lisbon, following a systematic organisation separated by family groups, from mammals to Myriapoda and Zoophyte; iii) the *desiderata*, a list of products that the museum desires to receive listing typical fauna from Portugal, and its colonies; iv) two *notes* on the history and current situation of the Museum's collections; and iv) a *List of Birds of Portugal*.

This publication was of paramount importance for it presented the future research strategy and plans for development of the collections. The *Instrucções praticas* can be read as three types of texts, with three separate agendas. The first is the procedural manual where techniques and chemical solutions are described, and which together with the *desiderata* list make up the core of the publication. This part does not differ much from other contemporary instruction manuals published by museums of natural history. In fact, instructions were a derivative typology, and most were written describing shared procedures, well-known chemical formulas, and even identical iconography. It was common practice to include the desiderata lists after the preparation manual. There is a second set of texts, that comprises the introduction and the historical appendix. The introduction declared a rhetorical program for a national science – that was much more than a national fauna. And the appended historical note on the collections reads like a report on the previous curatorial shifts that happened in the first half of the century, where shameful lack of patriotism was to blame for the earlier failures in collection management. Thirdly, the book finished with a list of Portuguese birds, which can be taken as a completely separate scientific work. Bocage even included this list as a scientific paper in his director's report published in 1865.[30] I argue that these last two original segments of the book, aside from the instructions themselves should be read as *paratexts* for they have provided the *Instrucções praticas* with new layers of meanings, affecting its readership and its reception.

[29] There were seemingly abundant copies, since a dozen copies with uncut pages were recently located in one of the unidentified boxes at the AHMB.
[30] Bocage, *Relatorio* [1865], 18.

To secure the voluntary participation of the potential museum collectors, Bocage introduced the idea that the enhancement of the Lisbon museum's collections would produce in the collector "the moral satisfaction of having contributed, even from afar, to the scientific rehabilitation of the fatherland."[31] Bocage's introduction to the *Instrucções practicas*, used multiple times the nationalistic rhetoric of the weight of "other eras" which had "made us great."[32] In Portugal, the nineteenth-century romantic search for the origins of the nation was built around the notion that the historical past of the so-called golden age of the global maritime empire represented a morally charged destiny. The idea that a place of power for the Portuguese empire (by then mostly in Africa) could be rehabilitated and that the country could once again be "ahead of the world's civilisation" was common currency in political and literary discourse. There was an underlying sense of "lost greatness" prevailing. This refers to what historian Valentim Alexandre called the "sacred heritage," a supra-narrative that bounded imperialistic and nationalistic views together in a teleological rhetoric.[33]

Bocage hoped that collectors in the colonial outposts as well as in Portugal's mainland would start shipping materials to Lisbon imbued by a patriotic agenda. The moral reward that Bocage wrote about in the introduction was nevertheless more reifiable and could be translated in the acknowledgements to collectors (Chapter 3). To acknowledge collectors was a common practice in the gift economy of collection management. However, while the Smithsonian Institution's *Directions* published by Spencer Fullerton Baird stated that "full credit" to the collectors would be given by the curators in the published reports on the collections, Bocage wrote about feelings of "moral reward" and enhanced the whole narrative with rhetoric and nationalistic purpose.[34]

Furthermore, Bocage repeated that:

> for sure [they] will not refuse to stimulate some exploration work and to promote the acquisition of zoological specimens; rather they will want to follow the noble example of viceroys and governors of other eras, once they are convinced that with their diligence, they will benefit science and the good fame of their country.[35]

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[31] Bocage, *Instrucções praticas*, 10. Original text: "muitos quererão tomar a si uma tarefa que lhes trará em recompensa a satisfação moral de haverem concorrido, mesmo de longe, para a rehabilitação scientifica da sua patria."
[32] Bocage, 11. Original text: "Não acreditâmos que sejam hoje apanagio exclusivo de outros povos as qualidades e sentimentos que n'outras eras e sob a influencia de outras idéas nos fizeram grandes e nos collocaram á frente da civilisação do mundo."
[33] Alexandre, 'A África no Imaginário Político Português.'
[34] Spencer Fullerton Baird, *Directions for Collecting, Preserving, and Transporting Specimens of Natural History Prepared for the Use of the Smithsonian Institution* (Washington: Smithsonian Institution, 1859), 3; Bocage, *Instrucções praticas*, 10.
[35] Bocage, *Instrucções praticas*, 10.

The shared idea that it was a matter of "diligence" conflated both the position of Bocage in the museum, and of the colonial employees: they were together contributing as public servants to a universally acknowledged science and therefore earning international recognition for the kingdom. The reiteration of the idea that an engaged civil servant and colonial official "will" want to participate in this collection agenda stand out as a pathos of "national decorum."[36] If any readers were left who still failed to see the strategic importance of a museum which adequately represented the nation and its imperial possessions, Bocage offered a comparison with other European museums which according to him were filled with natural history objects "donated by men foreign to science" but who nonetheless contributed because they were not "indifferent to the prosperity and intellectual progress of their country."[37]

Instruction manual: to "go out in different times of the day"

Generally speaking, nineteenth-century instructions followed a common structure. Since there are methodological differences in the collation and preparation of different types of animals in a variety of situations, manuals were usually divided by animal families. Some started by explaining how to catch and store the various marine invertebrates because "water is the element in which the greater number of the classes of animals exist," while others began with vertebrates and then moved downwards in the perceived scale of organisation.[38] Bocage's instructions started with quadruped mammals and followed with less organised beings down to maritime invertebrates. This arrangement respected, according to Bocage the "order and scientific divisions," because these "seemed to us to facilitate presentation."[39]

Twice in the first page of the procedural manual Bocage claimed that this was not a "scientific work." As many other authors, he was keen to engage with a larger audience than the limited number of people who would read a taxidermy guidebook. His aim was to describe how to collect zoological products "with most ease" and what procedures were necessary so that those products received a "first preservation" and how to accommodate them "in the case one wanted to ship them to the Lisbon museum."[40] The cautious and provisional tone was very

[36] Bocage, *Instrucções praticas*, 10.
[37] Bocage, *Instrucções praticas*, 11.
[38] Richard Owen, 'Zoology. Instructions for Collecting and Preserving Animals,' in *A manual of scientific enquiry; prepared for the use of Her Majesty's Navy: and adapted for travellers in general*, ed. John F. W. Herschel (London: John Murray, Publisher to the Admiralty, 1849), 343.
[39] Bocage, *Instrucções praticas*, 13.
[40] Bocage, 13. Original text: "É nosso fim unicamente dizer ás pessoas que se proponham a colligir productos zoologicos o que devem fazer para os obter com mais facilidade, as cautelas de que devem usar para que se não deteriorem, os melhores processos a que devem recorrer para lhes dar uma primeira preparação, e finalmente a maneira por que os devem acondicionar no caso de no-los quererem remetter para o museu de Lisboa."

typical of Bocage, especially when the matter is to represent collecting, preparing, and shipping as an effortless endeavour in order to engage as many collaborators as possible.

Being a collector for a museum involved many hours of work but did not always entail hunting birds or catching fish for yourself. In *Instrucções praticas*, Bocage explained in detail how to seize the best opportunities to get specimens, for example: "beside visiting the markets, one should witness the arrival of fishermen at the beach in order to obtain from them the species they usually dismiss."[41] Collecting for the museum was, in this sense, collating and organising sources of material. While this was just a manual for "first preparation" of specimens, meaning that the museum had different taxidermy procedures from those on the field, the level of detail used conferred due relevance to the phase of the "scientific" work done during field collation and mounting even if, at the time, it was problematic to consider this type of labour as scientific.

Outsourcing collecting skills and finding the best local helpers was also an important ability to encourage, for "in localities where [reptiles] abound one should find people who know them and know how to hunt them; these are the best collectors to employ."[42] Different socio-professional responsibilities were in place, and the collector was also presented as a mediator between local knowledge and local techniques of capture, and the transformation of the animals into prepared specimens ready to be shipped into the place where knowledge was finally created. The definition of the role of this type of collator involved intermediation with the local conditions, as well as understanding the basic preparation techniques and shipment procedures.

Naturally, the world of amateur naturalists, collectors of insects, or bird hunters for sport, had produced many manuals of the best practices for collection in the field, and Bocage's instructions did not leave that kind of activity behind. Collecting for oneself was supposed to be a joyous activity and one that would positively be contaminated with the desire to become a natural history collector. Bocage's instructions recommend, for example, that in order to "obtain the most number possible of [butterflies] species in a certain locality it is indispensable to hunt throughout the spring until autumn and to go out in different times of the day."[43]

Depending on the size of the manual, the instructions were more or less detailed. Even when, like Bocage's, these were not meant as "scientific books," most included some level of

[41] Bocage, 34. Original text: "Alem de frequentar os mercados, precisa-se assistir á chegada dos pescadores á praia, e haver d'elles as especies que costumam desprezar."
[42] Bocage, 32. Original text: "Nas localidades onde estes animaes [repteis] abundam devem encontrar-se pessoas que os conheçam e saibam caça-los: estas pessoas são os melhores collectores a empregar."
[43] Bocage, 50. Original text: "para obter o maior numero possivel das especies de uma localidade é indispensavel que se lhe dê caça por toda a primavera e verão, e que se saia a diversas horas do dia (...)."

jargon particularly when it came to chemical formulae for the preservative powders or the alcoholic solutions to be used. Bocage's manual listed several recipes. Some of the instructions were very specific, like "with the scalpel secured in the right hand draw an incision from the breast bone through to the anus, taking care to only cut skin."[44] This was accompanied by Figure 1 where a bird is portrayed with his head facing the left, conveniently placed to be cut open by a right-handed person, according to the instructions. In other passages, details reveal that Bocage had also some first-hand experimentation: "it is indispensable to perfectly clean the skin [of mammals] of all the flesh and the fat that may adhere to it."[45] This was possibly written with a previous personal experience in mind. Although we know that Bocage was a sedentary cabinet naturalist first and foremost, he was also a keen hunter, and surely accumulated field experience when collecting in Portugal.

Taxidermic techniques and methods remained in practice the same since the eighteenth century, and this typology of text was inevitably dry and procedural explanations in one manual trickled down into the next edition. There are manifest similarities, not only between different impressions of the same book but also between different manuals published by different museums in different countries. Many instructions quote extensively from earlier scientific texts and sometimes cite entire pages. Referencing systems and quotations were not necessarily as strict in the 1860s as they are observed today, and Bocage's instructions reveal an interesting case between standardisation of scientific diagrams and direct copy, which is the focus of this section.

The *Instrucções praticas* included several diagrams to illustrate instruments and procedures. Although there are no indications of their authorship, it was possible that Bocage used the services of Capelo, who was a handy draughtsman.[46] In the section dedicated to insects a diagram showed the "invariable rules adopted with which to position pins in insects" (Figure 2.2).[47] This illustration showed a typical and standardised way to depict insects: as seen from above and, when winged, with the wings spread out in the unnatural fashion of museum insect

[44] Bocage, 27. Original text: "com o escalpello seguro na mão direita traça-se uma incisão desde o osso do peito pelo ventre até ao anus. Tomando cautela em só cortar a pelle."
[45] Bocage, 22. Original text: "É indispensavel limpar perfeitamente a pelle de toda a carne e gordura que possa adherir-lhe."
[46] Teresa Roma, Bocage's wife, was also a trained painter, but the extent of her participation in his work is yet unknown.
[47] Bocage, *Instrucções praticas*, 51. Original text: "Têem-se adoptado regras invariaveis quanto á maneira por que se devem cravar os alfinetes nos insectos (...)."

drawers.[48] This diagram was meant to exemplify how the procedure of pinning was conventionally made, a technique which has remained unchanged until today:

> [I]t is customary to prick coleoptera in the right elytron (fig. 6), orthoptera and neuroptera between the insertion of the wings (fig.7), hymenoptera and butterflies and all the rest a little further in the mid-body (fig.8). [49]

In this composite image Bocage's instructions represented different families of insects, and arachnids, and how specimens from each should be correctly pinned to an insect case. The pins are not very clearly distinguishable in this view, but the figures have a second purpose, that of showing diversity and inclusion at the same time. This illustrated how diverse the various families of insects can be, although spiders are not insects, they needed the exact same type of preparation scheme, and could be stored by the same procedure, also pinned in an insect case. This joint diagram functions like a miniature insect case, including different types of animals, which was what the museum expected to receive.

These types of diagrams are very similar to the ones found in modern day textbooks and were already typical at the time. So typical in fact that one of them is a direct copy of the third edition of the instructions published by the Smithsonian Institution, written by Baird.[50] Not just one but three of Bocage's ten diagrams were apparently copied from the Smithsonian's 1859 instructions (see comparison in Figure 2.3). In the case of Baird's insect illustrations, reproduced in the bottom image (left) of Fig. 2.3, they were meant to exemplify a different application. Here, what the reader learnt was not only where to correctly prick the pin, but also how to properly insert the pin, i.e. not all the way down, so that there is space created between the insect and the paper case, as well as between the insect and the tip of the pin, so that it is easily manageable and picked up. The second copied diagram was a demonstration of the skinning of serpents, which Bocage described as "extracted with utmost ease."[51] And a third picture explained how a dredge to catch marine invertebrates was built. The text connected to these diagrams in both manuals is also very similar. Bocage borrowed these diagrams without citing his source, and this may even suggest he used other sources as well to compile his own

[48] I wish to acknowledge the helpful insights I gathered from the hands-on workshop on insect preparation organised and taught by the curator of entomology Luís Filipe Lopes, held at the Museu Nacional de História Natural e da Ciência da Universidade de Lisboa, June 3, 2017.
[49] Bocage, *Instrucções praticas*, 51. Original text: "(...) costuma-se picar os coleopteros no elytro direito (fig.6), os orthopteros e nevropteros[sic] entre a inserção das azas (fig.7), os hymenopteros e borboletas e todos os mais, um pouco adiante no meio do tronco (fig.8)."
[50] Baird, *Directions [1859]*.
[51] Bocage, *Instrucções praticas*, 33, Fig. 2. Original text: "Ás serpentes grandes extrahe-se a pelle com suma facilidade."

instructions text. Although current plagiarism rules were not in place in the nineteenth century, and this was a "handbook" typology, other instructions did refer to their source materials.[52] Citing sources can also be used as a way to legitimate one's own authority, and Bocage referred often to the work of his fellow naturalists. Images have a different status from text, in particular diagrams such as these, and could be seen as belonging to a shared visual culture of the instructions' handbook. It remains unclear who replicated these images, and how Bocage had access to the Smithsonian's copy, nevertheless this particular case is evidence to how instruction manuals were built on an appropriation of earlier texts and, also, figures.

The List of Birds of Portugal

The handbook of instructions for collectors, *Instrucções praticas*, was internationally received as a scientific book. The reason was the appendix "Lista das Aves de Portugal" (List of Birds of Portugal) one of the first of Bocage's direct contributions for the compilation of a national fauna. This list was indeed a scientific work. It did not necessarily relate to the purpose of the instructions manual and, as a para-text, modified the readership of the *Instrucções praticas* completely. Without it, the book was a manual for the implementation of a set of standards and procedures, if also accompanied by details of historical context and imbedded with a strong national rhetoric. With it, the book was also read and exchanged as a scientific monograph.[53]

As was mentioned before, D. Pedro V had built up a famously large and respectable bird collection in the Nec

3essidades Palace, completed with an aviary in the palace's garden.[54] After his death, in 1861, the bird collections were bequeathed to the Lisbon museum, under the scientific supervision of Barbosa du Bocage. These were mostly collections of exotic birds, some resulting from diplomatic offerings, nevertheless national fauna was also represented. Furthermore, Bocage wrote "we have been able to grant the Lisbon museum with an excellent

[52] See, as an example, Richard Owen, 'Zoology. Instructions for Collecting and Preserving Animals,' in *A manual of scientific enquiry; prepared for the use of Her Majesty's Navy: and adapted for travellers in general*, ed. John F. W. Herschel (London: John Murray, Publisher to the Admiralty, 1849).
[53] In previous work I have already attributed the added interest of the international community on the *Instrucções praticas* to the inclusion of this List, see Madruga, 'José Vicente Barbosa du Bocage,' 59.
[54] João Albuquerque Carreiras, 'Tapada das Necessidades em Lisboa: A Historia de um Jardim Esquecido,' *Espacio Tiempo y Forma. Serie VII, Historia del Arte* 14 (2011): 89–111. Also see João Brigola, *Os Viajantes e o 'Livro dos Museus'* (Porto: Dafne Editora / CHAIA, 2010).

collection of European birds," owing perhaps to his 1859 European travel and new acquaintances in European museums such as Hermann Schlegel in Leiden.[55]

In the introduction to the list, Bocage stated that these collections were open to the "examination of people who wish to study them."[56] This did not mean, however, that the collections were already on display in a public room but rather that the collections were mostly taken as research collections to be shared with fellow naturalists and peers.

The List, the final twenty-two pages of the *Instrucções praticas*, was a listing of bird species organised by families from birds of prey to aquatic birds.[57] It did not include domesticated birds and was compiled according to three criteria explained by Bocage. Those marked with an asterisk (*) were considered to definitely exist in Portugal whether they were sedentary or migrant, and of which "authentic specimens" existed in the EPL museum or in the "magnificent" royal collections. The relation of authenticity in observational records was therefore substantiated with the presence of the actual physical specimens for which locality provenance was identified. Then there were those species which "we assume with some safety to be found here" because they were also reported in Spain and south of France, for example, even though there were (yet) no specimens in the national collections; and, finally, those which "we haven't yet observed" and were doubtful, were given a question mark (?).

According to Bocage it was useful that the list included scientific as well as vernacular names, and he used French synonymy so that this list could be compared against the established works of Comte Buffon, Georges-Louis Leclerc (1707-1788), the classical reference. Bocage also referred to the *Ornithologie Européenne* by another Frenchmen Côme Damien Degland (1787-1856) whose work was, according to Bocage, available to Portuguese amateurs.[58] Bocage also mentioned the "excellent work" by Coenraad Jacob Temminck (1778-1878), the first director of the Leiden natural history museum, the Rijksmuseum van Natuurlijke Historie, and the author of classical works on European ornithology.[59] Bocage considered such books as

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[55] Bocage *Instrucções praticas*, 76. Original text: "Temos conseguido dotar o museu de Lisboa com uma excellente collecção de aves da Europa."
[56] Bocage, 76. Original text: "os quaes franquearemos da melhor vontade ao exame das pessoas que os desejarem estudar."
[57] The List comprised 34 species of *Accipitres* (birds of prey); 153 *Passeres*; 4 *Columbae*; 6 *Gallinae*; 64 *Grallae*; and 65 *Anseres* (aquatic birds). The total amount was of 326 species, while a recent guide confirmed 280 species from Portugal's mainland: Helder Costa, Eduardo de Juana, and Juan Varela, *Aves de Portugal. Incluindo os arquipélagos dos Açores, da Madeira e das Selvagens* (Barcelona: Lynx, 2011).
[58] Bocage, *Instrucções praticas*, 76. Bocage referred to Côme-Damien Degland's, Ornithologie Européenne, ou, catalogue descriptif, analytique et raisonné des oiseaux observés en Europe (Paris: Rorer, 1849). A second edition was published posthumously in 1867, with co-authorship of Zéphirin Gerbe (1810-1890).
[59] Bocage may have met in person with Temminck in his European tour in 1859 although, in Leiden, he corresponded mostly with Schlegel. Here Bocage was referring to Temminck's *Manuel d'ornithologie, ou Tableau systématique des oiseaux qui se trouvent en Europe*, published in 1815, a classic reference work. Eulalia Gasso-Miracle has studied Temminck's impact in

a compromise between more popular and accessible publications and the minimum scientific quality that reflected recent knowledge. An updated list of Portuguese birds did not exist and most of the available information was retrieved from European publications. This was why both amateur observers and professional communities of ornithologists demonstrated due attention to the List. The British reverend Alfred Smith (1822-1898), and amateur ornithologist, used and cited Bocage's List as one of few existing works on the topic.[60]

So as to gather this type of data, hundreds of records needed to be authenticated and new observations combined. Although the *Instrucções praticas* were published in 1862, just after the MNL was created, the list was a project of earlier months. The compilation of this list was thus probably due to the work, or possibly co-authorship, of curators Florindo and José de Sousa, mentioned earlier, who already worked with the large ornithological collections of D. Pedro V in the Necessidades Palace. A listing of geographical distribution of this kind required that Bocage went over as many printed sources on European ornithology as possible, to complement the available information from the existing specimen collections. The list was a taxonomical revision work which, albeit provisional, was the foundation work for a Portuguese fauna. In fact, the "Lista das Aves de Portugal" was cited in various scientific works and resonated accordingly in the community.

The leading British ornithological journals, *The Ibis*, when reviewing the *Instrucções praticas*, claimed that these were the first record of "ornithological matter in one of the languages of the Spanish Peninsula" since *Ibis* was founded.[61] The review left a sense of anticipation for a more detailed study, writing that "we trust that it may only be the precursor of a more extended work on the ornithology of Portugal." Such research, it continued "would greatly add to our knowledge of the laws of distribution of European species and their varieties – a most interesting subject (...) still in its infancy."[62] This review hints at a possible reason for

taxonomic practices and nomenclature, and on the early history of biogeography, see Eulalia Gasso-Miracle, *Temminck's Order. Debates on Zoological Classification: 1800-1850* (Ph.D. dissertation, University of Leiden, 2019).

[60] Alfred Charles Smith, 'A Sketch of the Birds of Portugal,' *The Ibis. A Quaterly Journal of Ornithology* 4, no. 16 (1868): 428–60. Smith was a member of British Ornithologist Union. In 1869, Bocage reviewed Smith's list in Bocage, 1869 –Smith further published in 1870 the Narrative of a Spring Tour in Portugal, with a chapter on the Birds of Portugal, comprising a list of 235 species.

[61] The editors of *Ibis* wrote that they had received news of the List of Birds in the *Instrucções praticas* together with the mention of an article by José de Sousa which they had not yet received. They were referring to an article by José de Sousa in July 16, 1861, on the birds of Portugal, published on the *Gazeta Medica de Lisboa* [which I have not yet accessed].

[62] 'Portuguese Publication,' *Ibis* 5, no. 17–20 (1863): 227–28.

the "Lista" to be attached to the instructions text, Bocage may have felt there was no other proper outlet where to publish this work.[63]

In fact, Bocage himself circulated the *Instrucções praticas* widely. He sent it not only to his national collaborators and overseas officials of the colonial government but also to his fellow zoologists and scientific societies who would not be otherwise considered as the perceived audience for this publication. Not long after the publication of the book, and as early as April 1862, Hermann Schlegel, had already read it. Bocage himself had sent it to him. Schlegel was very interested in regional variations within the same bird genus. His original take on the subject of variation led him to assemble large sets of the same European ornithological species.[64] In his thank you note, Schlegel referred simply to the *Instrucções praticas* as the "bird book." He required a clarification of the geographical location of the "Outra-banda" (the south bank of the river Tejo), which was mentioned as a locality for various of the Portuguese birds listed. Schlegel also inquired Bocage for a trustworthy collector who could send him specimens from that same region.[65] For Schlegel, the *Instrucções praticas* was a new addition to his bibliographical references not because of the procedure manual, but because of the list of birds from Portugal.

The list was also mentioned as a part of the *Instrucções praticas* in an 1878 paper on the distribution of the *Perdrix Gambra*, the Barbary partridge. Adrien Lacroix, an amateur ornithologist from Toulouse and one of the founders of the *Société d'histoire naturelle de Toulouse*, cited the 1862 list as one of the sources that complemented his paper on the observations of this game bird.[66] Although Bocage listed the *Perdrix pedrosa* (synonym for *P. Gambra*) as one of the uncertain species for Portugal, therefore marked with a (?), Bocage's list is accepted as a reference for it locates the north African species in "Italy, and south of Spain" and thus still served a scientific use. It is probable that Bocage had sent the book to the Société of Toulouse, however Lacroix may have accessed it in Paris, for it was received in

[63] European diverse faunas were raising much interest and many naturalists dedicated their research to local and regional and national faunas. Because of his personal network, and due to the opportunity presented by the *Instrucções practicas* Bocage circulated a new and *bona fide* list of birds, that was the first printed work of the new Museum.

[64] According to various authors, Schlegel "preferred to have series of specimens to illustrate variation instead of collecting as many species as possible." Ostende, Dekker, and Keijl, 'Type-Specimens of Birds in the National Museum of Natural History, Leiden,' 6.

[65] AHMUL/AHMB/CE/S023 Schlegel to Bocage, 1862.04.22.

[66] Adrien Lacroix, 'La Perdrix Gambra - Perdrix Pedrosa dans les environs de Toulouse,' *Bulletin de La Société d'histoire Naturelle de Toulouse* 12 (1878): 127–33. The current nomenclature is *Alectoris barbara* (Bonnaterre, 1791), and its geographical distribution does not include Portugal.

1865 by the Académie des Sciences of Paris among other publications sent by Bocage and Felix de Brito Capelo.[67]

The Smithsonian Institute also has a copy of the *Instrucções praticas* in its library.[68] This copy contains a title page with a dedication to William Saville-Kent (1845-1908), a naturalist of the British Museum who visited Lisbon, and Bocage, in 1870 during his dredging exploration of the Spanish and Portuguese coast. In his paper communicated to the Biological Section of the British Association, Edinburgh, in August 8, 1871, Kent mentioned the help received by Bocage regarding the contacts with local authorities and fishermen in Setúbal.[69] In fact, the expedition was also intended to get specimens of the *Hyalonema lusitanica* (Bocage, 1864), a contested species with affinities with the *Hyalonema japonica*, and Bocage was certainly very interested in the contact with the British naturalist.[70]

The list was introduced in this publication as a first attempt to look at the national collections with a new approach, where findings were published and made known internationally. Bocage was, it could be argued, testing the field with the List, and checking for the international interest which would ultimately serve as his leverage in future requests for more money for the enlargement of the collections. Ornithological work continued as one of the leading areas of research in the following decades at the MNL. Although it remains unclear why Bocage chose to publish the List with the *Instrucções praticas*, it is possible to suppose that Bocage intended to use the opportunity afforded by a larger audience, and a large number of copies, to claim the authority of the Museum of Lisbon, and his own, over the production of a national fauna.

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[67] 'Bulletin Bibliographique (31 Juillet 1865),' *Comptes Rendus Hébdomadaires des Séances de l'Académie des Sciences* 61, no. Juillet-Decembre (1865): 227–28., p.228.

[68] This copy is available online via the repository *archive.org*. It is bounded with an ex-libris and signature of Alexandre Wetmore (1886-1978), who was an ornithologist and avian palaeontologist, who served as the sixth secretary of the Smithsonian, and bequeathed his papers to the Smithsonian Archive. Although it is unclear how he purchased the book, there is however an indication of Wetmore visiting Lisbon to attend the 12th International Zoology Congress which was organised in 1935 at the *Museu Bocage* by its director, Artur Ricardo Jorge (1886-1975).

[69] William Saville Kent, 'Zoological Results of the 1870 Dredging Expedition of the Yacht "Norna" off the Coast of Spain and Portugal,' *Nature* 4, no. (Oct 5, 1871) (1871): 456–58. In this report he also mentioned Brito Capelo and the shark species described by the two Lisbon naturalists, Bocage and Capelo. His mission was dredging but he also mentioned the microscopical preparations with which the new specimens were studied and the microscopical analysis made as part of the work done on board as well as afterwards at the museum. In his correspondence with Bocage, in the summer of 1871, Bocage engaged Kent to broker his purchase of a binocular microscope for £76.13. (Kent further suggested Bocage the purchase of a polariscope.) AHMUL/AHMB/CE/K005-6 (1871).

[70] AHMUL/AHMB/CE/K004, Kent to Bocage, 30.05.1870. Original text: "for the special purpose of procuring specimens of *Hyalonema lusitanica*."

The "scientific rehabilitation of the fatherland"

In the *Instrucções praticas,* Bocage wrote that with his "Lista das Aves" he wanted "to stimulate the curiosity of the people in the situation to participate in this interesting kind of investigations."[71] With this seemingly candid remark Bocage conveyed the common idea that by collecting, one becomes in love, an amateur of natural history, and that stimulating curiosity is an effective engagement technique for future collaborators. However, as I hope to have demonstrated, this text was riddled with exhortations of the national psyche.

Historian Harriet Ritvo has mentioned how the connection between imperial networks and the collation of materials destined to museums in the metropole was effective. She wrote that "it was assumed that British administrators in remote outposts would collect specimens of the local fauna and flora for ultimate deposit in collections at home." For that effect "museums published and republished manuals with guides for preservation of specimens and exhortations that even lowly functionaries, especially peripatetic members of the navy and merchant marine, be pressed into the service of natural history."[72]

I hope to have shown how the instructions issued by Bocage were most of all a rhetoric device and that, in that sense, they worked successfully to build a network of collaborators from all over the empire. As I will exemplify in the following chapter, issuing the *Instrucções praticas* had the desired outcome of alerting and involving non-professional naturalists both in Portugal and in the overseas colonies. Their direct consequence was the involvement of the colonial and the metropolitan government which led to a large network of collaborators of numerous navy and army officers, medical doctors and pharmacists, and locally engaged colonial agents, who were inspired by the underlying rhetoric.

The basis for the work done by the naturalists in the Zoological Section was the successive and systematic explorations in colonial territories, particularly in Africa. The *Instrucções praticas* were conceived, published, and distributed not for the contracted naturalists but rather for colonial government personnel, working in the navy, military, or in the medical professions who would be inspired by the narrative of its text and its ideology. It was also, it can be argued, a representation of the new MNL which presented itself, and its zoological section, as a valid and valuable node in the European network of natural history museums. The whole book, albeit written in Portuguese, was also a statement of a working

[71] Bocage, *Instrucções praticas,* 75. Original text: "é nosso intuito estimular a curiosidade das pessoas que estejam no caso de se poderem entregar a este interessante genero de investigações."
[72] Harriet Ritvo, 'The Power of the Word,' 6.

research museum in the making. It proved to be relevant internally as a national declaration of a new structure able to accommodate zoological collections and dutifully representing the country and its empire. In the international arena, it was vital to assert the museum's position as a repository specialised in meridional African fauna.

3.

First shipments from the colonies

> Having received several Royal Orders to form a Museum of the natural products of this Province due to the great convenience to its respective scientific, industrial and commercial progress, and acknowledging that these orders were not yet implemented (...) I find it convenient to assign the 2nd Pharmacist of the same Province Manoel Joaquim Leyguarda de Villalba y Ore Pimenta (…) the formation of a Museum of the natural products of this Province.[1]

At the same time as Bocage was issuing the *Instrucções praticas*, the Portuguese crown communicated to the several provinces the need to establish museums with their respective natural products. The context of national and international exhibitions of national and colonial products of science, industry and commerce prompted the creation of museums of colonial products all over Europe. One such example was the 1865 colonial exhibition of Porto which featured products from the Portuguese colonies and aimed for a national representation.[2]

[1] *Boletim Official da Provincia de Cabo Verde*, 1863, 4, p.239 (regulation N.271, signed by Carlos Augusto Franco, the Governor General in November 10, 1863). Original text: "Havendo sido mandado formar por diferentes Ordens Regias um Museu dos produtos naturaes desta Provincia, atenta a sua grande conveniência para o respectivo progresso scientifico, industrial e do commercio, e não tendo tido ate hoje o devido cumprimento aquellas ordens, ou não se havendo colhido das mesmas resultado algum, talvez se achar a pessoa a quem foi incumbida a formação daquele Museu sobrecarregada com outros serviços a ponto de não poder desempenhar-se daquele; concorrendo no 2º Pharmaceutico da mesma Provincia Manoel Joaquim Leyguarda de Villalba y Ore Pimenta as circunstancias bastantes para lhe ser cometida aquella importante missão; hei por conveniente encarregal-o da formação de um Museu dos productos naturaes desta Provincia."

[2] In his review of the international exhibition Ignacio Vilhena de Barbosa mentioned that the inaugural meeting where the decision was made to hold in Portugal an international exhibition took place on July 7, 1864. This date, a reference to Vasco da Gama's voyage to India, was regularly considered an auspice for events of national pride, Ignacio de Vilhena Barbosa, 'Porto. Exposição Internacional Portugueza de 1865,' *Archivo Pittoresco*, no. 43 (1865): 338. Also see Manuela Cantinho, *O*

Indeed, after the Paris international exhibition of 1867, the Secretary of State for Navy and Overseas was reorganised to include a section dedicated to Scientific Explorations, Collections, and Exhibition of Colonial Products.[3] As such, some of the colonial correspondents of the Lisbon museum signed as official "collectors of natural products for the Museum of Lisbon," a title bestowed upon them by colonial governors.[4] In two of the Portuguese colonies, Angola and Cape Verde, there was an official order for the creation of a local natural history museum. These yielded, however, no results during the period under analysis. It is fair to assume that the idea of creating natural history museums in the colonies was prompted by the representation of colonial products in European international exhibitions. Still, it is unclear whether there was in fact, as Luis Pequito Antunes claimed, a "colonial policy" in place at the time.[5]

Although the precise agenda behind this intention is unclear, Bocage's opinion on the subject is known and it was not positive. Bocage was informed by the State Secretary of Navy and Overseas on June 30, 1865 that the Governor General of Angola wanted to create a natural history museum in Luanda. He received a letter on behalf of the Minister asking for Bocage's recommendation for a naturalist who could take on the job.

> [N]ot having anyone in that city who may be in charge of the Museum and of the zoological preparations, the Governor General proposes that a skilled individual be hired in Lisbon for this specific service; besides the year wage of three hundred thousand reis, he should be offered accommodation, and treatment in the military hospital in case of disease. [6]

Battling himself with requests to expand the museum's budget and staff, Bocage was not comfortable with the news. He replied he could not recommend anyone that would take the job for such small compensation. Furthermore, he added that in order to create a zoological museum in Luanda the best would be to "start from the beginning" and appoint someone to do

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Museu Etnográfico da Sociedade de Geografia de Lisboa. Modernidade, Colonização e Alteridade (Lisboa: Fundação Calouste Gulbenkian / Fundação para a Ciência e a Tecnologia, 2005), chap. 2. Also see Peter H. Hoffenberg, "'A Science of Our Own": Nineteenth Century Exhibitions, Australians and the History of Science', in Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970, ed. Brett M. Bennett and Joseph M. Hodge (Basingstoke: Palgrave Macmillan, 2011), 110–39.

[3] This would later lead to the creation of the Museu Colonial de Lisboa (see note 13, page 62).

[4] More colonial officers were possibly given this responsibility and title. With the help of the correspondence received by Bocage I have confirmed two: Pimenta in 1864 in Cape Verde, and Raphael das Dores in 1881 in Timor.

[5] See more on the several attempts of creating a local museum of natural history in Cape Verde in Luis Pequito Antunes, 'Museus e Ciência em Cabo Verde, 1850-1876,' *Revista de Estudos Cabo-Verdianos*, 2013, 1–26.

[6] AHMUL/AHMB/Div099. Correspondence from the State Secretary of Navy and Overseas to Bocage, 1865.06.30. Original text: "não havendo porem naquella cidade pessoa que possa encarregar-se da guarda do Museu e das preparações zoologicas, propoem [sic] o mesmo Governador Geral que seja contractado em Lisboa um individuo habilitado para o indicado serviço a quem se pode offerecer, alem do vencimento annual de trezentos mil reis, casa para habitação, e tratamento no Hospital Militar em caso de doença."

the methodical exploration of those "most interesting regions." And thus a counter-plan was devised:

> After the zoological specimens are obtained, their study could be done in the Lisbon museum, to where all duplicates should be sent; only then it will be possible to amass in Loanda [sic] a type collection of all the species found respectively classified. (...)
>
> I can gladly present a more developed and detailed plan with the means I suggest for the zoological exploration of our colonies by national explorers, with seriousness, economy, and all the conditions necessary to secure that the natural products that result from such explorations are not sold or offered to foreign museum instead of enhancing the collections of national scientific establishments.[7]

Bocage replied in a firm tone to the ministry's request and used the opportunity to reinforce the central place of the Lisbon museum. It was one thing to have multiple small-scale museums all over the country and the colonies, but something quite different to have a strong centralising institution in Lisbon and subsidiary ones elsewhere. The fact that Bocage was seemingly available to relinquish the possession of what he called type-specimens possibly simply means that he was ready to send what we call today paratypes.[8]

His reference to special "conditions" expressed Bocage's reaction in the aftermath of Friedrich Welwitsch's scientific exploration of Angola, between 1853 to 1861. When Welwitsch returned to Lisbon he requested to work with the collections in London to have better resources to support his classifications. By 1865, Welwitsch was already for two years in London, and did never return to Lisbon. This was a source of aggravation for some Portuguese naturalists, Bocage included. Bocage was adamant that the zoological exploration sponsored by Portuguese institutions should be made by nationals. As mentioned before, Bocage's program was embedded in a nationalistic agenda and, therefore, nationals should be contracted. In fact, in the same reply letter Bocage suggested a name for the first contracted

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[7] AHMUL/AHMB/Div100. Correspondence (draft) from Bocage to Manuel Jorge d'Oliveira Lima, 1865.07.08. Original text: "Se S. Exª o Sr. Ministro da Marinha e Ultramar quer levar a effeito a projectada fundação d'um museu zoologico em Loanda, parece-me que o que mais convem é começar pelo principio, isto é, escolher pessoa que emprehenda a exploração zoológica regular e successiva d'aquellas interessantíssima região. Obtidos os especimens zoológicos, o estudo d'elles poderia fazer-se no museu de Lisbôa, aonde seriam remettidos os duplicados de todas as requisições que se fizessem e seria possível então, e só então, reunir em Loanda uma collecção typo de todas as espécies encontradas devidamente classificadas. Só deste modo é que no meu entender, se poderá levar a effeito a fundação em Luanda d'um pequeno museu com um pessoal resumido o qual todavia há-de constar pelo menos d'um conservador e d'um preparador. (...) Se a S. Exª o Sr Ministro da Marinha e Ultramar agradasse este meu alvitre, encarregar-me-hia eu com a melhor vontade de appresentar um plano mais desenvolvido e minucioso ácerca do modo por que entendo que deva ser tentada a exploração zoológica das nossas colónias por exploradores nacionais, e com seriedade, economia, e todas as precisas seguranças para que os productos naturaes fructo d'essas explorações, não sejam vendidos ou offerecidos a museus estrangeiros em vez de virem acrescentar as collecções dos estabelecimentos scientificos nacionais."

[8] Paratypes, or syntypes, are specimens that belong to the same set or were collected in the same locality as the type specimen.

Table 3.1 Details, when known, of some of the identified overseas collectors who shipped zoological specimens to the Lisbon museum, between 1860 and 1900.

Colonial territory	Name, *Profession,* Location, years of shipment
Cape Verde & Guinea Bissau	**Manuel Leyguarda Pimenta (ca.1844-1868)**, *Pharmacist*, Cape Verde & Bissau, 1864-1866 **António da Costa Ferreira Borges (?-?)**, *Pharmacist*, Cape Verde & Bissau, 1867-? **Custódio José Duarte (1841-1893)**, *Medical Doctor, Colonial Administrator, Author*, Cape Verde, (?) **Francisco Frederico Hopffer (1828-1919)**, *Colonial Medical Doctor, Author*, Cape Verde, 1873-1876 **Damasceno Isaac da Costa (?-?)**, *Medical Doctor, Author*, Guinea Bissau & Bolama, 1880-?
Angola & Congo	**José de Anchieta (1832-1897)**, *explorer*, Congo, 1864-1865 (and 1866-1897 as *contracted collector*) **Eduardo Augusto de Sá Nogueira Pinto Balsemão (1837-1902)**, *Journal editor, Author*, Gorée Island (Senegal), 1866; Angola, (?) **Francisco A. P. Bayão (1833-1883)**, *Army officer, author*, Duque de Bragança, 1863-1866 **Faustino José de Menna Aparício (1819-1869)**, *Army Engineer, Public Works*, Luanda, Angola, 1860s **Ignacio Teixeira Xavier (?-?)**, *Owner of "Fazenda Equimina,"* Benguella, Angola, 1865-? **João Osmondo Toulson (1832-1873)**, *Trader, Amateur Collector*, Luanda, Angola, 1864-1869
S. Tomé & Príncipe	**Pedro Craveiro Lopes (1834-?),** *Colonial Administrator*, São Tomé, 1863 **Custódio Miguel de Borja (1849-1911),** *Navy, Colonial Administrator*, S. Tomé e Príncipe, 1879
Mozambique	**Alfredo Brandão Cró de Castro Ferreri** (fl.1867-1889), *Army officer, Colonial Administrator, Author*, Angoche, Mozambique,1867 **Valdez** (?-?), *Army officer(?)*, 1867
Goa	**Antonio Roberto Gomes (?-?)**, *Pharmacist, Journal Editor*, Goa, 1863
Macau & Timor	**Raphael das Dores (*fl.*1901-1907)**, *Army, Author*, Timor, 1901

collector in Angola: Francisco António Pinheiro Bayão (1833-1883). Together with Manuel Leyguarda Pimenta (*ca.*1844-1868), a pharmacist in Cape Verde, Bayão was one of the most important collectors shipping zoological specimens to Lisbon in the early 1860s.

In this chapter I will provide an overview of several of Bocage's collaborators in order to provide a characterisation of this group of *occasional collectors*. Secondly, I will go into more detail in the comparison between two of the first correspondents of the museum: pharmacist Manuel Leyguarda Pimenta, working in Cape Verde, and army officer Francisco Antonio Pinheiro Bayão, stationed in Angola. Their colonial careers and eagerness to communicate with metropolitan institutions were, I argue, illustrative of a dynamic colonial network of occasional suppliers of the Lisbon museum.

Administrative demands

> Snake = *Suá-Suá* = is the longest one inside the smaller flask; very long and thin, with a blueish colour (when alive, it is of a beautiful celestial blue). Venomous, with very quick movements = jumps [...] and curls up in trees, from where it springs on those who come near – the bite is not poisonous.[9]

The first recorded description of the *Suá-suá* snake accompanied a shipment from the Portuguese colony of São Tomé in 1869 to the zoological museum in Lisbon. The author was Pedro Craveiro Lopes, an army officer and a former student at the EPL who was, at the time of this shipment, the governor of São Tomé and Príncipe.[10] This excerpt referred to the *Philothamnus thomensis* or the *Suá-Suá*, which was identified as a new species by Bocage in a paper in 1882. Bocage was only able to ascertain this new variety of snake during a revision of the *Philothamnus* genus he made with the materials available in the Lisbon Museum.[11]

The shipment included a report with details not readily available to cabinet naturalists in zoology museums in the nineteenth century, such as behavioural details or the colours of living specimens – these usually faded away by the time they arrived in the museum due to the preparation chemicals used for transport and conservation. The collaboration of skilled collectors in the field was paramount for the development of state-of-the-art research in the

[9] AHMUL/AHMB/DIV 120c [s/d] appended to DIV 120. Correspondence and shipment report from Pedro Craveiro Lopes, 1869.09.08. Original text: "Cobra = Suá-Suá = É a mais comprida que vai no frasco pequeno; m[ui]to comprida e fina, com côr azulada (q[uan]do viva é d'um azul celeste lindo). [É] venenosa, de movimentos m[ui]to rapidos = salta [...] enrosca-se nas arvores, e de lá salta aos que se lhe aproximão – a picada não é venenoza."

[10] Pedro Carlos de Aguiar Craveiro Lopes was a Governor of S. Tomé and Principe from 1869.05.30 to 1872.10.07. He was a student in the EPL during the years 1848-1849, and again in 1863: AHMUL/EPL/LME n.3 f.154 [1848-1849] and LME n.8 f.13 [1863], There were some problems with his governance and he was ordered to move to Timor in 1870, but apparently, he never went. His career was the target of a contemporary defamatory book: Vital de Bettencourt de Vasconcellos Côrte Real do Canto, *Memorandum que esclarece as immoralidades, as torpezas, e os actos illegaes praticadas pelo Governador da Província de S. Thomé e Principe Pedro Carlos de Aguiar Craveiro Lopes* (Lisboa: Typographia Universal, 1871).

[11] José Vicente Barbosa du Bocage, 'Notices sur les espèces du genre «Philothamnus» qui se trouvent au Muséum de Lisbonne,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 9, no. 33 (1882): 11. Original specimen description: "Ile Saint Tomé, rapporté 1863 [possibly a typo for 1869] par Mr. Craveiro Lopes. *Philothamnus Thomensis* (Bocage, 1882)."

museum.[12] Collaborators who gathered variegated specimens from local fishermen, hunters, and merchants, and who themselves managed a little cohort of helpers, were crucial. They should be minimally trained in medical practices of alcoholic preparations of specimens, and have basic knowledge on geology, flora and fauna of the territories where they were stationed. In this case, Lopes had been a student at the EPL, a liberal institution which, as mentioned earlier, ran several scientific institutions which were gaining importance, and whose directors were regarded as key figures of the liberal regime. He was also an army captain who had access to colonial literature and official reports while occupying his colonial post. Lopes' report on the shipment continued:

> Also, in the crate – To be delivered to H. Exc. Mr. An[tonio] Aug[usto] Aguiar, Chemistry Professor – 1 bottle with mineral product. To be delivered to Ministry of Navy – 1 bottle with the same object.[13]

Collecting zoological objects for the museum was also a means to connect with other metropolitan institutions, and since collecting was not a main occupation the time spent with these activities was used as best as possible. In this case, Lopes shipped to Bocage and the Zoological Section of the MNL; to António Augusto Aguiar (1838-1887), the chemistry professor responsible for the Chemical Laboratory at the EPL; and to the Navy Ministry.[14] The collecting activity and the participation in the preparation of shipments from the colonies to Lisbon resulted from a desire to collaborate with the scientific institutions of the metropole.[15]

Although Craveiro Lopes, as many of the collectors mentioned in this chapter, made only few and occasional shipments to the Lisbon museum, he was nevertheless recorded as a collector in S. Tomé in two of Bocage's herpetological papers. In fact, a new species of amphibian native to S. Tomé, *Siphonops thomensis* (Bocage, 1873) was described thanks to the "happy occasion of being found amidst a small collection of reptiles offered to the Museum

[12] See Gordon McOuat, 'Cataloguing Power: Delineating "competent Naturalists" and the Meaning of Species in the British Museum,' *British Journal of History of Science* 34 (2001): 1–28.
[13] AHMUL/AHMB/DIV 120c [s/d] appended to DIV 120. Correspondence and shipment report from Pedro Craveiro Lopes, 1869.09.08. Original text: "Vai mais no caixote – P[ara] ser entregue ao Ex.mo Snr. An[tonio] Aug[usto] Aguiar Lente de Chimica – 1 Garrafa com producto mineral. P[ara] ser entregue ao Ministério da Marinha – 1 garrafa com o m[esmo] objecto."
[14] Within the Ministry of Navy, there was a colonial museum, the Museu Colonial de Lisboa, organised in Lisbon in 1870 by a commission led by Visconde de Paiva Manso, in the building of the Naval School (Escola Naval), Rua do Arsenal. Some of the colonial products amassed there were later a base collection for the museum of the SGL. Possibly the building in Rua do Arsenal was where, even before 1870, products sent from overseas were amassed and stored. See Cantinho, *O Museu Etnográfico da Sociedade de Geografia de Lisboa. Modernidade, Colonização e Alteridade*, 81–97.
[15] A great importance was given to the new methods of analysis of vegetal, animal, and mineral materials, especially when leading to new findings. It was the age of international exhibitions, and many 'new' chemical stuff and compounds were being tested and displayed as industrial solutions.

of Lisbon by Mr. Craveiro Lopes."[16] Even occasional shipments could have relevant scientific results, and Bocage was keen to acknowledge his collectors in order to encourage them to stay engaged.

This type of shipments was, however, not really "offered" as the language of symbolic exchange so typical of natural history trade suggests. Most of these collections of specimens arriving in Lisbon from the colonies brought with them the respective receipts of expenses. The construction of the Portuguese overseas empire had traditionally included a gift economy of natural and artificial products sent by colonial governors to the crown. The distribution of instructions from Lisbon institutions that started in the late eighteenth century assured that curiosities were gradually substituted with systematic collation. Local colonial governors still sent the odd shipment of materials such as a "flask containing the tongue in alcohol of a small harmless animal, similar to the lizard."[17] For the scientific policy of the Lisbon museum such materials were not a priority, and it was up to the director to voice and reinforce the museum's agenda. A type of trade more similar to a barter economy substituted the gift economy of sending artefacts representing the exotic nature and cultures found overseas. Although these new shipments were still described by Bocage as "offers" they were in fact payed by the museum's budget. That barter economy was duly publicised in the notices in the various colonial bulletins accompanying the distribution of the museum's instructions. This practice notwithstanding, seemingly Bocage felt the need to reinforce a perceived relationship of symbolic trade and his scientific papers reaffirmed it. In his effort to engage occasional but constant collectors Bocage even went as far as retributing a successful relationship with honorific honours such as the medal of the Order of Christ, for example.[18] From the point of view of the occasional collectors there was a desire to be regarded as useful to the museum, making sure they corresponded in their epistles to the ideal of the disinterested gentleman.

Even occasionally and outside of the scope of their main occupation, collecting for the Lisbon museum required special procedures. Certain arrangements were required in order to comply with the specialised tasks of specimen preparation. With that in mind, Craveiro Lopes

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[16] José Vicente Barbosa du Bocage, 'Breves considerações sobre a fauna de S. Thomé,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes (2ª Serie)* 1, no. 1 (1889): 34. Original text: "em 1873, tivera eu o feliz ensejo de encontrar n'uma pequena collecção de reptis offerecidos ao Museu de Lisboa pelo sr. Craveiro Lopes, então Governador de São Tomé." Also José Vicente Barbosa du Bocage, 'Mélanges Erpetologiques. sur quelques reptiles et batraciens nouveaux, rares ou peu connus d'Afrique Occidentale,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 4, no. 15 (1873): 209–27. The new species announced, *Siphonops thomensis*, today refers to *Schistometopum thomense*.

[17] AHMUL/AHMB/CN/B 01. Correspondence from Eduardo Augusto de Sá Pinto Balsemão to Bocage, 1865.09.16. Original text: "Um frasco contendo em alcool a lingua d'um pequeno animal inoffensivo, semelhante ao lagarto,"

[18] AHMUL/AHMB/DIV 111. Correspondence from Bocage to the Navy ministry (draft), s/d.

requested Bocage not only the money to cover his expenses with the specimens, but he also insisted on having better, more suitable equipment. He asked for an *almude* (*ca.* 16 litres) of alcohol to restore the quantity he had previously solicited from the local pharmacy; an alembic to distil his own alcohol, and "if that cannot arrive immediately," a second portion of alcohol to get him started in the preparation of a new shipment. He was very particular about some of the dissection instruments and claimed he needed "2 dissection knives, one small, another large; 4 scissors (two straight and two curved); 4 scalpels; [and] a portion of cannisters." [19] He added a note of the "expenses made with the objects [already] sent" with the total amount of 6.000 reis. This expenses receipt differentiated the prices for transport containers, ship's passage, as well as a "payment to the 2 men who captured the [sea] sponges – 2000" and the cost of 800 reis for two of the snakes. He added that "all the rest was offered or collected without expenses."[20] The collectors, too, used the language of the gift to their advantage.

Craveiro Lopes was not a collector of natural history nor an amateur enthusiast. He held a political position in the Portuguese colonies, which had only as a side responsibility the collection, preparation, and shipment to Portugal of local products. His station in the local government compelled him to reply to the many measures taken in previous years to accumulate colonial collections in Lisbon's scientific institutions. Another example concerns Raphael das Dores, who corresponded with Bocage in 1880s. In his introduction letter to Bocage he signed as the "Military Pharmacist commissioned by decree of the Local Government to collect and ship products for the Museum of Lisbon."[21] Dores was indeed part of the commission convened in Timor in 1881 devoted to collecting and classifying the natural products of the district "as a means of publicizing the productive wealth of the colony."[22] Portuguese imperial efforts to use natural sciences to legitimate territorial appropriation started out timidly but increasingly grew in importance and eventually lead to more and more geographical expeditions as the twentieth century approached.

[19] AHMUL/AHMB/DIV 120. Correspondence and shipment report from Pedro Craveiro Lopes, 1869.09.08.
[20] AHMUL/AHMB/DIV 120c [s/d] appended to DIV 120. Correspondence and shipment report from Pedro Craveiro Lopes, 1869.09.08.
[21] This letter was transcribed by Dores in his autobiography, stating his responsibility as museum collector as a means to claim his integrity. Dores, *Como se adquire a fama ou história dum calumniado*, 173-74.
[22] Cited in Ricardo Roque, *Headhunting and Colonialism. Anthropology and the Circulation of Human Skulls in the Portuguese Empire, 1870-1930* (London: Palgrave Macmillan, 2010), 111. Dores was confirmed in this committee, in Macao, in May 8, 1881.

Colonial contributors

Knots in twine. Pimenta, a pharmacist with "untiring zeal"

One of the first results of the publication of the *Instrucções praticas* in the African colonies came from Cape Verde, in 1865. Stationed in the main island of Santiago since 1862, the pharmacist Manuel Leyguarda Pimenta worked in the health division of the province in one of the hospitals in Cidade da Praia, the capital of Santiago, and he was seemingly close to the local governor. In 1863, the year following the shipment of Bocage's *Instrucções praticas* to every colonial government, there was a directive that appointed Pimenta as the responsible for the collection of specimens for a future natural history museum that was projected in Santiago. In 1865, his commission was changed to "responsible for the collection of natural history products for the national museum," extending his reach from the local projected museum to the national museum.[23] Pimenta was an engaged and ambitious young man who made great efforts in maintaining a relationship with the metropole's scientific institutions.

The Cape Verde official bulletin shows that Pimenta was most of the time engaged with side projects of governance of the island encompassing its administration and cultural and scientific representation. He was part of the commission to organise Cape Verde's participation in the 1865 Industrial Exhibition in Porto, among other appointments in technical commissions in the islands. On top of his duties, and at least since 1864, Pimenta was also an active collaborator of the Meteorological Observatory Infante Dom Luiz, located in the Polytechnic School in Lisbon. Pimenta's work for the Observatory is mentioned in the annual reports for the year 1864 as the only post "currently in exercise and prepared for climate studies" within the African colonies. Pimenta received from Lisbon sets of instruments and instructions on how to use them and how to fill in the standardised meteorological data. The daily observations and monthly deliveries of information kept him in close ties with Lisbon. Pimenta also published in the official bulletin of the local government of Cape Verde a list of all the natural history products he collected from the islands of Cape Verde and coast of Guinea, and shipped to the Lisbon museum during the year of 1865, with mention of local names, localities and observations on each species.[24]

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[23] *Boletim Official da Provincia de Cabo Verde*, Nº 24 (supplemento) 1866.05.01, Portaria 101, p. 83. Original text: "Pharmaceutico do Quadro da Provincia e encarregado de colligir productos de historia natural para o Museu Nacional,"

[24] Manoel Leyguarda Pimenta, "Relação dos Productos de Historia Natural das Ilhas de Cabo Verde e Costa da Guiné, colligidos e remettidos ao Museu Nacional de Lisboa durante o anno de 1865." *Boletim Official do Governo Geral da Provincia de Cabo Verde*, 3 (1866): 10-11 (1866.01.20).

In order to comply with the instructions of the Lisbon museum, collectors in the archipelago were asked to contact the museum for more information but also for the monetary means they needed to acquire the natural objects. Pimenta corresponded with Bocage between 1865 and 1866 sending in this period several shipments of zoological specimens, both alive and prepared. In October 1865, along with the specimens sent, he also drafted a report on the habitat, behaviour and common usage of some of the molluscs, reptiles, and insects he collected. Although his first shipments are unsystematic and do not follow any plan, with the addition of this eight-page report Pimenta aims to distinguish himself from any other amateur collector. He was clearly aiming at a different, and higher, social status than the one he had as a pharmacist. He is keen to show himself as an irreplaceable node in Bocage's network of collaborators.

> I will make all diligences to gather the most specimens for the Lisbon museum. I have already some. From Bissau I got some snakes I will send on the first steamer coming from the south.[25]

To achieve this, he repeatedly instigated Bocage to commission him to travel to Guinea (present day Guinea Bissau), so that he could be of service to the Lisbon museum, following the governor's next visit to the African coast. Before the opportunity to collect in Bissau, which happened in January 1866, Pimenta made the acquaintance of a French taxidermist, Beaudouin, who lived in Bissau and travelled to Santiago to recover from arsenic poisoning.

> It is much convenient that I go to [Guinea] soon due to the poor physical state of the preparator [Beaudouin] who may well very soon pass on to a better life; he is a powerful help for the acquisition and preparation of specimens. I hope he will not charge me too much for his preparations for I had already the opportunity to pay him favour in these islands.[26]

Pimenta mediated between Bocage and the taxidermist, who is portrayed as crucial to purchase a Guinean collection. He insisted with Bocage and wrote again only two weeks later boasting about reptile and bird collections, and how the French taxidermist had a rare Guinean

[25] AHMUL/AHMB/CN/P014. Pimenta (Cidade da Praia, Cabo Verde) to Bocage, 1866.03.15. Original text: "Farei toda a diligencia para alcançar maior numero d'exemplares para o Museu de Lisboa. Tenho já alguns. Recebi de Bissau algumas cobras que mandarei no primeiro vapor que vier do sul."

[26] AHMUL/AHMB/CN/P013 (1866.01.14). Original text: "Há toda a conveniencia em que a minha ida àquella possessão não seja demorada, pelo mau estado physico do preparador que pode brevemente passar à melhor vida, e é elle um poderoso auxiliar para a acquisição e preparação dos exemplares. Espero que elle não levará caro pelas preparações porque n'estas ilhas tive occasião de o obsequiar."

ram for sale. In the end Bocage authorised a transaction and Pimenta acted as the official go-between for the museum of Lisbon in Cape Verde.[27]

> Take Guinea under your scientific protection; it is a very rich country for science and yet unexplored. What a variety in birds! Such quantity and beauty! The river birds are in thousands and of every colour and size.[28]

When Pimenta finally went to Guinea as an official delegate for the Lisbon museum he stayed there for a whole month. He wrote Bocage that in Guinea he felt like a "charlatan," acting as a medical doctor, seeing patients and "the visits were payed for with animals." Keenly aware that his status as pharmacist was considered lower than that of a medical doctor Pimenta mocked the situation: "I was most glad; some doctors will not even receive animals [as payment]."[29]

> Tin n.2 Contains fishes numbered by knots in twine. The specimens marked with singular units only have one long end of the twine, and the knot that goes around the animal should not be tallied. The specimens with higher numbers have two twine ends, the shorter one indicating the tens' place.[30]

In order to accommodate as many specimens as possible in the same shipment and to assure safer transport, many cases and jars were full to the brim. For fish specimens in fluid preservatives the *Instrucções praticas* directed only to "tie a piece of parchment with the corresponding number," and this should be attached with a piece of twine to the extremity of the tail."[31] Evidently, localised field conditions did not always offer the best materials and equipment and Pimenta substituted the parchment tag with a system of knots in twine. This is yet another example of his general creativity and entrepreneurship. In fact, the 1854 edition of the Paris natural history museum mentioned the alternative knotting system when metal plates

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[27] AHMUL/AHMB/CN/P014. Correspondence from Pimenta (Cidade da Praia, Cabo Verde) to Bocage, 1866.03.15. A note in Bocage's handwriting says "Replied April 2. Authorised to spend up to 80$000 qith the purchase of some Guinean birds and reptiles from preparator Baudouin," in the original Portuguese: "Respond[ida] em 2 d'abril. Auctorisei que gaste até 80$000 com a compra d'alg[umas] aves e reptis da Guiné ao prep[ara]dor Baudouin."

[28] AHMUL/AHMB/CN/P016. Correspondence from Pimenta (Cidade da Praia, Cabo Verde) to Bocage, [1866].04.05. Original text: "Na Guiné vi-me na necessidade de ser charlatão: vi doentes, e as visitas foram pagas com bichos. Fiquei satisfeitíssimo; há medicos que nem bichos recebem. [...] Agora ainda outro pedido. Tome a Guiné debaixo da sua protecção pelo lado scientifico; é um paiz riquíssimo para a sciencia e ainda nada explorado. Que variedade de pássaros! Que quantidade e que belezas! As aves ribeirinhas são aos milhares de todas as cores e grandezas."

[29] AHMUL/AHMB/CN/P016. Pimenta (Cidade da Praia, Cabo Verde) to Bocage, [1866].04.05.

[30] AHMUL/AHMB/CN/P010. Pimenta (Cidade da Praia, Cabo Verde) to Bocage.

[31] Bocage, *Instrucções praticas*, 35. Original text: "A cada exemplar se atará um pedacinho de pergaminho com o numero que lhe corresponde na relação ou catalogo que deve acompanhar a remessa: esta etiqueta deve prender-se com um cordel à extremidade da cauda."

or parchment was not available. A little twine with knots could be used attached to objects preserved in fluid or dried in boxes. These knots "should be arranged into two series separated by an interval: the first series for the tens, and the second for the ones' place."[32] Pimenta's alternative is even clearer – a short end and a longer end of the twine indicated the different series of knots, instead of using "an interval" to distinguish between them. It is unclear whether Pimenta had access to any other booklets of instructions when in Cape Verde, or even earlier in Madeira, however published instructions were the result of decades of practice and practitioners and a reflection of standardised commonplace techniques.

Due to his early demise helping with an outbreak of yellow fever in the islands, Pimenta never met Bocage in person, and never achieved a larger role as collector. In his place, some years later, another medical worker Francisco Hopffer (1828-1919) was to carry on Pimenta's role in Cape Verde as an important node in Bocage's network of colonial collaborators.

The "indefatigable" Bayão

Francisco António Pinheiro Bayão (1833-1883) was the first collector in Angola whose shipments to Lisbon were scientifically prominent. Two specimens sent by Bayão were the basis for the first naming, description, and publication of new African species by the Lisbon museum. In 1864 Bocage proposed a new frog, the *Rana Bragantina*, in the *Revue et Magasin de Zoologie*.[33] And in 1865 Bocage described yet a new species, also a new genus, with the generic name *Bayonia* in an attempt to "perpetuate our tribute of acknowledgement for the services rendered to the Museum of Lisbon and to science by the indefatigable explorer, Mr. Lieutenant Bayão!"[34] Both these species were proposed against previous descriptions of fauna from the region.

Bayão's engagement with zoology and natural history stopped after 1866, but he never ceased to demonstrate his position regarding Portuguese colonial policies. He was an activist journalist who wrote on colonial affairs, and in 1875, wrote a personal report to Marquis de Sá

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[32] Muséum Royal d'Histoire Naturelle, *Instructions pour les voyageurs et les employés dans les colonies, sur la manière de recueillir, de conserver et envoyer les objets d'histoire naturelle*, 4th ed. (Paris: A. Sirou, Imprimeur-Librairie, 1854), 67. Original text: "On peut encore attacher aux objets conservés dans la liqueur, et à ceux qui sont dans les caisses et bien secs, une petite ficelle avec des nœuds. Ces nœuds forment deux séries séparées par un intervalle : la première série marque les dizaines, la seconde marque les unités ; et par ce moyen on peut indiquer tel numéro que l'on veut."

[33] José Vicente Barbosa du Bocage, 'Note sur un nouveau batracien du Portugal «Chioglossa Lusitanica» et sur une grenouille nouvelle de l'Afrique Occidentale «Rana Bragantina»,' *Revue et Magasin de Zoologie*, no. 16 (1864): 248.

[34] José Vicente Barbosa du Bocage, 'Sur quelques mammifères rares ou peu connus, d'Afrique Occidentale, qui se trouvent au Museum de Lisbonne,' *Proceedings of the Zoological Society of London*, 1865, 404. The new species was the *Potamogale velox*, or the Giant Otter-Shrew, see the next chapter for a full account of the early stages of its description and naming process.

da Bandeira denouncing a situation of veiled slavery in the *roças* of São Tomé.[35] In 1875, he was one of the founders of the Geographical Society of Lisbon, and in 1881 he was governor of the Mozambique province of Tete and participated also in the Geographical Society of Mozambique, created in the same year. He died back in Lisbon in 1883.

Bayão went to Africa in the context of his military career and duties. His first colonial positions were in Angola and Mozambique. In 1861, he was for the second time in Luanda, Angola, and contacted the meteorological observatory in Lisbon. The observatory was one of the research facilities in the EPL and was, just as the Zoological Section, in charge of producing scientific information and research. Its first directors were interested in the reliable production of "uninterrupted series of comparable observations" and in establishing a "meteorological league" of collaborating observatories.[36]

While shipping to Lisbon and corresponding with Bocage, in December 1863, Bayão was sent to prison for accusing a local governor of abusing black people. After the Sá da Bandeira anti-slavery laws the colonial context in Angola was politically hot due to the old behaviours of corruption and abuse of power still possible by a lax regime. Bayão was an active journalist with the periodical local press and was punished for his engagement with liberal anti-slavery ideals. As a result, Bayão was sent to prison and stayed in house arrest and deprived of court-martial rights for over two years. He was deployed to the fortress of Duque de Bragança (today Kalandula Falls, in Malange) and started collecting from the Angola hinterland regions.

> I don't see how to preserve these animals other than with alcohol, those that go in it haven't lost their colours much and will maybe arrive in a good state. I thought to paint them with gum arabic, since I lack any varnish, but the colours faded either way.[37]

As a collector Bayão was inventive and dedicated, and sometimes even creative. He collected often with impressive results, both in quantity and quality. When the time came, Bocage tried to persuade Bayão to stay in Angola, no longer in the army career but rather as the first contracted "explorer-naturalist" of the renewed Zoological Section of the MNL. Bayão declined the offer claiming he felt too weak from the hardships he had endured in prison, and suggested the name of his friend José de Anchieta, who later became the most prolific contributor of the museum (see chapter 6).

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[35] AHM/DIV/3/18/01/04/209, Fundo Sá da Bandeira Cx1717.
[36] Joaquim Henriques Fradesso da Silveira, 'Introduction,' *Annaes do Observatorio do Infante D. Luiz* 1 (1863): v–viii.
[37] AHMUL/AHMB/CN/B019. Correspondence from Bayão to Bocage, 1863.06.07.

Certainly, Bayão's shipments contributed greatly to the commencement of the African collections at the Museum of Lisbon. However, his main influence was imprinted on their future development due to his suggestion of José de Anchieta as the first permanent field naturalist who could systematically collect in the Angolan hinterland. Anchieta became indeed the most important collector and the counterpart to Bocage's work in Lisbon.[38]

As it turned out, Bayão recovered, and while back in Lisbon, between 1874 and 1876, he was very active and engaged with new projects. But his passion was not natural history. This was already clear earlier, when, he wrote to his friend the naturalist Félix Brito Capelo.

> I warn you that I want to find many books at my disposal to make up for lost time and appreciate your good will to hear me regarding certain projects of applied mechanics !!! of which I bring my mind full.[39]

Bayão's involvement in political life in Angola continued in Lisbon. The mechanical projects Bayão alluded to in his letter possibly correspond to two projects, one for a precision instrument and the other for a locomotive system. In the meetings of the SGL, of which he was a founding member, as said above, he was one of the first to offer newspaper clippings of articles on the colonisation of Angola, published by himself, in Luanda. And he was also the first to propose an oral paper, which he gave on a project for a new instrument, "Analytical scales for the verification of terrestrial gravity."[40] The year before, Bayão submitted an application for a patent of a system of steam-based transportation that would not need tracks to run on, a "Portable Railway."[41] He published his proposal in French, and the drawings of his locomotion invention were presented in 1876 as part of the Portuguese representation at the Philadelphia International Exhibition.[42] After this brief stay in Lisbon, Bayão went back to Africa on several colonial commissions.

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[38] See chapter 4 for more details on the first contracted naturalist to work with Bocage, José de Anchieta.

[39] AHMUL/AHMB/CN/B020. Correspondence from Bayão to Bocage, 1863.10.11. Bayão thought at that time that he was returning to Lisbon soon. Original text: "Previno-te de que quero achar à m[inha] disposição m[uitos] livros, p[ara] me indemnizar do tempo perdido, e m[uita] boa vontade da tua parte p[ara] me ouvires em certos projectos de mecanica !!! applicada, de que levo a cabeça cheia."

[40] The 'Balança Analytica para verificação da variação da gravidade terrestre' paper was presented May 15, 1876 'Sessão Em 15 de Maio de 1876,' *Boletim da Sociedade de Geografia de Lisboa*, 1876, 39–46.

[41] AHMOP/Conselho Superior das Obras Públicas e Minas /Pareceres-Consultas/Caixa 18 (1874-1875), Consulta-Parecer Nº6544, 1875.04.22. I wholeheartedly thank Hugo Pereira for helping me access this document.

[42] An analysis and further context of Bayão's steamer-machine invention and its imperial context was presented in the conference paper: Catarina Madruga and Sílvio Correa, 'Techno-Scientific Utopia and Imperial Expansion,' *ICOHTEC*, 2016. Manuscript copy of the patent request on the military individual process of Francisco Bayão, Arquivo Histórico Militar, Lisboa. The project was also exhibited in the 1876 Philadelphia International Exhibition, 'Description of a Project for a Portable Railroad, with Lithographic Designs,' *International Exhibition 1876 Philadelphia – Portuguese Special Catalogue*, 1876, 81.

To "assure the authenticity of the specimen"

> From this location [Duque de Bragança] I believe that no museum in Europe has received any authentic specimens, except when I intervened.[43]

In 1866, in the first volume of the new scientific journal promoted by the Lisbon Academy of Sciences, the director of zoological section of the Lisbon museum published the museum's first lists of its collections which were formed by the first, and recently obtained, shipments from Portuguese Africa. The museum's first two listings identified 82 species of reptiles (of which 18 considered new), and 183 species of birds.[44] All these earlier additions to the museum's collections were due to individual contributions from afar. To ensure participation and maybe engage more colonial collaborators Bocage wrote in the first list that "each specimen will mention the name of the person who shipped it to us."[45] By naming individual collectors with the specimens in the Lisbon museum's collections Bocage, and the other museum naturalists, payed their due acknowledgements to outside collaborators and entered into a symbolic gift economy with them. Mentioning collector's names in taxonomical listings is manifold: while it acknowledges work outside the museum's walls it also reinforces the museum's own authority. Bocage continued:

> By doing this we aim not only to assure the authenticity of the specimen but also to encourage the discoverer with esteem and acknowledgement for his due part. [46]

The museum was also using the collector's names as a substitute for provenance, or "authenticity." Although problems of control over collaborators in the distant overseas could arise, and there were many reasons to distrust collectors, in this case the Lisbon museum depended on the growing network of the imperial administration for its national museum project.[47]

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[43] José Vicente Barbosa du Bocage, 'Lista dos reptis das Possessões Portuguezas d'Africa Occidental que existem no Museu de Lisboa,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 1, no. 1 (1866): 38.

[44] Bocage, 'Lista dos Reptis'; José Vicente Barbosa du Bocage, 'Aves das Possessões Portuguezas d'Africa Occidental que Existem no Museu de Lisboa. Segunda Lista,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, no. 1 (1867): 324–39.

[45] Bocage, 'Lista dos Reptis.' This paper was published by Bocage in the first number of the new scientific journal of the Lisbon Academy of Sciences. The introduction notes can be read as a continuation of his 1865 yearly museum report Bocage, *Relatorio [1865]*.

[46] Bocage, 'Lista dos Reptis,' 39. Original text: "Com isto não tivemos só em vista assegurar a authenticidade do specimen, mas attrahir ao doador a estima e o reconhecimento (...)."

[47] Many collectors tried to sell their exotica collections to museums who turned out to be fraudulent. In Africa some collectors in the coast would receive specimens from the hinterland and therefore possibly identified their provenances incorrectly. Jim Endersby has shown also how Hooker struggled with Kew's collectors' ambitions at naming new species themselves. Hooker struggled because some of his collectors had ambitions regarding their contribution to natural history at large. They saw and

The Lisbon museum needed specimens of "authentic" provenance, and collectors were instructed to adequately provide local of capture, season, etc.[48] What was most important was geographical provenance for the scientific agenda was biogeography or animal distribution studies. The usage of the concept of "authentic" in Bocage's papers with regard to his occasional collectors is revealing. In the same review paper mentioned on the *Philothamnus* genus, when discussing geographical distribution of the *Suá-Suá* snake, or the *P. thomensis*, Bocage stated:

> Habitat[ion]: All the individuals that we were able to examine, which had an authentic provenance, are from the S. Tomé island; only one specimen which did not possess any indication of locality – it was part of a small collection sent from Angola belonging to an amateur, Mr. Toulson, former businessman in Luanda - but which he most probably received from S. Tomé.[49]

Habitat, or habitation, in Bocage's work was a crucial data set for the geographical distribution of fauna, and not related to our modern use of the ecological term.[50] The phrase "authentic provenance" is of the utmost importance for it encapsulated the whole reason to maintain as many colonial collectors as possible. The specific fixed locations of colonial administrators, officials or pharmaceuticals, who were not travellers nor explorers, was what created the possibility of "authentic provenance" for the Lisbon museum's collections and what made them most valuable.

> The indigenous names of *C[ausus] rhombeatus* vary according to localities: *Quimbanda* in S. Salvador (Bishop of Himeria); *Quimbolo-bolo* in Cassange (Capelo and Ivens); *Bandangila* in Caconda and *Cucuta* in Quindumbo (Anchieta).[51]

In this example, of many in the *Herpétologie,* Bocage associated local nomenclature with localities and the collectors in those localities. In this way, the collectors in the field acted as a

represented themselves as participants in the progress of science. Jim Endersby, *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* (Chicago and London: University of Chicago Press, 2008).

[48] Which not necessarily happened, availability of information was not constant.

[49] José Vicente Barbosa du Bocage, 'Notices sur les espèces du genre «Philothamnus» qui se trouvent au Muséum de Lisbonne.' Jornal de Sciencias Mathematicas, Physicas e Naturaes 9, no. 33 (1882): 1–19, p.12. Original text: "Habitat.: Tous les individus que nous avons pu examiner, ayant une provenance authentique, sont originaires de l'Ile Saint Thomé; un seul spécimen ne portant pas aucune indication de localité faisait partie d'une petite collection rapportée d'Angola, mais ayant appartenu à un amateur, M. Toulson, ancien negociant à Loanda, qui l'aurait reçu très probablement de l'Île Saint-Thomé."

[50] Notions of habitat were not yet related with the general concept of *ökologie* created by Karl Möbius in Germany Lynn K. Nyhart, *Modern Nature. The Rise of the Biological Perspective in Germany* (Chicago and London: The University of Chicago Press, 2009). nor with the French notion of *millieu* Raf de Bont, 'Organisms in Their Milieu. Alfred Giard, His Pupils, and Early Ethology 1870-1930,' *Isis* 101, no. 1 (2010): 1–29. which were developed decades later.

[51] José Vicente Barbosa du Bocage, *Herpétologie d'Angola et du Congo.* (Lisboa: Imprensa Nacional, 1895), 146. Original text: "Les noms indigènes du C. rhombeatus varient suivant les localités: *Quimbanda* à St. Salvador (Évêque d'Himeria); *Quibolo-bolo* à Cassange (Capelo et Ivens); *Bandangila* à Caconda et *Cucuta* à Quindumbo (Anchieta)."

validation for locale also through the information gathered on local identification. Local, or indigenous, names were important data for subsequent collecting efforts, and could help distinguish between species. There seems to be a connection established between the different types of data collected and the collector who also represented locality. Without geographical knowledge of the terrain, the Lisbon museum's collections were not as valuable. Many times, the collector was an amasser and not the collator of the specimens and the animals could have been purchased in a central settlement without actually belonging there. Toulson, for example, living in the capital Luanda was able to gather collections of specimens to send to Lisbon. When his specimens didn't have any provenance information, Bocage was willing to accept them only provisionally. Thus, although considered a useful supplier to the museum many of Toulson's specimens in *Herpétologie* appear as having "no precise indication of locality."[52] Toulson is an example of an amateur collector, and he possessed his own collection in Luanda of ethnographical and natural history specimens. After Toulson's death his collection was offered to the Lisbon museum by António do Nascimento Pereira Sampaio, who had married Toulson's widow, and also had held administrative positions in Angola and Cape Verde.[53]

The location of the Portuguese administration's colonial network provided the potential for the collections in the MNL to gain weight as research collections. Their juxtaposition with the provenance localities of the African collections in the museum was no coincidence. The effective presence of Portuguese men interested in collecting and shipping natural history products to Lisbon was a tenuous but serious manifestation, from the 1860s onward, of the colonial machine at work.

Like Craveiro Lopes, Pimenta, or Bayão, many others enrolled as collectors prompted by their positions in the colonial structure, as physicians or pharmacists, as army or navy officers and government representatives, or as journalists, missionaries, and entrepreneurs. Their main interest was *not* natural history. The collectors included in this chapter may be described as *occasional* collectors for they have all made but occasional shipments to the Lisbon museum. They were not officially contracted by the museum, and they were not collectors of natural history outside of their temporary responsibilities to ship products to the museum. They normally only made shipments from one of their locations in the colonies, and in a specific

[52] Bocage named a new species of frog after Toulson in 1867, *Hyperiolus Toulsonii* (Bocage, 1867), syn: *Rappia Toulsonii* (Bocage, 1895). Today the species is synonimised with *H. parallelus*. See Mariana P. Marques et al., 'Diversity and Distribution of the Amphibians and Terrestrial Reptiles of Angola. Atlas of Historical and Bibliographic Records (1840-2017),' *Proceedings of the California Academy of Sciences*, 4, 65 (2018): 90.

[53] António Roberto Pereira Guimarães, 'Lista dos peixes da Ilha da Madeira, Açores e das possessões portuguezas d'Africa, que existem no Museu de Lisboa. Supplemento,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 9, no. 33 (1882): 30–39. Original text: "Coll. Toulson, offerecido pelo sr. Pereira Sampaio em janeiro de 1882."

time frame. Some received a copy of the 1862 *Instrucções praticas* and had been commissioned by the colonial local government as "collectors of the local natural history products" to the Lisbon museum. Others had possibly also been students at the liberal EPL, and even met Bocage previously as a professor. Word of mouth prompted others directly in the colonies to contact the Lisbon museum. News about the instructions and about the interest of the Lisbon museum in receiving shipments of animals spread and, as a tonic for the overwhelming feeling of colonial boredom, provided a sure way to maintain contact with the metropole, and its institutions. Directly or indirectly they were responding to Bocage's plea to "study what is ours."[54]

In the initial period of constitution of the museum's collections Bocage maintained a support and implicit trustworthiness of the work done outside the museum's walls. As such, many details mentioned by the collectors were incorporated directly into the scientific papers. For Bocage, these collectors' credibility was grounded on their positions as part of the government colonial structure. Also, because they presented no challenge to the authoritative voice of the museum, they did not question the hierarchies of knowledge production, and thus were not a difficulty for the museum nor for Bocage. On the contrary they were a fundamental asset. Bocage had no reason to distrust their efforts or good faith. And so, he didn't.

Occasional collectors often had generic training in natural history provided in the EPL, army and navy schools, and medical schools. Surgeons and the medical professions were obviously apt to handle the skilful preparations and preservatives formulae. Being a pharmacist, Pimenta had access to a particular set of skills, and a familiarity with materials and instruments of taxidermy and conservation. Pickling required large amounts of alcohol, but also glass jars or metal containers. And the wax, or other sealing agent, with which to properly secure lids and to stop the alcohol solution from evaporating during the ocean voyage. There was also a need to have good contacts among the ship's captains since not all were comfortable with the task of transporting closed boxes to Lisbon. For the most part, they never met with each other. Nevertheless, they established a longstanding relationship with Lisbon and the museum.

> [The] zoological products of the included listing are not nor could they have been well prepared since I do not have any jars, fluid preparation

[54] See chapter 1. Quote from the museum's 1865 report: Bocage, *Relatorio [1865]*, 8.

> or conservations, adequate instruments and lastly, [I do not have] authorisation to spend the budget needed to acquire said products [55]

These were the preoccupations of the collectors since they were very rarely the actual shooters, fishers, root pickers, stone lifters, carriers, porters, etc. The collation of natural history objects, before the era of field stations was very heavily reliant on socially diverse people who were obscured by the specific workings of eighteenth and nineteenth century scientific practices. The examples of phrases such as "was brought to me" or "the fishermen caught them" point to the mediating role of many of the said *occasional collectors*. They were mostly *amassers* of materials, becoming themselves recognised locally as centripetal centres of attraction acting as the museum's representatives. These *collectors* were in fact local accumulation nodes which stockpiled information and specimens by locally brokering natural knowledge. Central to their engagement were the many tasks involved in the process of circulation of natural objects, paying the fishermen or other collators; inscribing known data on each specimen when possible; naturalising the specimens with the proper tools and materials; paying for those tools and materials; accommodating collections to be shipped by land and/or sea; contacting local authorities and ship captains; and, finally, maintaining correspondence with the museum in Lisbon.

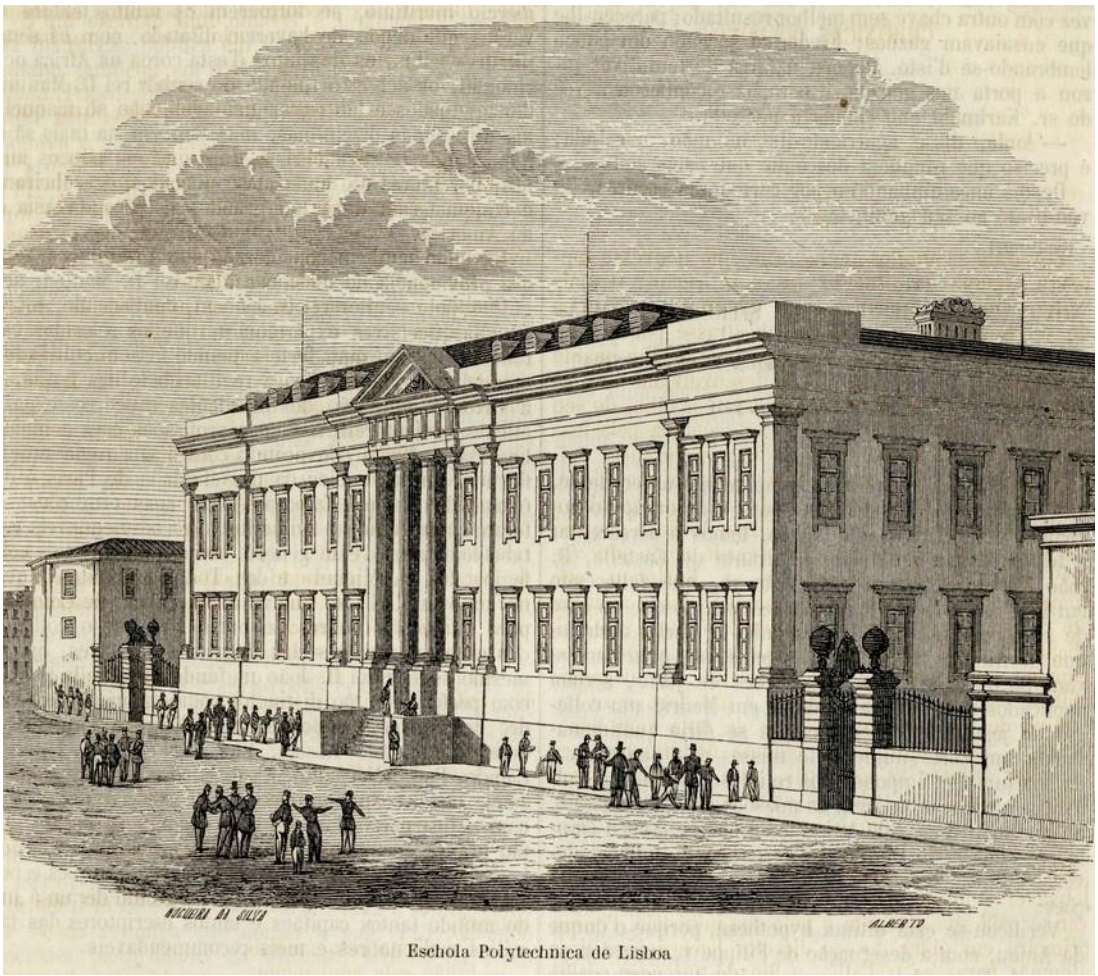
In sum, occasional collectors did not display typical behaviour of amateurs of natural history. From their point of view, their main duty was the collaboration with the liberal institutions in the metropole. Many were authors of extensive and published reports on acclimation, phytosanitary conditions, geographical (orography, hydrography, cartography) descriptions, or army strategies of diplomacy for the areas. So their expertise as colonial officers was often recognised as such. Many, from higher social backgrounds, were local governors of provinces, and fulfilled many other important roles in the overall colonial administration.

Most were engaged in the colonial administrative structure of the Portuguese empire, and many authored reports, books, and contributed to the betterment of the colonial regime in their own way. As journalists, secretaries of specific official committees and even as authors of reports on specific issues, they shared a common expertise derived from serving in the colonies. Many of them travelled between colonies and were promoted to different official positions.

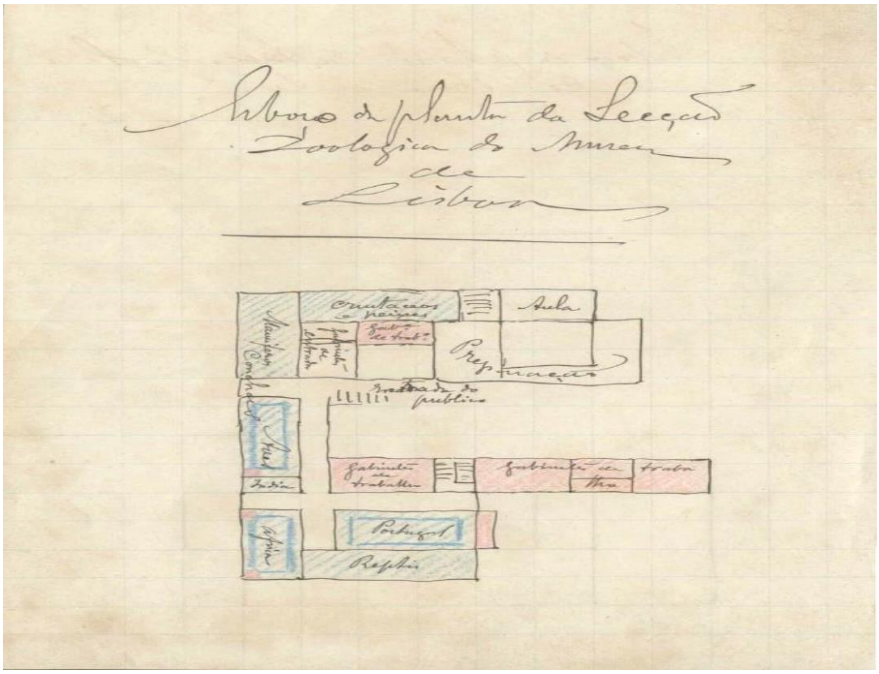
[55] AHMUL/AHMB/Div174. Shipments records from Damasceno Isaac Costa (Guinea), 1880. Original text: "os productos zoologicos da relação inclusa nao sao nem podiam ser devidamente preparados visto eu nao possuir frascos, liquidos, preparadores concervadores, instrumentos apropriados e por ultimo authorisacao para despender a quantia precisa para fazer a acquisição dos mesmos productos."

Some were already governors or were to be future governors, and they were in different measures close to the power structures. This did not mean they were not critical of it, as the case of Bayão exemplifies.

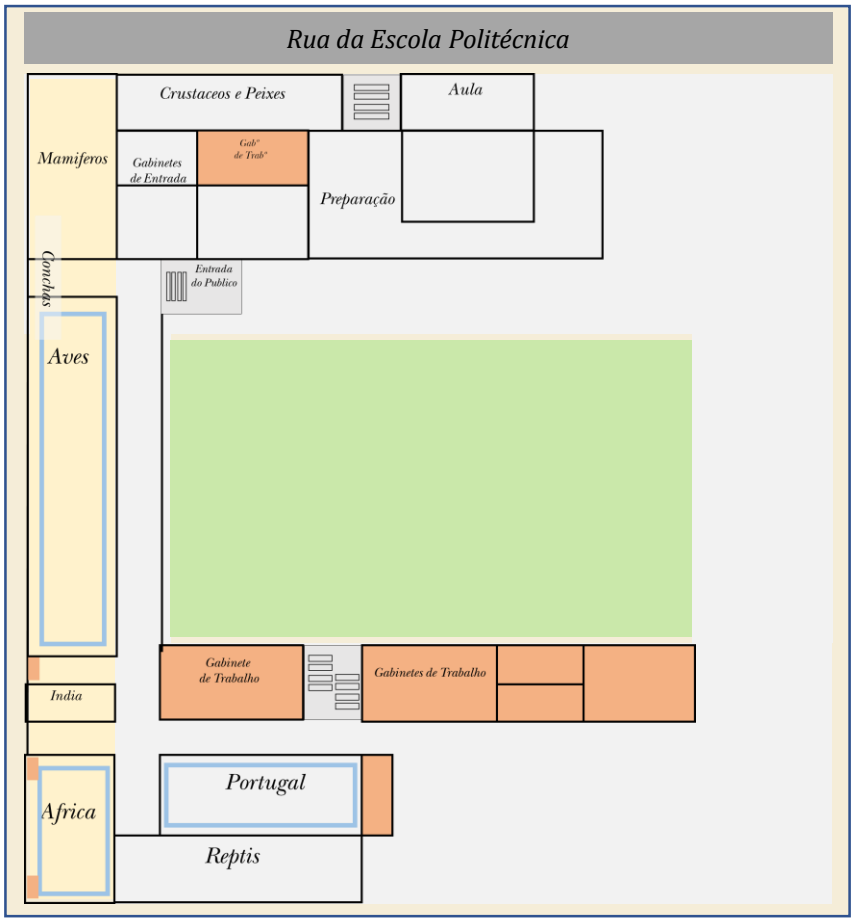
1.1. ***Embossed emblem of the Zoological Section of the Museu Nacional de Lisboa.***
Source: AHMUL/AHMB/Div451, copy of the 1862 regulation (my photo).



1.2. ***Engraving "Eschola Polytechnica de Lisboa."***
Published in "Noviciado dos Jesuitas no Sitio da Cotovia, Collegio dos Nobres, Eschola Polytechnica II" (1863) Archivo Pittoresco, 6(34), pp. 270–271, p.269. The Zoological Section museum occupied the whole second floor of the east wing, visible in the image.
Online source: Hemeroteca Digital



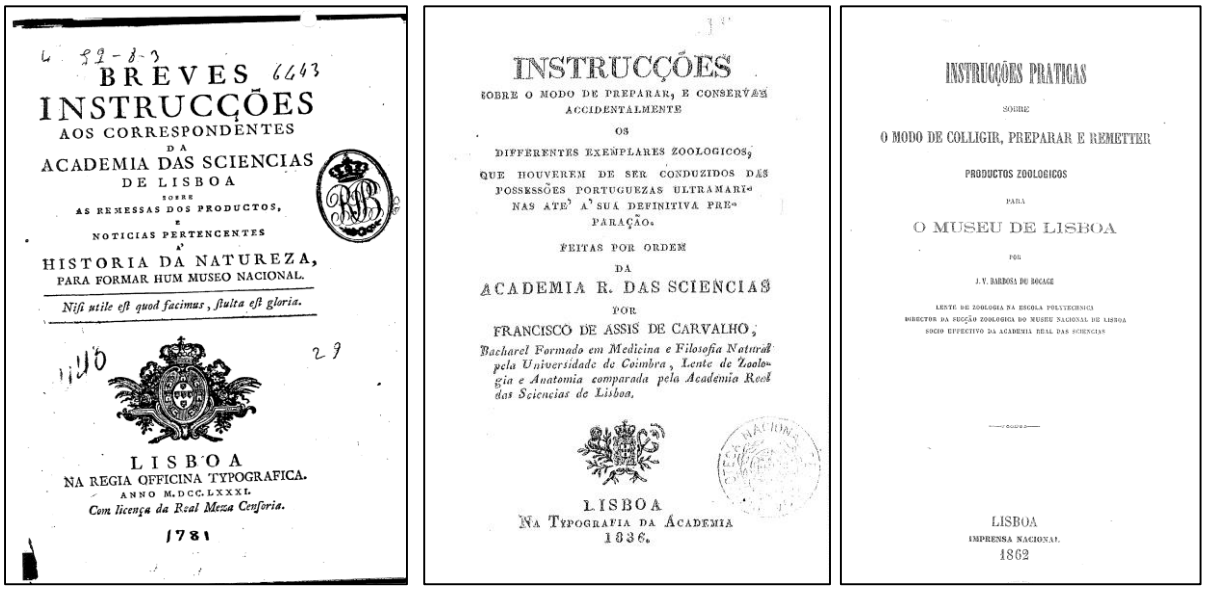
1.3. *Francisco de Arruda Furtado's drawing of the floorplan of the Zoological Section of the MNL.*
Source: AHMUL, Arruda Furtado, "Esboço da planta da Secção Zoologica do Museu de Lisboa," ca. 1883.



Key:
Crustaceos e Peixes = Crustacea and Fish
Aula = Classroom
Mamiferos = Mammalia
Gabinetes de Trabalho = Offices – workspaces
Gabinetes de Entrada = Front Office
Preparação = Preparation / Taxidermy
Entrada do Público = Public Entrance (from the School)
Conchas = Shells
Aves = Birds
India = Indian fauna
Africa = African fauna
Portugal = Portuguese fauna
Reptis = Reptiles

EPL Building
Offices - workspaces
Exhibition rooms
Second floor balcony
Courtyard
Street

1.4. ***Diagram adapted from Arruda Furtado's draft, drawn to scale.***

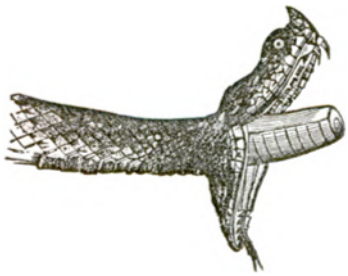


BREVES
INSTRUCÇÕES
AOS CORRESPONDENTES
DA
ACADEMIA DAS SCIENCIAS
DE LISBOA
SOBRE
AS REMESSAS DOS PRODUCTOS,
E
NOTICIAS PERTENCENTES
Á
HISTORIA DA NATUREZA,
PARA FORMAR HUM MUSEO NACIONAL.
Nisi utile est quod facimus, stulta est gloria.
LISBOA
NA REGIA OFFICINA TYPOGRAFICA.
ANNO M.DCC.LXXXI.
Com licença da Real Meza Censoria.
1781

INSTRUCÇÕES
SOBRE O MODO DE PREPARAR, E CONSERVAR ACCIDENTALMENTE
OS
DIFFERENTES EXEMPLARES ZOOLOGICOS,
QUE HOUVEREM DE SER CONDUZIDOS DAS POSSESSÕES PORTUGUEZAS ULTRAMARINAS ATÉ Á SUA DEFINITIVA PREPARAÇÃO.
FEITAS POR ORDEM
DA
ACADEMIA R. DAS SCIENCIAS
POR
FRANCISCO DE ASSIS DE CARVALHO,
Bacharel Formado em Medicina e Filosofia Natural pela Universidade de Coimbra, Lente de Zoologia e Anatomia comparada pela Academia Real das Sciencias de Lisboa.
LISBOA
NA TYPOGRAFIA DA ACADEMIA
1836.

INSTRUCÇÕES PRATICAS
SOBRE
O MODO DE COLLIGIR, PREPARAR E REMETTER
PRODUCTOS ZOOLOGICOS
PARA
O MUSEU DE LISBOA
POR
J. V. BARBOSA DU BOCAGE
LENTE DE ZOOLOGIA NA ESCOLA POLYTECHNICA
DIRECTOR DA SECÇÃO ZOOLOGICA DO MUSEU NACIONAL DE LISBOA
SOCIO EFFECTIVO DA ACADEMIA REAL DAS SCIENCIAS
LISBOA
IMPRENSA NACIONAL
1862

2.1. ***Covers of Portuguese instruction manuals***
(from left to right) Published in 1781, 1836, and 1862.
Source: BNP



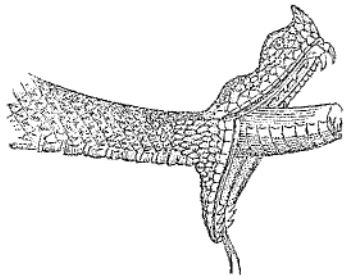
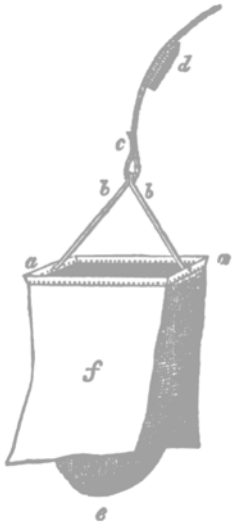


Fig. 2



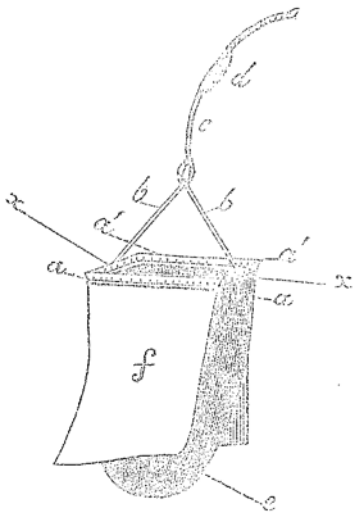
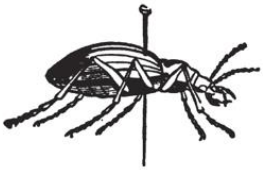


Fig. 3

Fig. 1.



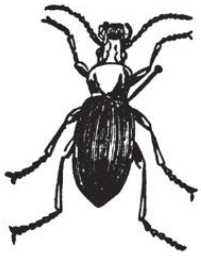
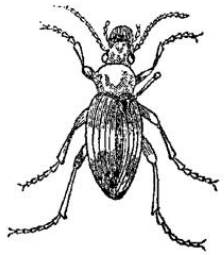
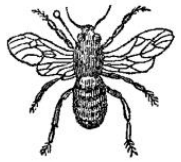


Fig. 2.





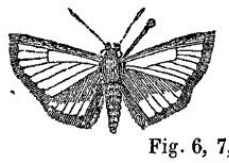
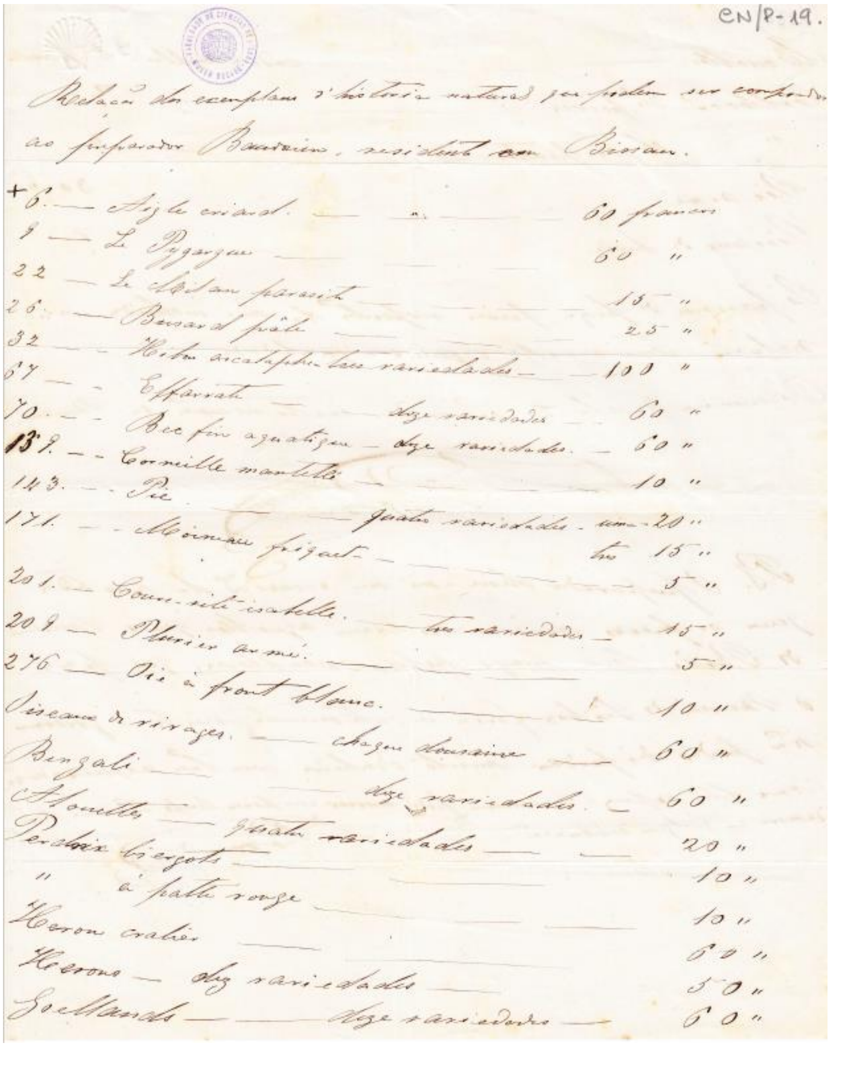


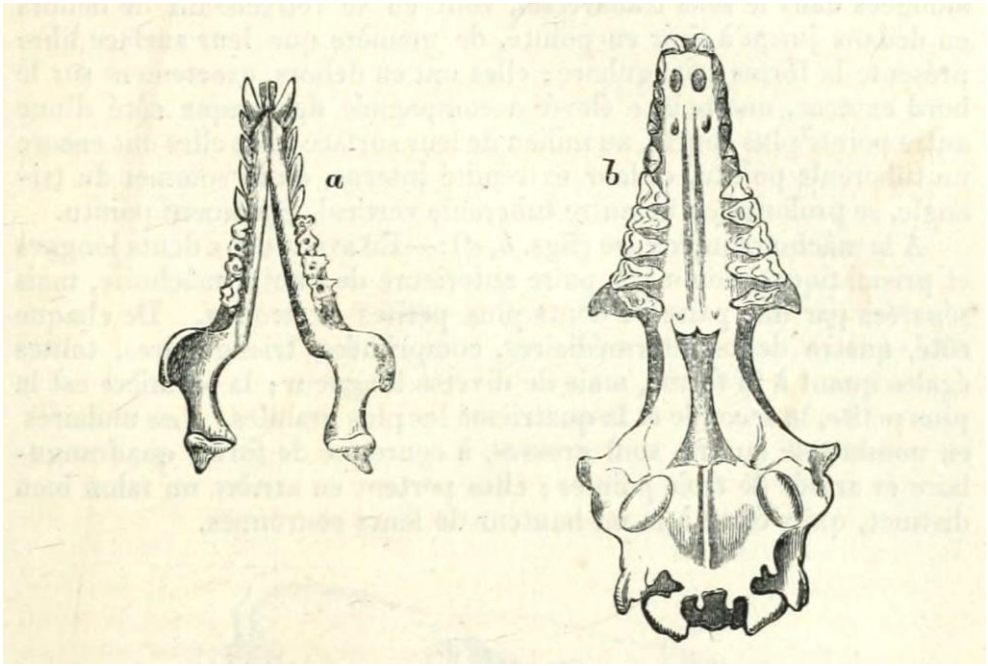
Fig. 6, 7, 8 e 9

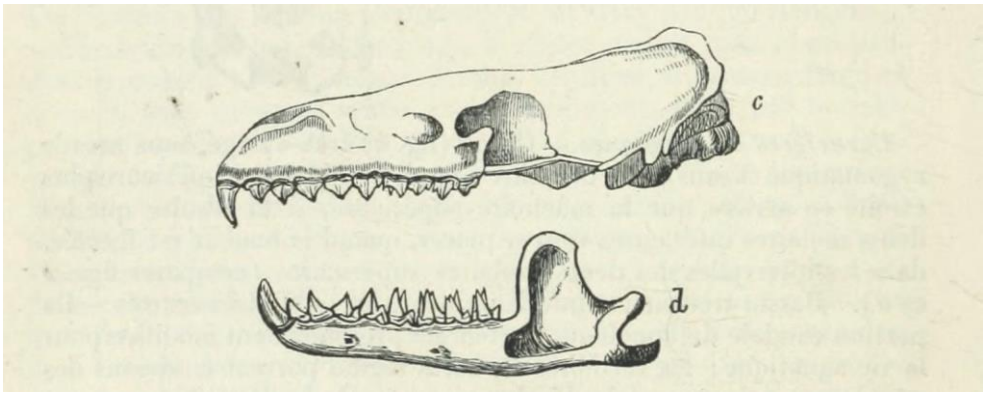
2.2. ***Comparison between diagrams.***
(left) Baird's instructions, 1859
(right) Bocage's Instrucções praticas, *1862.*



3.1. ***List of specimens on sale from preparator Baudouin, in Guinea***.
Source: AHMUL/AHMB/CN/P019, 1866.

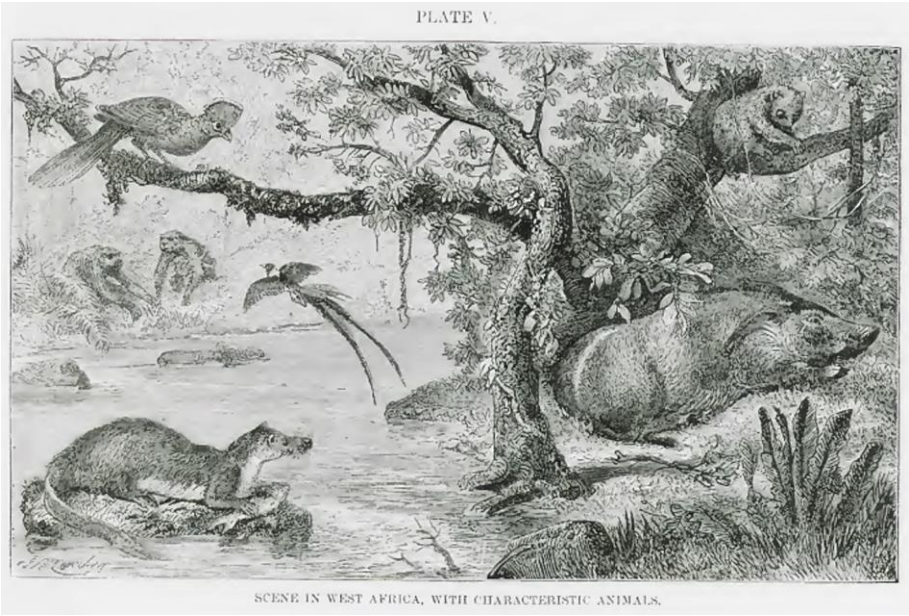
4.1. ***Giant Otter-Shrew specimen, Museum of Zoology, University of Cambridge***.
This Giant Otter-Shrew specimen was captured by Dr. Adrian Friday.
Online source:
https://animalbytescambridge.wordpress.com/2013/04/19/west-african-otter-shrew-potamogale-velox/





4.2. *Bocage's* Bayonia velox.
(top and centre) Illustrations of Bocage's 1865 paper in Proceedings of the Zoological Society of London*; (bottom) Plate in the 1865 memoir.*
All illustrations were signed by Felix Brito Capelo.
Online source: BHL

4.3. *Allmn's* Potamogale velox.
Plate II in Allman's memoir, depicting the riverain animal with its tail partially submerged indicating its aquatic behaviour.
Online source: BHL



4.4. *"Scene in West Africa, with characteristic animals"*
Plate V in Alfred Wallace, The Geographical Distribution of Animals, Vol. 1. *1876.*
Online source: BHL

A JOURNEY

TO

ASHANGO-LAND:

AND FURTHER PENETRATION INTO EQUATORIAL AFRICA.

By PAUL B. DU CHAILLU,

AUTHOR OF 'EXPLORATIONS IN EQUATORIAL AFRICA.'

Potamogale Velox. Mythomys of Gray.

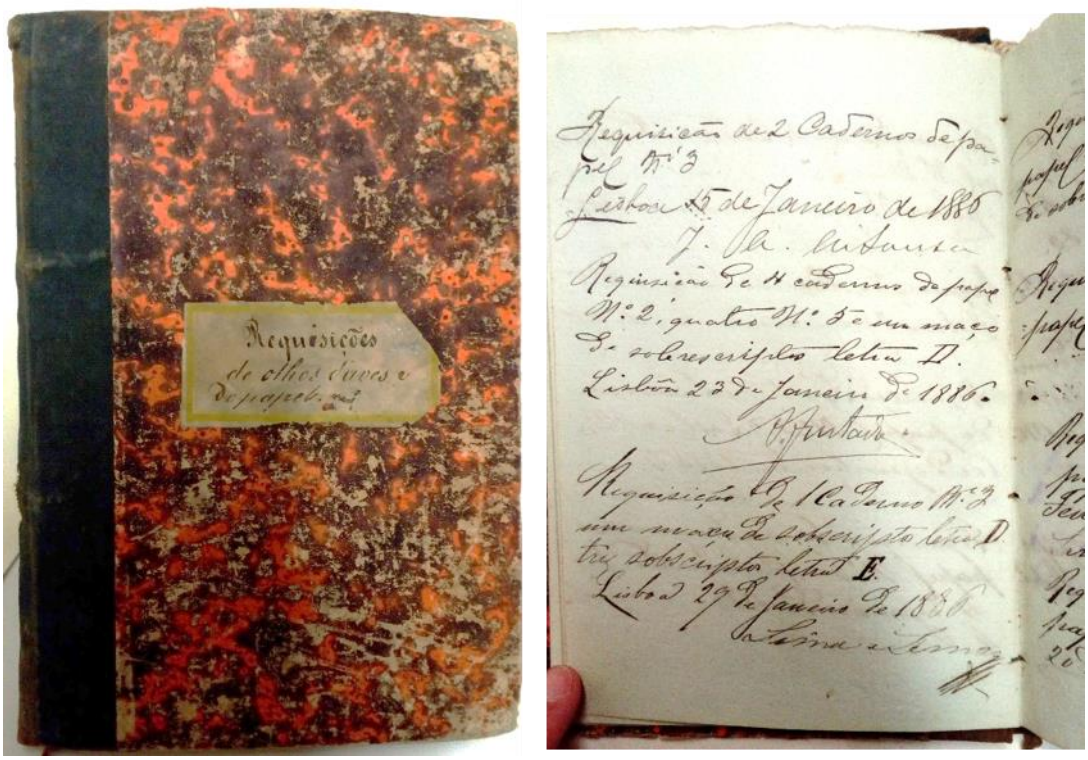
WITH MAP AND ILLUSTRATIONS.

LONDON:

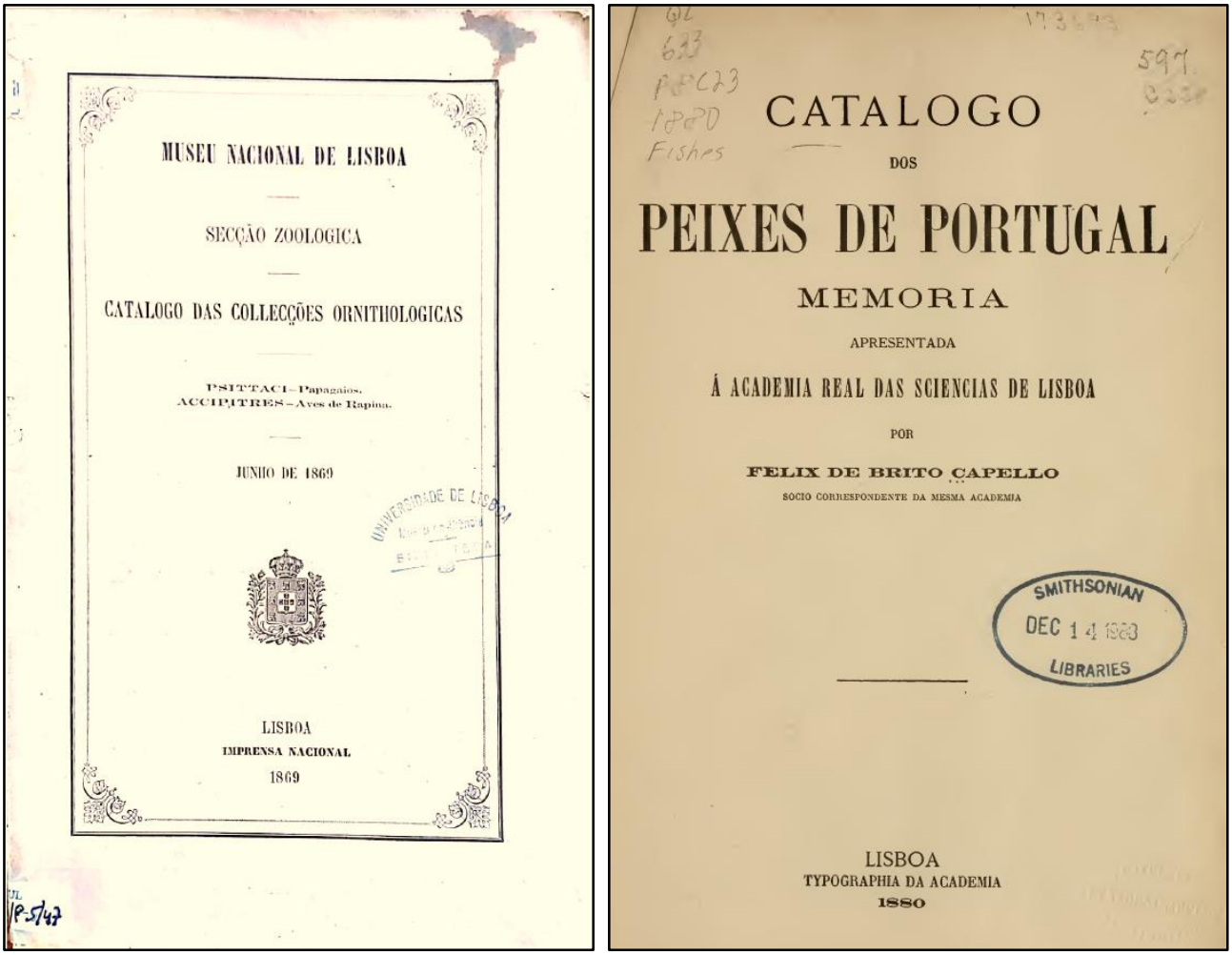
JOHN MURRAY, ALBEMARLE STREET.

1867

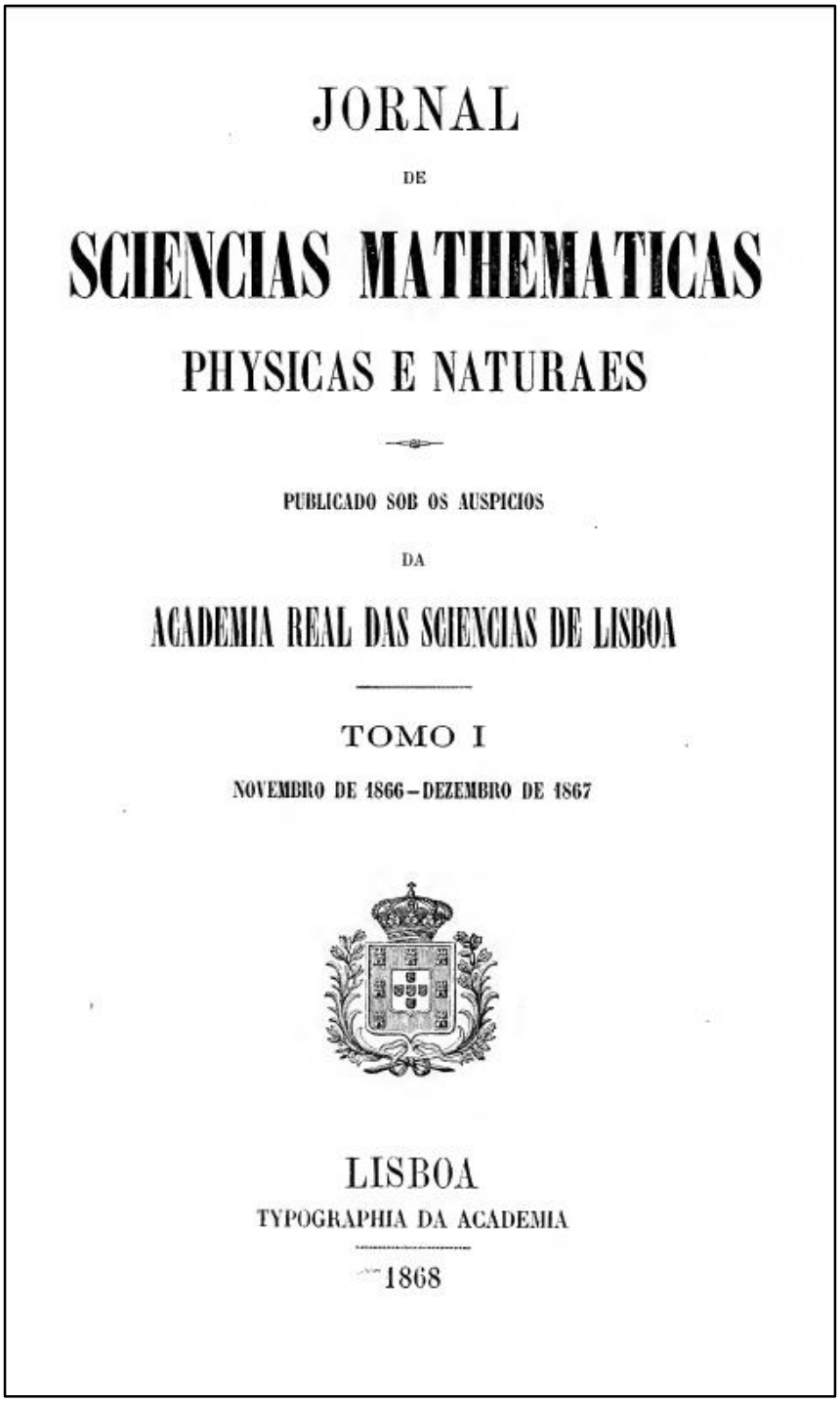
4.5. ***Cover of Du Chaillu's 1867 book.***
Du Chaillu's second attempt to catch the Potamogale is described in the text and featured in the cover illustration.
Source: BHL



5.1. ***Notebook of requisitions for bird's [glass] eyes and paper.***
Cover and January 1886 page.
Source: AHMUL/AHMB/Div223, "Requisições de olhos d'aves e de papel"
(my photo).



5.2. ***Covers of museum catalogues.***
(left) Ornithological collections, 1869; (right) Ichthyological collections, 1880.
Source: Library of the Museu Nacional de História Natural e da Ciência; and BHL (online)



JORNAL

DE

SCIENCIAS MATHEMATICAS

PHYSICAS E NATURAES

PUBLICADO SOB OS AUSPICIOS

DA

ACADEMIA REAL DAS SCIENCIAS DE LISBOA

TOMO I

NOVEMBRO DE 1866 – DEZEMBRO DE 1867

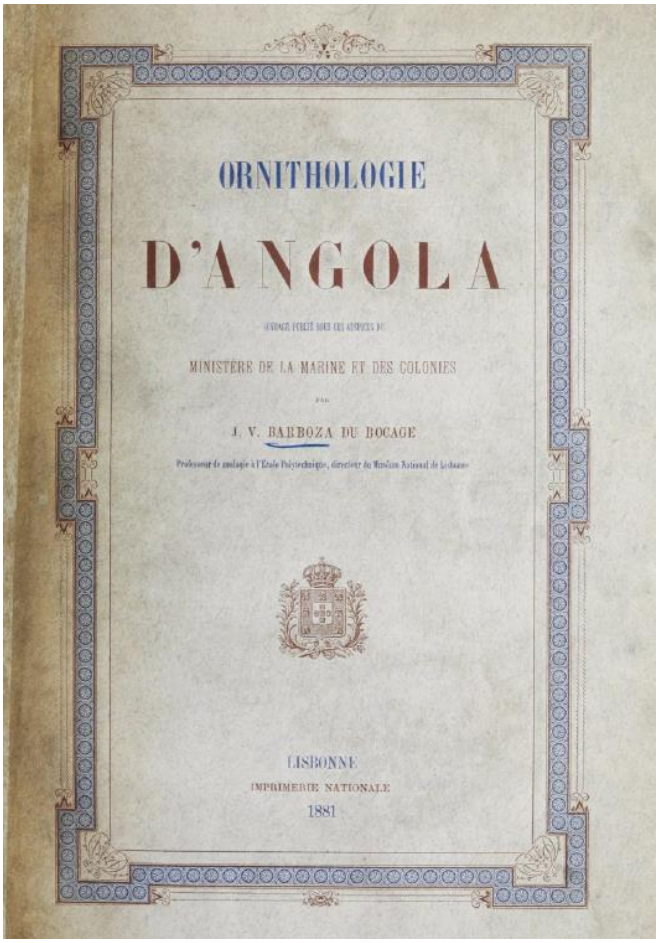
LISBOA

TYPOGRAPHIA DA ACADEMIA

1868

5.3. Jornal das Sciencias Mathematicas, Physicas e Naturaes.
Cover of the first volume.
Online source: BHL

6.1 *Rose-Coloured Map.*
"Mappa d'Africa indicando as Estações civilisadoras portuguesas em projecto", appended to Sociedade de Geographia de Lisboa, Ao Povo Portuguez, *1881.*
Source: BNP



ORNITHOLOGIE

D'ANGOLA

PUBLIÉE SOUS LES AUSPICES DU

MINISTÈRE DE LA MARINE ET DES COLONIES

PAR

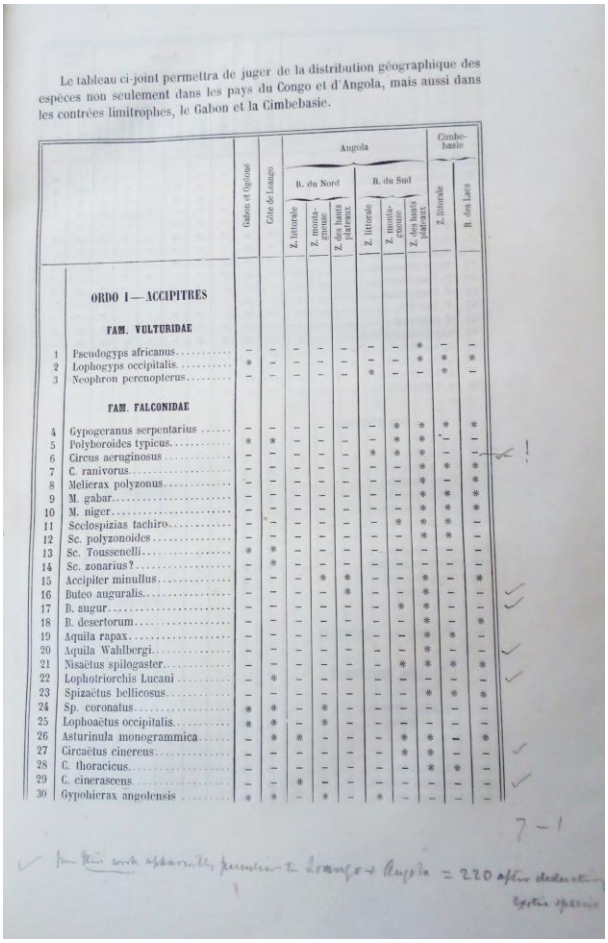
J. V. BARBOZA DU BOCAGE

Professeur de zoologie à l'École Polytechnique, directeur du Musée National de Lisbonne

LISBONNE

IMPRIMERIE NATIONALE

1881

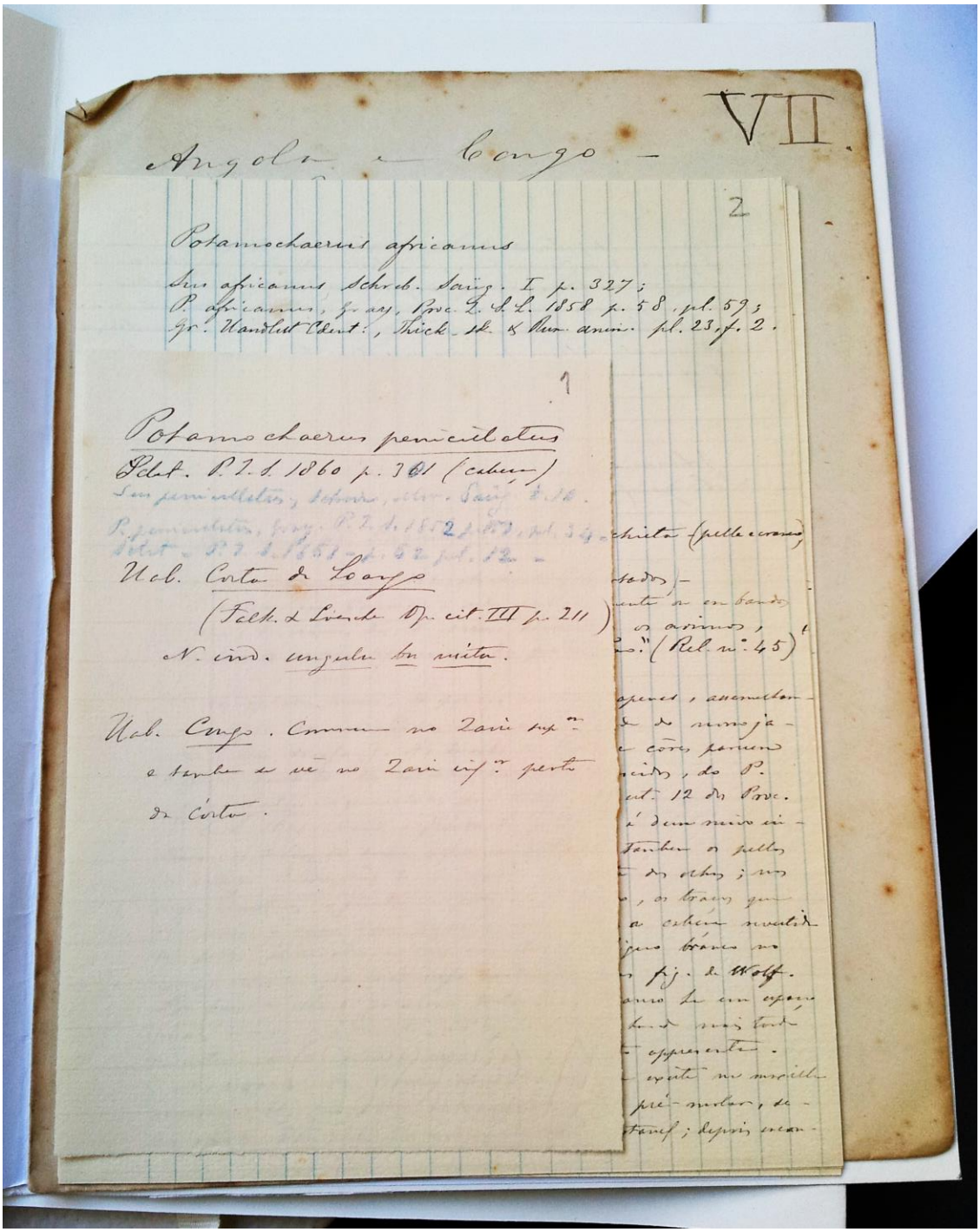


Le tableau ci-joint permettra de juger de la distribution géographique des espèces non seulement dans les pays du Congo et d'Angola, mais aussi dans les contrées limitrophes, le Gabon et la Cimbebasie.

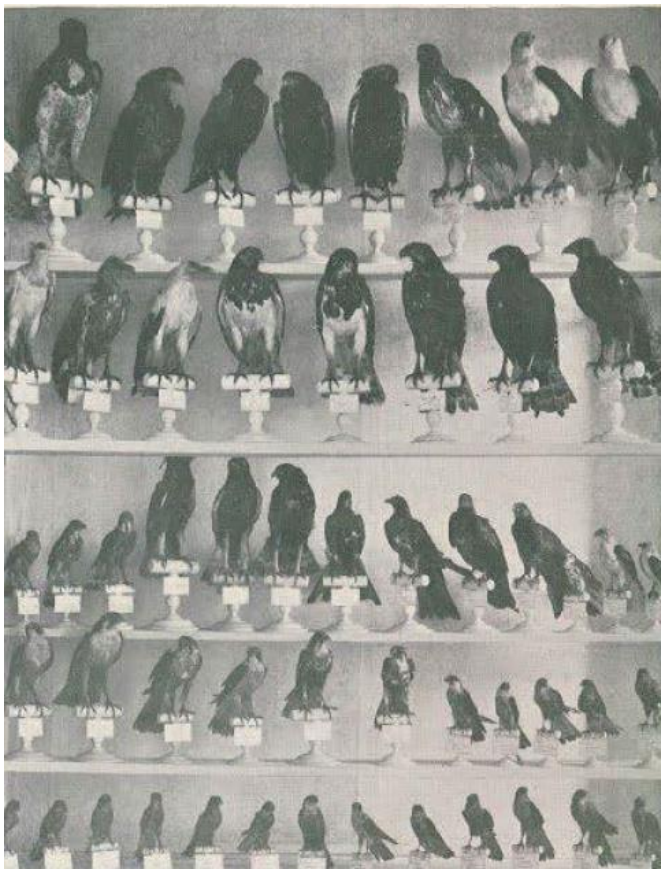
		Gabon et Ogôoué	Côte de Loango	Angola						Cimbebasie	
				B. du Nord			B. du Sud				
				Z. littorale	Z. monta-gneuse	Z. des hauts plateaux	Z. littorale	Z. monta-gneuse	Z. des hauts plateaux	Z. littorale	R. des Lacs
	ORDO I — ACCIPITRES										
	FAM. VULTURIDAE										
1	Pseudogyps africanus	–	–	–	–	–	–	–	*	–	–
2	Lophogyps occipitalis	*	–	–	–	–	*	–	*	*	*
3	Neophron percnopterus	–	–	–	–	–	*	–	–	–	–
	FAM. FALCONIDAE										
4	Gypogeranus serpentarius	–	–	–	–	–	–	*	*	*	*
5	Polyboroides typicus	*	*	–	–	–	–	*	*	–	–
6	Circus aeruginosus	–	–	–	–	–	*	*	*	–	*
7	C. ranivorus	–	–	–	–	–	–	–	*	*	*
8	Melierax polyzonus	–	–	–	–	–	–	–	*	–	*
9	M. gabar	–	–	–	–	–	–	–	*	*	*
10	M. niger	–	–	–	–	–	–	–	*	*	*
11	Scelospizias tachiro	–	–	–	–	–	–	*	*	*	–
12	Sc. polyzonoides	–	–	–	–	–	–	–	*	*	–
13	Sc. Toussenelli	*	*	–	–	–	–	–	–	–	–
14	Sc. zonarius?	–	*	–	–	–	–	–	–	–	–
15	Accipiter minullus	–	–	–	*	*	–	–	*	–	*
16	Buteo auguralis	–	–	–	–	*	–	–	*	–	–
17	B. augur	–	–	–	–	–	–	*	*	–	–
18	B. desertorum	–	–	–	–	–	–	–	*	–	*
19	Aquila rapax	–	–	–	–	–	–	–	*	*	–
20	Aquila Wahlbergi	–	–	–	–	–	–	–	*	–	–
21	Nisaëtus spilogaster	–	–	–	–	–	–	*	*	*	*
22	Lophotriorchis Lucani	–	*	–	–	–	–	–	–	–	–
23	Spizaëtus bellicosus	–	–	–	–	–	–	–	*	*	*
24	Sp. coronatus	*	*	–	*	–	–	–	–	–	–
25	Lophoaëtus occipitalis	*	*	–	*	–	–	–	–	–	–
26	Asturinula monogrammica	–	*	*	–	–	–	*	*	–	*
27	Circaëtus cinereus	–	–	–	–	–	–	*	*	–	–
28	C. thoracicus	–	–	–	–	–	–	–	*	*	–
29	C. cinerascens	–	–	*	–	–	–	–	–	–	–
30	Gypohierax angolensis	*	*	–	*	–	*	–	–	–	–

7 – 1

6.2. ***Alfred Newton's copy of*** **Ornithologie d'Angola,** ***1881.***
(left) Coloured cover; (right) annotated first page of the geographical distribution table.
Source: Newton and Balfour Library, Department of Zoology, University of Cambridge (my photos).

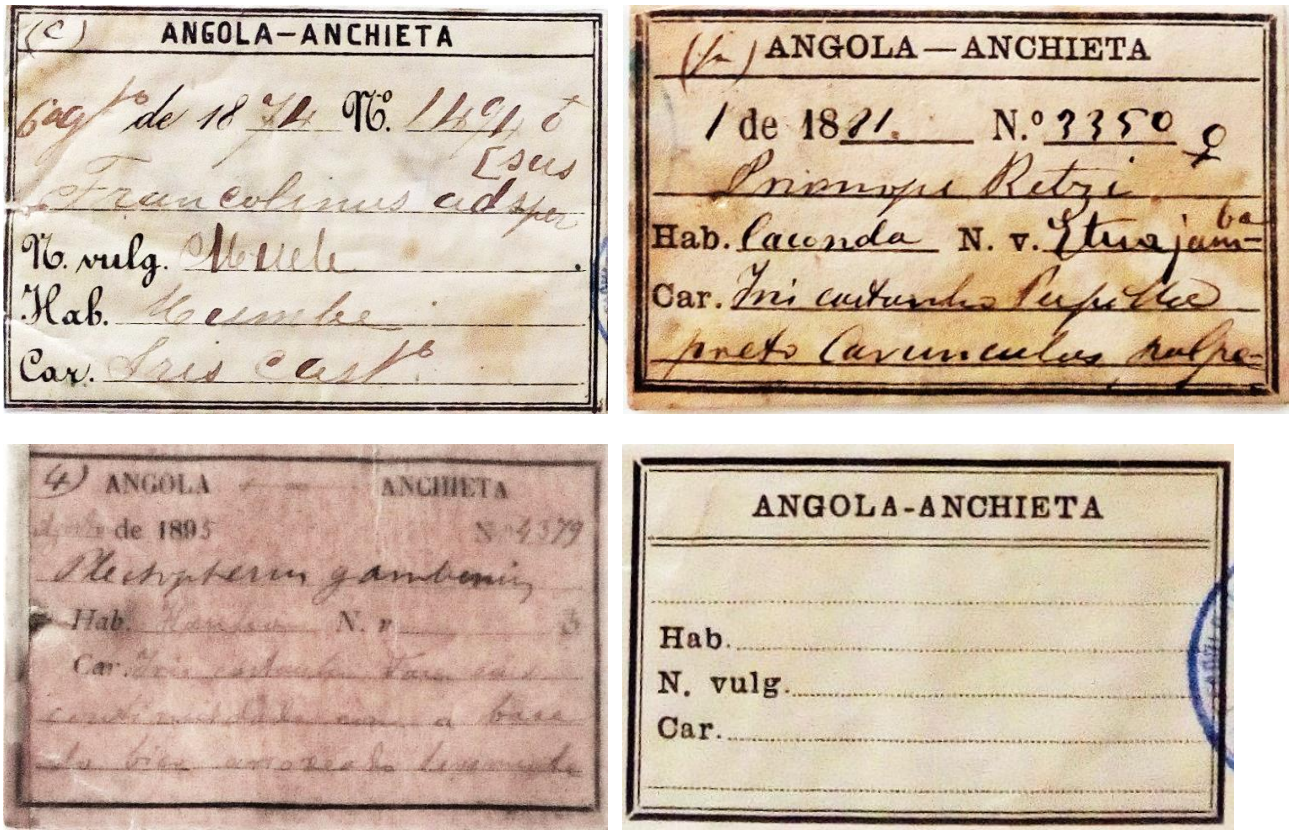


6.3. ***Manuscript index cards for "Mammifères d'Angola et Congo."***
*Example of one of the envelopes (VII), a species sheet (*Potamochoerus africanus*), and draft paper slip. Photo taken after preventive cleaning, accommodation in new archival folders and identification.*
Source: AHMUL/ AHMB Barbosa du Bocage, former "Não Identificados" folder (my photo).

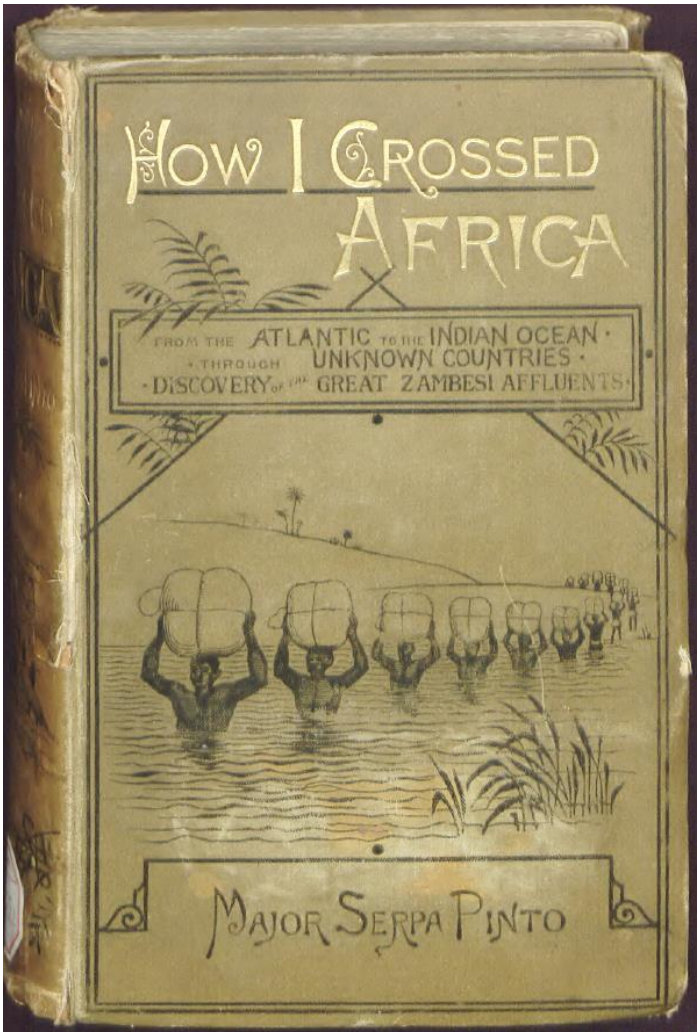


6.4. *Photographs of the Angola Room.*
(above) "Um aspecto da sala que contem as colecções de Angola, no Museu Bocage"; (below) "Aves de Angola: um aspecto da collecção tipica na respectiva sala do Museu Bocage."
Source: Hemeroteca de Lisboa
Armando da Silva "Um grande sábio portuguez J. V. Barbosa du Bocage", *Illustração Portugueza*, 1907, N.94, pp.737-744, images from photographies reproduced in pages 741 and 742, possibly by photographers António Novaes or Joshua Benoliel.

6.5. ***Sample illustration for*** **Ornithologie d'Angola.**
Drawn and litographed (and possibly coloured) by ornithological illustrator John Gerrard Keulemmans. Corresponds to Plate X of the printed work.
Source: AHMUL/AHMB/Div 147 (my photo).

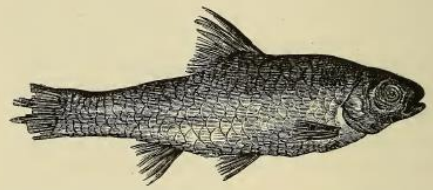


6.6. ***Museum specimen labels printed especially for Anchieta's shipments.***
Preserved in the archive as evidence of specimens traded or loaned to other museums, or as printing samples.
Source: AHMUL/ AHMB/ Rem077 (my photos).



modes of appreciation in the old country, where the possession of a splendid beard might perhaps assist its owner to aspire to the post of a sapper, but would not help him up higher in the social scale.

At noon, the appearance of the *abba* (alta-azimuth) for the determination of the meridian altitude, caused a perfect sensation; nor was the astonishment of our little crowd of spectators less excited on view of the magnetic needle, the pencil, paper, and calculus; every article in turn gave rise to questions and discussions. The singular thing about the negro is, that when he sees an object for the first time, although he has no notion of what it

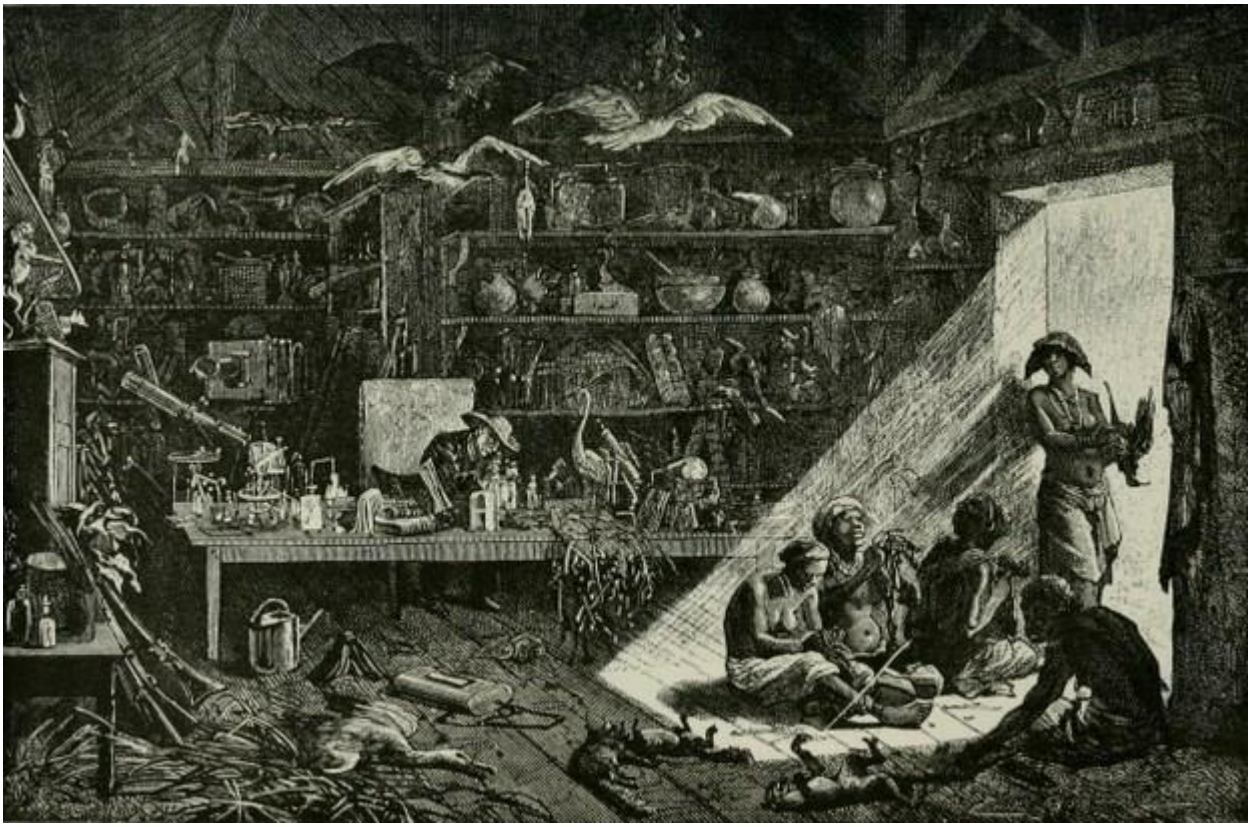


OLOCHI (BARBUS KESSLERI, STEIND.). FISH OF THE RIVER CALAE.
(*Photo. from Nature.*)

means, he nevertheless ventures forthwith to explain it. And it is amusing to find how ready he is with an explanation. On one occasion, for instance, we were exhibiting a small musical box to a native, who, without more ado began to describe it to his fellows. We quietly asked the expositor how it was that the instrument played without any one touching it. He grinned and said, "Why, of course there's somebody inside!"

On the 16th of the month, when camping on the bank of the river Cuando, near some rapids, one of our saddle-oxen, an enormous beast, from which his rider had.

6.7. *Books of the 1877 Portuguese Expedition.*
(left) A. Serpa Pinto, How I crossed Africa *1881 (cover).*
Source: BNP, purl.pt/28509;
(left) H. Capello e R. Ivens, From Benguella to the territories of Yacca, *1882 (p.84, featuring the local name "Olochi" of* Barbus kessleri *(*Gillbar Barb*).*
Source: BHL



6.8. *Depiction of José de Anchieta's dwelling in Caconda, Angola.*
"Interieur de la demeure d'Anchieta (voy. p.218) Dessin de E. Bayard après un croquis du major Serpa Pinto." Engraving and drawing by Émile Bayard for the French version of Serpa Pinto's book, Comment j'ai traversée l'Afrique*, published in episodes in the illlustrated periodical* Le Tour du Monde.
Source: Gallica.bnf.fr: *Le Tour du Monde. Nouveau journal des voyages*, Paris, 1881, p.217

6.9. ***Allegoric drawing of the Society of Geography of Lisbon.***
"A Sociedade de Geographia de Lisboa está indicando Loanda como nucleo do futuro imperio Luzo-Africano" drawing from António Lopes Mendes, Paisagens, edifícios, retratos e costumes da Índia portuguesa; Paisagens e edifícios de Lisboa e Sintra.
Source: BNP purl.pt/26647.

4.

Priority in print[1]

> Priority is a fixed and positive term, which won't allow for anything arbitrary nor partial.
>
> - De Candolle[2]

Imperial networks allowed for continuous shipments of specimens to metropolitan museums and herbaria and created a "deluge of information."[3] There were too many cases of confusion derived from the sheer scale and specialisation of scientific work. Other problems included growing amateur communities and the overlapping usage of parochial and regional names. Reformers of nomenclature suggested changes to improve and control naming procedures, names and, sometimes, spelling.[4] To resolve the debate and accomplish better and more stable catalogues several scientific societies in France, Germany, and England, created committees to address some of the problems generated with the use of common names, and the possibilities

[1] This chapter was presented as a paper in the seminar "Cabinet of Natural History" in Cambridge History and Philosophy Department in 2017, and it was discussed multiple times with colleagues, and I presented it for the first time in 2015 at the *JournalClub*, organised by CIUHCT's Ph.D. students and Post-doc researchers.

[2] Alphonse de Candolle quoted in Philip Lutley Sclater, ed., *Rules for Zoological Nomenclature Drawn up by the Late H. E. Strickland, MA, FRS. (Assisted by Many Zoologists, British and Foreign) at the Instance of the British Association* (London: John Murray, 1878), 6. The original quote is "L'auteur même qui a le premier établi un nom n'a pas plus qu'un autre le droit de le changer pour simple cause d'impropriété. La priorité en effet est un terme fixe, positif, qui n'admet rien, ni d'arbitraire, ni de partial."

[3] Bruno J. Strasser, 'Collecting Nature: Practices, Styles, and Narratives,' *Osiris* 27 (2012): 303–40.

[4] This problem was debated contemporarily by communities of professionals and amateurs, and nomenclature stabilization was one means to better define the status of professional naturalists. See, the analysis in Miracle, 'On Whose Authority?'; L C Rookmaaker, 'The Early Endeavours by Hugh Edwin Strickland to Establish a Code for Zoological Nomenclature in 1842–1843,' *Bulletin of Zoological Nomenclature* 68, no. 1 (2011): 29–40. Leonhard Stejneger, 'A Chapter in the History of Zoological Nomenclature,' in *Smithsonian Institution Miscellaneous Collections*, 1934.

of better reference systems. Since the 1830s that nomenclatural codes were tested, however an internationally valid code for zoological nomenclature was effectively began to be composed in the international zoological congress of Paris in 1889, and Moscow in 1892.

In Britain, Hugh Strickland (1811-1853) was famously appointed to lead a commission to produce a proposal for a Zoological Code of Nomenclature. The British version of the Code was discussed and negotiated in meetings of the British Association for the Advancement of Science since 1842.[5] The initial text of the Code was amended several times and finally published in 1878 and edited by Philip Lutley Sclater (1829-1913).[6] In terms of priority, the new standards proposed that it should be established considering two distinct features: definition and publication. The first versions of the code recognised that definition implied a "distinct exposition of essential characters; and in all cases we conceive this to be indispensable." The second requisite was to "constitute publication, nothing short of the insertion of the above particulars in a printed book can be held sufficient."[7]

Naturally, what exactly was a "good description" needed to be more clearly defined. The Strickland code, for example, stated that when a description of a species proposed a new name but did not allow for its proper comparison or identification in relation with other genera associated with it, by lack of elements, or for any other reason, then it should not be considered a definitive description. In that case it should be replaced as soon as possible by a new and more complete description. As for what constituted "publication," nineteenth-century naturalists no longer considered oral communication in scientific societies as acceptable, rather the emphasis was on printed publication.

In the case of two clashing descriptions of different specimens which would afterwards be considered as the same species, the author of the confirmation would get "first reviser" status. "First revisers" were reserved the right to decide which of the previous names given fitted the species "better," or to name the species anew. In the meantime, before a species was sufficiently known, every given name and description was credited via synonymy. Synonymy was and is a very relevant feature of zoological or botanical nomenclature. Each description of a species was considered potentially useful and was repeated with every new description as a bibliographical referencing system. Synonyms persisted in catalogues and listings as long as

[5] Rookmaaker, 'The Early Endeavours by Hugh Edwin Strickland'; Hugh E. Strickland, 'Rules for Zoological Nomenclature,' *Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology, and Meteorology (New Series)* 1 (1837): 173–76.
[6] Sclater, *Rules for Zoological Nomenclature*.
[7] Hugh E. Strickland, 'Series of Propositions for Rendering the Nomenclature of Zoology Uniform and Permanent, Being the Report of a Committee for the Consideration of the Subject Appointed by the British Association for the Advancement of Science,' *The Annals and Magazine of Natural History; Zoology, Botany, and Geology* 67 (1843): 267.

they were considered by the authors of catalogues as markers of an important part of the story of the description of a specific animal or plant. Simultaneously, this meant that the so-called "species-mongers" – naturalists who would not refrain from naming every variation as a new species; and even *nomina nuda*, i.e. names which can no longer be accepted as an adequate description of a species, for example, were constantly rewarded by persevering in zoological atlases.[8] Taxonomical revision, to consider all available knowledge on a specific family of geographical area was and still is a huge task, and it has proven to be very complex to erase even very crude errors incorporated in the synonymy reward system. Robert Merton, when discussing the priority criterion as an important institution of scientific practice, also mentioned zoological nomenclature, and eponymy – the practice of honouring people with new species' names. However, to complicate things further, zoological synonymy brought with it a very peculiar operating reward system, as this chapter shows by focussing on a specific African species.

The Giant Otter-shrew, or *Potamogale velox* (Figure 4.1), is a small mammal with aquatic behaviour and a fish-like tail. It is nor a well-known animal, its quick and elusive demeanour made for a difficult catch in the nineteenth as well as in the twentieth century. It was considered "extraordinary" by the explorer who first published on it in 1860. During the following years it received much attention for being "strange," "curious," "remarkable," and simply "wonderful." Conversely, the *Le Magasin Pittoresque* deemed it as "not very intelligent."[9]

Between 1860 and 1864, only one incomplete specimen of the Giant Otter-Shrew was described and incorporated in the London natural history museum. As a result, its morphological and osteological characteristics were not immediately well known, until two new and complete specimens arrived in Edinburgh and Lisbon. The "deluge of information" that brought many shipments from all parts of the globe to European natural history museums was counteracted by cases such as this one, when only a small number of physical specimens were acknowledged. How fast the information of these one-of-a-kind specimens was transformed into new species was determined not only by its physical traits but also by the social networks of authority already in place in the community of naturalists. This chapter is not about the very curious animal, but rather about the social processes that surrounded the naming of a new species for science.

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[8] Robert K Merton, 'Priorities in Scientific Discovery,' in *The Sociology of Science*, 1973, 286–324.

[9] The *Potamogale velox* received many names during its first years of existence in European museums. Naturalists were also keen to characterise the features of the animal as well as qualifiers, such as "extraordinary" (Du Chaillu, 1860); "curious" (Bocage, 1865); "strange" (Peters, 1865); "remarkable" (Wallace, 1876); "pas très intelligent" by the newspaper *Le Magasin Pittoresque* in 1882; and "wonderful" in 1895 Jentinck

The curious tail of the *Potamogale*

In the 1860s, Africa captured the attention of large European audiences eager to learn more of the unknown foreign lands of the Dark Continent. These were the years of popular and exciting exploration reports by missionaries as Livingstone, and army officers as Richard Burton (1821-1890) and John Speke (1827-1864), and others. The search for the source of the Nile and the Mountains of the Moon fuelled the fame of explorers and the curiosity of readers of newspapers and travel literature. One such famous explorer was Paul Belloni Du Chaillu (ca.1831-1903).[10]

Du Chaillu made his living as an explorer and trader. During his exploration of African territories in 1855-1859 he was stationed in the region of the Old Calabar (present day Nigeria), and his most famous journeys were supported by the Boston Academy of Sciences. With his return to the United States of America he was expected to bring back tales of courageous feats, as well as the evidences of his geographic travels and his encounters with possibly unknown landscapes, people, and animals. Associated with the travel literature audiences' curiosity, the community of naturalists and museum curators had also certain expectations. These were commonly satisfied with conferences in learned societies, exhibitions of the specimens brought, and the participation of established and reputed naturalists in the description of animals new to science.

Du Chaillu's name became especially well-known in London in the summer of 1861 when he was caught in the middle of the diatribe over the Gorilla skull and the Darwinist debate that ensued.[11] A so-called 'Gorilla war' was effectively spurred by the specimens brought to Europe from Gabon in Africa by Du Chaillu, which he publicised in conferences and displayed in exhibitions in London. Different interpretations of the features of Du Chaillu's Gorilla skulls divided each side of the debate. The authenticity of the specimens themselves, and of its collector were also called into question.

Richard Owen, standing across from Darwinist Thomas Huxley, defended Du Chaillu's specimens and helped connect him with the publisher John Murray for the London edition of *Explorations and adventures in Equatorial Africa*.[12] As Stuart McCook has shown, the Gorilla

[10] For updated biographical and publishing details on Du Chaillu see Stuart McCook, '"It May Be Truth, but It Is Not Evidence": Paul Du Chaillu and the Legitimation of Evidence in the Field Sciences,' *Osiris* 11 (1996): 117–97; and also, Homer Rushing, 'The Gorilla Comes to Darwin's England: A History of the Impact of the Largest Anthropoid Ape on British Thinking from Its Rediscovery to the End of the Gorilla War, 1846-1863' (M.Sc. dissertation, University of Texas at Austin, 1990).

[11] Janet Browne, *Charles Darwin. The Power of Place* (London: Pimlico, 2003), 156–60.

[12] Joel Mandelstam, 'Du Chaillu's Stuffed Gorillas and the Savants from the British Museum,' *Notes and Records of the Royal Society of London* 48, no. 2 (1994): 227–45.

question was centred around credibility and the defence of the community of professional museum naturalists against collector-explorers who were portrayed as outsiders. As McCook described: "missionaries, ship's officers, and professional collectors were generally not practising scientists, so their discoveries were treated as tentative knowledge until the collections had been processed and described by a metropolitan scientist."[13] Du Chaillu's book was scientifically indorsed by the Boston Academy, where he read a memoir which was then published in the society's journal.

It was made known that Du Chaillu's collections were revised by the naturalist Jeffries Wyman while he was in Boston, although Wyman was not the formal author of any of the published materials. By naming new species he discovered in Africa in his own name, Du Chaillu looked for an acknowledgement as a naturalist in addition to his reputation as explorer. Because he stepped into the field of professional museum naturalists, the name-givers, he was publicly attacked by John Edward Gray (1800-1875), keeper for zoology in the British Museum, and the reception of his book in England was compromised even beyond the "gorilla war." The little *Potamogale* was one of the crucial specimens to receive all the attention and anger of Gray.

With the full title *Explorations and adventures in Equatorial Africa; with accounts of the manners and customs of the people, and of the chase of the Gorilla, crocodile, leopard, elephant, hippopotamus, and other animals*, Du Chaillu defined his travels alongside considerations of ethnographic and zoological interest.[14] In contrast with the big game invoked in the title, the cover art of the volume shows the "Ncheri – a diminute Gazelle." By using the indigenous name of this animal, the author aimed to, from the beginning, convince his readers of his direct connection with the distant African tribes and territories. In mentioning a smaller animal, Du Chaillu possibly intended to state his reliability regarding more zoological interests than just the big, famous, and celebrated gorilla.

As many travel accounts authored by non-naturalists, in the end of his book, Du Chaillu added an Appendix titled "The Fauna of Equatorial Africa." Under "Mammalians" the reader would find the section "Species discovered by P. B. Du Chaillu."[15] These listings were intended

[13] McCook, '"It May Be Truth, but It Is Not Evidence": Paul Du Chaillu and the Legitimation of Evidence in the Field Sciences,' 183–84.
[14] Paul Du Chaillu, *Explorations and Adventures in Equatorial Africa; with Accounts of the Manners and Customs of the People, and of the Chase of the Gorilla, Crocodile, Leopard, Elephant, Hippopotamus, and Other Animals* (London: John Murray, 1861).
[15] This section lists 17 different mammals, including the *Aspidonectes aspilus* with the indication "(TURTLE [sic])," as it refers in fact to the African soft-shelled turtle. This was one of the many typos and mistakes in Du Chaillu's work pointed out by Gray.

for "the use of naturalists" and contained the names of alleged new species for science. [16] Since the list had no other author, Du Chaillu claimed alongside his discoveries, the naming rights. It was among these claims to scientific priority that the first mention to a *Cynogale velox* was ever published. The list was a sequence of names and provided no animal descriptions; for those, the reader of *Explorations and adventures* was referred back to the 1860 volume of the *Proceedings of the Boston Society of Natural History* which included a two-part communication with the full scientific report on the new species.[17]

In the 1860 published papers the determinations by Du Chaillu, or Wyman, followed the tacit practices of professional naturalists. The new species were compared against the available literature in specialised journals and books. The text quoted several savant publications as the *Archives du Muséum d'Histoire Naturelle*, and the *Proceedings of Zoological Society London*, as well as academic authorities such as Isidore Saint Hilaire (1805-1861), and Gray. The latter, who did not regard Du Chaillu as part of the community of professional naturalists, claimed that Du Chaillu was helped along in the preparation of the taxonomical descriptions. Gray dismissed most of the claims for new species and in the process attempted to ruin Du Chaillu's reputation. In several articles, he criticised one by one all his findings, the book's illustrations and, specially, his claims on new species. Gray's only concession to a new species was the one Du Chaillu had dubbed *Cynogale velox*.

In his description of the *Cynogale velox* Du Chaillu began by associating his African specimen with the Asiatic *Cynogale Bennettii*. The Asian genus *Cynogale* had been first determined by Gray, in 1837. This allusion to Gray's expertise in Du Chaillu's text may be interpreted as an attempt to legitimise the new species. However, the result was Gray's further aggravation. The Asian otter-civet *Cynogale* is a mammal with aquatic behaviour just as the one Du Chaillu encountered in Africa. The *Cynogale* is also a carnivorous genus, which is how Du Chaillu categorised his new species. Du Chaillu followed that comparison by explaining the distinctive characteristics, and geographic location, in order to sustain that this was in fact a new species. "The teeth resemble those of the above genus of Gray," wrote Du Chaillu, "but the size of the animal, the length and characters of the tail, and the habitat, indicate a distinct species."[18] Distinctive characters were described as follows:

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[16] Du Chaillu, 1861c.
[17] The *Proceedings'* communications present firstly "five new species of mammals" (Chaillu, 1861a: 296), followed by 11 other mammals (Du Chaillu, 1861b).
[18] Paul Du Chaillu, 'Descriptions of Mammals from Equatorial Africa (Cont),' *Proceedings of the Boston Society of Natural History* 7 (1861): 358–67, 361.

> hind claws partially webbed, and the external border of the tarsus fringed with a membrane; tail stout, compressed laterally, the terminal three fourths sharp above and at the end below, terminating in a point.

All these characters are still visible and recognisable today from the type-specimen.[19] A crucial problem originated from this initial description. Du Chaillu had only brought with him, as evidence of his observations, a single skin of the animal, with no skull, skeleton or teeth to be analysed, compared, or confirmed.

> This extraordinary animal is found in the mountains of the interior, or in the hilly country explored by me north and south of the equator. It is found along the watercourses of limpid and clear streams, where fish are abundant; it hides under rocks along these streams, lying in wait for fish. It swims through the water with a rapidity which astonished me; before the fish has time to move, it is caught; on account of the rapidity of its movements I have given it the specific name of velox. The animal returns to land with its prey almost as rapidly as it started from its place of concealment. The great motive power of the animal in the water seems to be in its tail.[20]

In this paragraph of the *Proceedings* paper, the explorer drifted back into the narrative mode of the adventurous explorer, albeit providing a vivid account of the feeding habits of the animal. Proposing himself to the reader as an acting witness of the fishing animal, Du Chaillu introduced himself as a valid witness. The same behavioural traits which provided him with authority over the facts pertaining to this animal are exactly those which escaped the typical cabinet naturalist which has access only to morphological comparisons between skins or skeletons. The explorer may have witnessed a moment such as the one described, he may have been told of it by the locals, or he may have just based his description on the remnants found in the animal's stomach while preparing it. Nevertheless, Du Chaillu insisted that the animal was a carnivore, *because* it fed on fish. This was behind his justification in adding the species to the genus *Cynogale*. This depiction also corroborated his proposal of the specific name as *velox*, referring again to the live animal's performance. According to the most recent rules of nomenclature, behaviour was one of the most preferable rationales for specific names, but one that a cabinet naturalist most often did not have contact with.

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[19] Chaillu, 362. Du Chaillu's stuffed skin of the Cynogale, preserved at the Natural History Museum in London, shows these characters clearly: that it is a syndactylous species, or with fused hind digits (2nd and 3rd); and its very peculiar laterally compressed tail. I wish to acknowledge Dr. Roberto Portela-Miquez, curator at the Natural History Museum, London, for granting me the access to this type-specimen in October 5, 2017.
[20] Chaillu, 362.

In the final paragraph of his short description, considering the affinities with the Asiatic *Cynogale*, Du Chaillu expressed some caution regarding the new species, and candidly advanced a secondary hypothesis: "I thought the different shape and proportions of the tail, with its African habitat, were sufficient to make this the representative of a different genus, for which I proposed the name of *Potamogale*."[21] In his haste Du Chaillu simultaneously advanced two distinct generic placements. First, convinced the animal was a carnivore, he related it with the *Cynogale*. Afterward, but in the same text, he made sure to establish future priority with a new generic name: *Potamogale*. The form *Potamogale velox* was not actually written down in Du Chaillu's presentation of the new species. It must be said that this chosen generic name provided an adequate and informed eponym, since *Potamo* is Greek for river, and *gale* is a common Greek epithet for a weasel-like animal. At a time when naturalists were trying to avoid abstract concepts and too many patronyms in nomenclature, this could surely be considered an acceptable name.

Legitimating his descriptions via the publication in the Boston Society's journal, Du Chaillu hoped to have all his new species, along with the *Cynogale*, or *Potamogale*, acknowledged by the community of naturalists. As it turned out, the style of his proposal was to make the author of the *Cynogale* genus very angry. A hand full of inaccuracies, and sentences such as this last one in the description of the *Cynogale*: "preferring however, to wait until I can procure the skull and skeleton, I have placed it in the genus *Cynogale*, to which it certainly bears a close resemblance," definitely aggravated the keeper of the Zoological Collections of the British Museum, a naturalist engaged for some decades with the systematic revision of the British Museum's collections. The curious tail which was the most outstanding character of the *Potamogale* was at the same the feature that was most challenged by Gray.

"Almost as much talked about as the gorilla itself"

John Edward Gray was, by the 1860s already associated with the increment and systematization of the British Museum's zoological collections and a leading figure of the naturalists' community in Britain. He also saw himself, as Homer Rushing put it, as "an expert in the business of acquiring zoological specimens as well as [in] the specimens themselves."[22] In the decade of the 1860s Gray benefited from the large extension of the British Museum's

[21] Chaillu, 363.
[22] Rushing, 'The Gorilla Comes to Darwin's England,' 265.

collections with which he was able to compare the new specimens arriving from all the corners of the British empire.

In the summer of 1861, as Du Chaillu arrived in London with his collections, Richard Owen as head of the Natural History Collections of the British Museum, and Gray's superior, asked Gray to compose a report. Gray was to advise on whether the explorer's collections should be bought by the British Museum. From his part, Owen felt these were inestimable collections. In fact, Owen had been in contact with Du Chaillu since 1859 when the explorer, still in Africa, offered to sell his collections to London.

Du Chaillu's arrival in London was not, however, peaceful. His most notable specimens were not the *Cynogale* or any of the other new species he claimed to have found, but rather the several specimens of the mentioned *Gorilla*. Gray was publicly critical of Du Chaillu's zoological aptitudes and his report on the collection was unsurprisingly against the purchase. According to Gray, "the specimens were in poor condition and the collection was over-priced."[23]

While Du Chaillu's collections were exhibited to Victorian audiences, Gray was granted access to them to analyse them thorough and systematically. In the session of June 25, 1861, Gray took his seat as President of the Zoological Society of London and attacked one by one Du Chaillu's alleged new species. Gray identified all of the "new species" as known to science and presented their correct and updated identification. In particular, he commented on the claim to the new animal: "I cannot conceive that Mr. Du Chaillu's proposed name of *Potamogale* has any claim to be adopted, as he gives no character to it." From Gray's point of view, "the animal has no relation to the genus *Cynogale*." This was one of the prompts for his attack on Du Chaillu's credibility.[24]

From Gray's perspective, the *Cynogale* was but a skin in poor state, "with only three feet, the end of the tail broken, and without any skull."[25] Gray focused on the morphological features of the hind limbs to propose a "correct" taxonomical place for the only animal he considered new in the collection.[26] He associated the form of the feet with the rodent *Fiber* (beaver). Fixating on the hind feet, Gray further argued against the validity of Du Chaillu's account since "the description of the feet [...] is very incorrect and does not at all fit the specimen." This

[23] Mandelstam, 'Du Chaillu's Stuffed Gorillas and the Savants from the British Museum,' 238.
[24] John Edward Gray, 'Observations on Mr. Du Chaillu's Papers on "The New Species of Mammals" Discovered by Him in Western Equatorial Africa,' *Proceedings of the Zoological Society of London* 18 (1861): 273–75, 275.
[25] The current state of the specimen still fits Gray's description. Only three of the limbs remain, and the tail is broken and has a thick wire run through it.
[26] Gray, 'Observations on Mr. Du Chaillu's papers,' 274.

passage reiterates the importance of type-specimens for taxonomical reassessment and revision work.

Quoting Du Chaillu in detail, Gray explained how this first description was thoroughly unusable, since "if the character of his genus were drawn from his description, no one could recognise the animal."[27] This was a serious claim, since it matched one of the indications of the commission for nomenclature. For Gray the description of the new animal was not satisfactory according to the rules of the trade. Du Chaillu's description was not enough. Gray went a step further and claimed that his description could not be considered as evidence for the existence of said animal.

Such a laterally compressed tail had not been registered in aquatic mammals, and the state of the specimen and its broken tail did not offer sufficient corroboration according to Gray. Rejecting any of Du Chaillu's claims to the christening of this animal, Gray advanced an altogether new name, the animal should be mockingly considered a *Mythomys*, or a mythical mouse, which is to say, a figment of the explorer's imagination. Gray thus ridiculed Du Chaillu's whole account and discarded any relation of the animal with the carnivore family. Given the similarities he found between the specimen's skin and the *Castor*, Gray declared the *Mythomys* a rodent. Amidst all the other harsh critiques that Gray produced in his published notes on Du Chaillu's work, the *Mythomys* was one of the most resonant.

Gray's report notwithstanding, in July 1861 the trustees of the Museum voted in favour of Owen's proposal to purchase specimens from Du Chaillu. The whole debate had run parallel to the Gorilla diatribe and made very public by Du Chailu's detractors and Du Chaillu's enthusiasts. The *Potamogale* was "almost as much talked about as the gorilla itself." [28] On the purchase of the Du Chaillu collection, *Punch* magazine commented that: "In his post at the Museum, Dr Gray will have the charge [of the collection] and will always have before his eyes a souvenir of his defeat."[29]

The revised status of the first reviser

A Foreign Member of the Zoological Society of London since 1863, Bocage was already gaining his name in the natural history community as the director of the Zoological Section of the National Museum in Lisbon. During his administration, the Lisbon Museum would in time

[27] Gray, 275.
[28] 'A Journey to Ashango-Land,' *The Athenaeum*, no. 2050 (1867): 188.
[29] 'A Case of Real Distress,' *Punch,* 1861, 29.

become a reference for the study and research in African fauna. In 1865, this was not yet the case. Bocage's interests were not limited to Africa and he also had to coordinate research on Portuguese fauna. Many naturalists, mainly but not exclusively from Europe, maintained a dynamic epistle exchange with Bocage and the Lisbon museum regarding Portuguese and African fauna research, and its African collections. Leading British naturalists as Gray and Sclater, corresponded with Bocage since 1863.

In early 1865, Barbosa du Bocage received a second shipment from Francisco António Pinheiro Bayão, his correspondent in Angola's hinterland. The first shipment sent by Bayão dated from 1863 and had already included a large number of species, according to Bocage "interesting and rare, among which some entirely new to science."[30] On receiving the shipment, Bocage noticed a female specimen of Du Chaillu's *Potamogale*. He knew that even after Gray's articles on the matter, the animal was still lacking a full description. This was not just another new animal. It represented an entire new genus. Bocage had received not a badly prepared skin, but a specimen in good conditions, a complete female specimen in alcohol, with the full skeleton, and the added extra of an unborn foetus.

With these materials Bocage wrote a memoir with a full description and new nomenclatural determination for the Lisbon Academy of Sciences. With his international contacts in many learned societies and museums, Bocage also was aware of the value of publishing abroad. This was not the first description of a new species he wanted validated by the international community. Respecting the process of publication of exclusively original material at the *Proceedings of the Zoological Society of London*, he sent a French summary of the memoir to Albert Günther, sometime before his presentation at the Lisbon Academy. Günther would send the summary paper to Sclater in Bocage's name including the description of the new genus. Together with other highlights of Bayão's shipment, Bocage presented the new genus as the *Bayonia*.[31]

Bocage had new data on the contentious new species and the skull and dental features allowed finally to determine its correct place. He went straight to the point: "Here is the brief description of the curious *Insectivore* which Mr. Du Chaillu has taken as a Carnivore, and Mr. Gray for a Rodent." With this sentence, Bocage settled the determination of the new genus in the *insectivora*, which is where the animal was lastly validated. It was, after all, neither a

[30] AHMUL/AHMB/CN/B 35, Bocage to the Navy and Overseas Minister (draft), 1865.04.04. Original text: "Comprehendia tambem um grande num[ero] de especies interessantes e ráras, entre as q[uai]s algumas inteiram[en]te novas p[ara] a sciencia."
[31] José Vicente Barbosa du Bocage, *Noticia ácerca dos caractéres e affinidades naturaes de um novo genero de mammiferos insectivoros da Africa Occidental* Bayonia Velox, *(*Potamogale Velox, *Du Chaillu) apresentada em sessão de 1ª classe da Academia de 27 d'abril de 1865* (Lisboa: Typographia da Academia, 1865).

carnivore feeding on fish in the riverbanks, nor the imagined mythical rodent. Bocage also claimed for himself the status of *first reviser*. Armed with new information, he considered himself free to propose a new name.

Bocage's description and determination is more complete and finally "correct." Given Bocage's understanding that the species was not yet determined and therefore not yet named, he tried to pay tribute to his loyal collaborator in the hinterland, Bayão. Bocage proposed in his paper to name the new insectivore from Angola as the *Bayonia* aiming to please his dedicated collector but also to persuade him and other to continue shipping materials to the Lisbon museum. Bocage wanted Bayão to become a contracted collector for the museum and honouring him with such an important eponym was one of the strategies to secure Bayão's collaboration.[32] Both Gray and Bocage were cabinet naturalists but performed differently in relation with the role of the collectors. The augmentation of the national and colonial collections of the Lisbon museum depended on the shipments of outside collectors. For Bocage, to pay tribute to his collaborators was crucial, especially in the case of a new species.

After sending his manuscript to Günther, Bocage received a reply from Sclater, one of his correspondents in London and the secretary of the Zoological Society of London and the editor of its proceedings and transactions. This letter confirmed the publication in the *Proceedings* but held, however, an unforeseen caveat:

> Dr. Günther has just handed me your very interesting paper upon the new Mammals from West Africa. We shall be glad to publish it in our 'Proceedings' but I trust you will allow me to restore the name of *Potamogale velox* to the Insectivore which you propose to call *Bayonia angolensis*, as according to the rules of nomenclature which we follow, no change can be made in a scientific name, once given.[33]

Sclater's letter was sent April 17, and Bocage probably received it before April 27, the day he presented his memoir on the *Bayonia* to the Lisbon academy. The paper delivered, or at least its published version, never mentioned the *angolensis* epithet condemned by Sclater. That name, *Bayonia angolensis,* would epitomise a (very) Portuguese species. Honouring a Portuguese colonial officer and the Portuguese imperial claim to Angolan territory through the name of a new species was a bold statement. The fact that the first specimen, Du Chaillu's, was

[32] Bocage continued insisting on his tribute to Bayão in a letter to Albert Gunther: "Si par hasard vous avez encore à publier d'autres espèces nouvelles […] je vous prie d'en nommer une d'après le nom de Mr. Bayão, l'infatigable explorateur qui m'a fait cadeaux de bien belles choses. (On pourra annoncer l'espèce *Bayoniana*)." Letter from José Vicente Barbosa du Bocage (1823-1907) to Albert Gunther in 17 November 1866. DF ZOO/200/1/183-195 Library and Archives, The Natural History Museum, London.
[33] AHMUL/AHMB/CE/S036. Sclater to Bocage, 1865.04.17.

brought from the Nigeria and not Angola contradicted the idea behind geographically specific names like *angolensis.* A new species called *Bayonia angolensis* would represent Portuguese science and the affirmation of Portuguese scientific presence in the territories under the rule of the Portuguese Crown. The race for the African hinterland that was just firing up between European nations would take military, diplomatic, but also technical and scientific nuances, and Bocage would play an active part in it.

The Code for Nomenclature would, however, disapprove thoroughly of such a name. This was emblematically a great name to ascertain the place of the Lisbon museum, but scientifically a name very difficult to uphold. Later, the Code would state that "we fully concur with those who censure the practice of naming species after persons of no scientific reputation, as curiosity dealers."[34] And although Barbosa du Bocage is trying exactly to honour officer Bayão for being more than a simple collector, his proposal *Bayonia* would be in this context naturally regarded as a somewhat lesser adequate name than *Potamogale*.

The following paragraph of Sclater's letter brought an unexpected information:

> Prof. Allman has lately received a perfect specimen of this animal in spirits and is preparing a Memoir upon it for our Transactions under the name *Potamogale velox*. It would, therefore, be only creating confusion to publish it likewise under your new name. [35]

Objections against Bocage's *angolensis* were clear, opposition against *Bayonia* was somewhat likely, what was unexpected was Sclater's new warning that Edinburgh Professor George James Allman (1812-1898) was also preparing a work on the new species. And already calling it *Potamogale velox*.

Allman had received another single specimen of the new animal and had requested for Sclater's help with its determination.[36] The problematic issue here was that Allman had not yet published on the subject. Even an oral communication among peers was no longer considered valid determination. And so, in publishing in print first, Bocage's summary note on the *Proceedings* (as well as his extended work on the *Memorias da Academia*), should have counted as the *first revision* of a species which had competing descriptions and names. By publishing Bocage's account of the new genus, it would seem that Sclater, as editor, acknowledged that Bocage would be the one to stabilise the name of the species and of the new genus. However, in his letter, Sclater stated his intentions otherwise. For all purposes, Sclater

[34] Sclater, *Rules for Zoological Nomenclature*, 14.
[35] AHMUL/AHMB/CE/S036. Sclater to Bocage, 1865.04.17.
[36] Allman mentioned this in his paper.

considered Allman as the 'competent' first reviser, and not Bocage. And from the centre of the nomenclatural debates, in the centre of London, and as the editor of the Proceedings, Sclater considered it his call to make.

Although Sclater wrote Bocage that Allman was producing a revision work on this animal and calling it, *Potamogale velox*, the fact remained that Allman only read his work on the subject months later in June 13, 1865.[37] In the end, due to publication lengthy processes, both Bocage's work on the new African mammals, which included the first description of the *Bayonia velox*, and the note on Allman's lecture were actually published in the same annual volume of the *Proceedings of the Zoological Society*. The volume would only be published later in the year, with the standard delay of scientific periodicals. In the meantime, Bocage read and published his memoir at the Academy of Lisbon. This was his second, and albeit in Portuguese, his more extensive work on the *Bayonia velox*. The detailed memoir was dated April 27, 1865 and was part of the fourth volume of the new series of the *Memorias* only published in 1867. Still, as customary, an offprint was published separately in 1865.

Bocage's published paper in the *Proceedings* already contained the first depiction of the skull and teeth of the *Potamogale*, the definitive and determinant feature of its classification as an insectivore. The Portuguese memoir also included two illustrated plates of the *Bayonia*, drawn and lithographed by Felix Brito Capelo. The first plate incorporated a drawing of the full animal as if alive, an overview of the peculiar snout, and the distinct fore and hind digits (Figure 4.2). This showed all three main morphological characters of the new animal: the laterally compressed tail (i), the vibrissae on the snout (ii), and the syndactylous hind toes (iv). The second plate presented different views of the skull, reprised from the *Proceedings* paper, showing the characteristic teeth and underjaw, and further osteological details. The number of teeth and the peculiar shape of the molars are depicted separately, and the representation of front and hind leg bones referred to the characteristic absence in this species of a collarbone, which is also mentioned in the text. These were all the important distinctive characters of the animal Bocage called *Bayonia velox*.

Bocage's memoir, when printed by the Academy of Sciences, had a confusing reference in its title to "a new genus of mammals from West Africa *Bayonia velox* (*Potamogale velox*.

[37] Despite the confusing typo on the cover of Allman's publication declaring that the paper was "Read on the June 13, 1863," a quick perusal of the *Proceedings of the Zoological Society of London* informs that Allman's memoir was in fact only presented in June 13, 186**5**, and only published in 1867: George J. Allman, 'On the Characters and Affinities of *Potamogale*, a Genus of Insectivorous Mammals,' *Transactions of the Zoological Society of London* 6, no. 1 (1867): 1–16.

Du Chaillu)."[38] Although in the written text he did not take on the same compromise, with the ambiguous title Bocage presumed his own contribution to the synonymy of the species. When read carefully, the text proved confusing since in his description of the shipment from Bayão, he stated that he was "fortunate to find a complete and well-preserved skin of the *Potamogale velox*."[39] Even for Bocage *Potamogale* was the name that could better identify the species.

Bocage began his text establishing how the species was still undetermined, as he had done in the *Proceedings* paper. With his single but whole specimen, and due to the quality of its preservation and care in the shipment, Bocage was the first to correctly publish its description as an insectivore. For Bocage, both Du Chaillu and Gray were equally excused for their misinterpretation of the species since they had only an "imperfect skin" to work with. Bocage followed the notion, also shared by the authors of the Zoological Nomenclature Code that priority should only be conceded to an exact and rigorous description. Additionally, he followed Gray's judgement as a source of authority: "with this reasoning already Dr. Gray had rejected the name thought by Du Chaillu. By also not conceding to it I do no more than follow the guidance of a much-authorised person."[40] Both names, the old and the new, can only be included in the same work because of the characteristics of synonymy. The idea was, and is, to refer to bibliographical references that reflect the history of the animal's nomenclatural descriptions, and thus create the narrative not only of descriptions of physical attributes but also of the negotiation process behind taxonomical work.

Bocage's detailed memoir in Portuguese contained osteological and physiological descriptions which allowed him to deduce in what ways is the animal related to other existing groups, such as *Solenodon*, *Sorex*, and, in lesser degrees, with the *Myogale*. But also, how irrefutably distinctive the new genus must be considered. Bocage's dental formula was accompanied with an extensive account of the unusual form of the teeth, to which he added a reflection on the methods of determining and counting molar, canine and incisive teeth.

Perhaps the most interesting in Bocage's account is that he dedicated more than a few pages to considerations of the possible arrangement of the genus in relation with the other known insectivore genera with which it was connected by natural affinity, quoting the work of Wilhelm Peters (1815-1883), director of the Berlin Museum. In his *de facto* revision of insectivore classification Bocage added new knowledge about the new genus and provided with

[38] Bocage, *Noticia*
[39] Bocage, *Noticia*, 2.
[40] Bocage, *Noticia*. Original text: "Com este fundamento regeitára já o dr. Gray o nome lembrado por Du Chaillu. Não o admittindo, pois, não faço mais do que seguir o alvitre de pessoa mui authorizada," p.2.

his own thoughts on the process of the search for the natural method. The new genus had put in question the existing seven families in which Peters had distributed the insectivores. By a process of elimination, Bocage detailed, step by step, why the new species could not, because of its precise characteristics, be included in any of the previously identified genera. He concluded that while "these relations of affinity may be defined by characteristics shared with other generic types, the presence of other characters of undeniable importance give way to the constitution of a separate family."[41]

In his work Bocage did not acknowledge Allman's intended publication. However, he added a post scriptum stating that after his work was completed, Mr. Aubry Lecomte, a French colonial officer had confirmed him that in the Paris colonial collections there was "one adult specimen of *Bayonia velox*, received from Gabon."[42] Siding with Gray and completely dismissing the claimed origin of Du Chaillu's specimen, Bocage delimitated the geographical habitat of the *Bayonia,* to the locations where the only specimens known to him were found: Angola's hinterland, and Gabon. With this he casts further doubt on Du Chaillu's account, acknowledging that the explorer could have purchased his specimen from any locations further south. With this criticism, Bocage is also encouraging the idea that the distribution of the new animal is indeed delimited to Angola, thus promoting his original epithet of *angolensis*.

In 1867, the awaited work of Allman on the *Potamogale velox* was finally published in the *Transactions of the Zoological Society*. Allman was a Professor at the Natural Museum in the University of Edinburgh and Regius Keeper of the Edinburgh Museum of Natural History. His first note on the *Potamogale* was read at the Society in 13 June 1865, but the full memoir was only available in print two years later.[43]

The Edinburgh museum logs mention the arrival of the specimen on July 6, 1864.[44] Allman received a specimen from the Old Calabar region, brought by a medical missionary,

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[41] Bocage, *Noticia,* 17

[42] Bocage, *Noticia,* 19. Charles Eugéne Aubry-Lecomte was a French colonial administrator who shipped specimens from Gabon to the Muséum National d'Histoire Naturelle, and plants to London's Natural History Museum, and who was also the director of the Musée des Colonies, in Paris, and collected for the British Museum. The French specimen was, to the extent of my knowledge, left undescribed. Bocage thanked Aubry-Lecomte for his collaboration, and the MNL received shipments from him in 1866/7, see AHMUL/AHMB/Rem307 (1866); Rem091 (1867); Rem265 (1867); Rem294 (1867).

[43] The volume has the publisher's date of 1869, it is unclear whether there might have been a circulating off-print. During these same years Allman was occupied with his other scientific work and teaching position at the University of Edinburgh, which may account for all the elapsed time between the oral presentation in 1865 and 1867, date of the manuscript. See Dale R. Calder, 'George James Allman (1812-1898): Pioneer in Research on Cnidaria and Freshwater Bryozoa,' *Zootaxa* 4020, no. 2 (2015): 201–43.

[44] According to the digitised registry book of the museum, volume for the years 1861-1869. I wish to thank Scotland National Museums' mammal curator Andrew Kitchener for pointing me to this relevant information (personal communication 2017.10.31).

Mr. Archibald Hewan.[45] The capture of the animal took place near the missionary-station, where it was "partly eviscerated, [and] put into spirits."[46] In his paper Allman described his work process and how he contacted Sclater who "at once recognised it as identical with a very badly preserved skin which had been brought over by Mr. Du Chaillu from tropical Africa."[47]

Allman also had a female specimen to work with. His determination of the species was, as Bocage's, morphological and osteological. However, he also added new research on the anatomy of soft parts which he described thoroughly and completed with diagrams. He analysed the differences between types of hair with aide of a microscope, using more modern methods for the practices of compared anatomy. Although his description is very complete, Allman missed the fact that the Edinburgh specimen was a juvenile. This had a major impact in the determination of his dental formula which only identified 36 teeth. This led him to the erroneous conclusion that the *Potamogale* was "more nearly allied to *Solenodon* than to any other known genus of *Insectivora*." Allman followed this with the statement that "on the other hand, the remarkably compressed, triangular teeth, the compressed form of the tail, the broad appressed muzzle, the presence of anal glands, the coalescence of tibia and fibula, and, above all, the absence of clavicles are points of marked divergence from the West Indian genus."[48] In his final determination of the mono-specific genus, Allman declared it *Potamogale, Du Chaillu*. In the end this would determine the stable nomenclature of this genus. Although Allman's *Potamogale* description was thorough and introduced new details about its internal organization it was not without problems.[49] Allman's identification of 36 instead of 40 teeth, which brought the *Potamogale* in affinity with the *Solenodon* was an incorrect observation which led to a flawed assumption.

Contrary to Bocage, Allman concurred with Du Chaillu, and with the explorer's account of the semi-aquatic behaviour of the insectivore. He quoted from Du Chaillu's account and converged with him in the specific epithet *velox*. On the nomenclatural debacle of 1861, Allman wrote on his memoir that:

> It is not always that provisional names ought to be accepted; they are not unfrequently a mere subterfuge, in which the ignorance or incapacity of the describer of some new species seeks to take refuge

[45] Archibald Hewan was born in Jamaica, and returned to Scotland early in 1864, according to J. Hardage, *Mary Slessor: Everybody's Mother. The Era & Impact of a Victorian Missionary* (Cambridge: The Lutterworth Press, 2008), 218.
[46] Allman, 'On the Characters and Affinities of Potamogale." 1.
[47] Allman, 1–2.
[48] Allman, 15.
[49] Allman revised and retracted his teeth formula of 36 in a second publication. George J. Allman, 'Supplementary Note on Potamogale Velox,' *Proceedings of the Zoological Society of London* 17 (1867): 256–58.

> without his thereby abrogating his claim to be regarded as the original namer [sic], though sounder views of the obvious facts may prove the incorrectedness [sic] of his determination. But when, as in the present case, the actual absence of data renders it impossible to determine important characters, the describer is quite justified in making the best of the material at his disposal, and, by the suggestion of a provisional name, reserving to himself the right of giving this name to his discovery, if further facts rendering it expedient should be brought to light.

It is exactly in this position that Mr. Du Chaillu's name of Potamogale stands: it has thus precedence over Gray's name of *Mythomys*; and the laws of natural-history nomenclature compel us to accept it. The synonymy of Mr. Du Chaillu's animal will accordingly stand as follows: *Potamogale* (prov.gen.) *velox*, Du Chaillu, = *Cynogale velox*, Du Chaillu, = *Mythomys velox*, Gray (gen.).[50]

In the end of his text Allman claimed that his work was already finished when he was told of both of Bocage's publications.[51] He mentioned both the paper in the *Proceedings* and the memoir in Portuguese published by Lisbon's Academy. He still quite clearly considered himself as the first reviser of the species. On his own part of the priority discussion with Bocage's description, he commented on his last paragraph that:

> The specimen from which the Lisbon Professor's description had been drawn up was sufficiently well preserved to enable him to recognise the true insectivorous relations of the animal, and to give a detailed account of its external characters and osteology. He will not, however, accept the generic name of either Du Chaillu or Gray, but constructs a new one of his own, and proposes to call the West African insectivore by the name of *Bayonia velox*.

In Allman's interpretation of the circumstances, he saw no other way than to "adhere to the claims of 'Potamogale' over all synonyms."[52] Still in the year of 1865, and after learning that Allman was proposing to reinstate Du Chaillu's authorship, Gray wrote - and published - a letter to Professor Allman. With it, Gray still hoped to convince Allman to "reconsider the question and avoid adding another to the several useless names which the animal has already received."[53]

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[50]Allman, 'On the Characters and Affinities of Potamogale,' 2–3.
[51] It is still puzzling that, just as Sclater warned Bocage about Allman's research, he would not share Bocage's publication with Allman.
[52]Allman, 'On the Characters and Affinities of Potamogale,' 15–16.
[53] The problem of excessive synonymy was the prerogative for Gray's defence of Bocage, but it could also be argued that Gray, at the same time, still wanted to expunge Du Chaillu's name out of the synonymy of the species altogether. John Edward Gray, 'On the Names of the Genus *Mystomys*. (In a Letter to Professor Allman),' *The Annals and Magazine of Natural History; Zoology, Botany, and Geology*. 16, no. 3 (1865): 425.

Allman's memoir was largely illustrated with diagrams, and partial views of the specimen, and finished with two plates. The first plate was an engraving of the mounted skeleton in a museum stand. And the second, a coloured illustration, showed the animal in its riverside habitat (Figure 4.3). The image of the resting animal atop a riverbank rock, with the end of its tail still inside the water, became a reprised representation of the *Potamogale velox*, and resonated in many of its depictions since (Figure 4.4).[54] The tail dipping into the water referenced to the animal's aquatic behaviour. Du Chaillu used a very similar rendition of what he called '*Potamogale velox*, *Mythomys* of Gray' on the cover of his 1867 book (Figure 4.5). In Du Chaillu's cover, however, the giant-otter-shrew is holding down a fish with its front paws, suggesting Du Chaillu's claim regarding the animal's eating habits which had led to his original description of the animal as a carnivore. In his second travel book, Du Chaillu wrote that "28th of December was a happy day to me; for I succeeded in what I had been long wishing for, the acquisition of specimens of the curious otter-like *Potamogale velox*."[55]

Allman was never credited in synonymy because he didn't actually propose new nomenclature, and that is how the system of reward is set up. Some years later he would, however, be included in the future synonymy by means of a caricatural rendition of a supposedly new species. Frederick Jentinck (1844-1913) was a Dutch zoologist who specialised in mammals and revised mammalian catalogues at the Leiden Museum. He followed Schlegel as the director of the *Rijksmuseum van Natuurlijke Historie* and was one of the founders of the International Commission on Zoological Nomenclature. In 1895, he published on the *Potamogale* and went to London to check Du Chaillu's type specimen. He found discrepancies between the London and the Edinburgh's specimens. He concluded that these should be considered as variants of the same genus. And proposed yet another new name.

> In conclusion, if Allman's individual has not been decoloured by the action of spirits and has the skull not mutilated, and if Allman's description and figure of the animal are correct, we are obliged to accept that – his specimen may be a *Potamogale* – it very likely cannot belong to *P. velox*, and therefore ought [to have] a new specific title: in the latter case I call it *P. Allmani*.[56]

Jentinck's supposition is sometimes carried seriously in taxonomic indexes, which is a result of the synonymy system at work. When there is a new bibliographical reference, it is

[54] Alfred Russel Wallace, *The Geographical Distribution of Animals. Vol. 1* (London: Macmillan and Co., 1876).
[55] Paul B. du Chaillu, *A Journey to Ashango-Land: And Further Penetration into Equatorial Africa* (London: John Murray, 1867), 117.
[56] Frederick A. Jentinck, 'On Potamogale Velox Du Chaillu,' *Notes from the Leyden Museum* 16 (1895): 234–36.

added to the species' reference list and if the authors of the new compilation are not careful strange results may incur.

The importance of being *Bayonia*

After describing the *Bayonia*, Bocage published increasingly more in the African fauna and worked towards the augmentation of the colonial collections of the museum with materials from, what were at the time, Portuguese colonial territories. He managed a wide network of amateur collectors who provided him, back in Lisbon, with research materials. He would not publish on nomenclatural issues however, on his personal correspondence, and due to the nature of his work with new Portuguese and African species, he would often comment on them. In 1888, in his correspondence with Günther, he would rhetorically ask: "If we are to suppose a rigorous etymologic critique to all names generally adopted in zoological nomenclature, we would have to make countless changes. Has there been a reflection upon all the inconveniences that will derive from it?"[57]

Nevertheless, the usage of the name *Bayonia velox* persisted in the Lisbon Museum. In 1885, when Bocage was not working at the museum since he was between 1883 and 1886 a cabinet minister, and preoccupied with the handling of the Berlin Conference, the Zoological Section sent thirty specimens from the museum's collections to the Antwerp International Exhibition. Their shipment included one of the available specimens of *Bayonia velox*.[58] Labelling this specimen as *Bayonia velox* instead of *Potamogale velox* indicated the practice of regional or parochial usage that naturalists at large claimed not to use anymore. However, the mechanism in place of accepting synonymy as a recognised currency indulged this type of procedure, especially since exhibition specimens don't have the same status as specimens in type- or reference-collections. Insisting in the usage of Bocage's name reiterated the authority of both Bocage and the Museum of Lisbon. It also is a reminder of the underlying tension not only between naturalists and museums, but especially between identities and nations that hid behind the projects of nineteenth century international exhibitions.

Years later, in 1889, when Bocage himself was planning a more thorough work on the mammals from the Angola region, he published revised listings of the mammals from the

[57] Natural History Museum, London, DF ZOO/200/33/24, Correspondence from Bocage to Günther, 1888.01.24.
[58] AHMUL/AHMB – "n/identificados." 'Relação dos exemplares tirados das salas abaixo designadas e que foram para a exposição de Anvers' (s/d).

Angolan region which could be found in the Lisbon Museum. Now over twenty years after his first description, Bocage described the naming process in almost simplistic terms:

> In 1865 a female sent from Duque de Bragança by Bayão (…) allowed us to ascribe to it its truthful place; almost at the same time, Mr. Allman arrived from his side to the same results and published in the Transactions of the Zoological Society an excellent work.[59]

He then stated that, by then, the *Potamogale velox* was in its rightful place as an insectivore, and that the main characters of its organisation were now well-known. Since he profited from more regular shipments from the Angolan hinterland, he added to his notes the presence in the Lisbon collections of more specimens from new localities, adding more zoogeographic knowledge on the animal's distribution. With the help of Anchieta, Bocage could add to his research the "names given to it by the indigenous vary with their localities: in Duque de Bragança and Malange, *Cahocha* or *Cahotscha*; in Caconda, *Cachihérére* or *Cachihéléle*."[60] The inclusion of indigenous names to his scientific description may also be viewed as a further assertion of Portuguese presence in the Angolan hinterland. It was certainly a part of his work to demonstrate that the biogeographic region of Portuguese Africa could be best studied in the Portuguese museum.

In the nineteenth century, an animal from Africa was transformed into scientific knowledge only if and when it was validated and charted in museums' catalogues. The elusive *Potamogale velox* presented a taxonomic puzzle when only a badly preserved skin reached North American and European museums and scientific societies. This African animal turned out to be not so simple to classify and register as one would expect from the promises of binomial classification system. The animal was finally characterised with more reliable osteological characters only after new explorations and explorers in the region made new shipments. As a mono-specific genus, the new species was still difficult to name. Its "useless names" kept fuelling the 1860s debate among the many naturalists involved on the rules that should be adopted in nomenclature internationally.

Scientific names are not only about names, but also about things. Nomenclature also means attribution of holotype status to specific objects in specific museums. When they are

[59] José Vicente Barbosa du Bocage, 'Mammifères d'Angola et du Congo «Primates», «Chiroptera», «Insectivora»,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes (2ª Serie)* 1, no. 1 (1889): 30–31.
[60] Bocage, 'Mammifères,' p.30.

holotypes, specific specimens are, in this sense, carriers of double meaning.[61] On the one hand, they are substitutes for a whole species, and on the other, they are signifiers for a specific name, author, and date, for they indicate a specific moment in time congealed in a bibliographic reference that can in turn claim its author's priority. Acknowledgment, and reward, can also endure in synonymy. It happens that even if the bibliographic reference and name given become outdated by taxonomic revision it can still continue to be referenced in synonymy. For Sclater, the maintenance of Du Chaillu's name, even if it was then *Potamogale velox* and not *Cynogale velox*, meant that the British Museum would still keep a holotype in their mammal collections. For Gray, who opposed Du Chaillu's classificatory outburst, it was not just about his first reaction to the name *Cynogale*, but also about invalidating the status of holotype to a battered skin in "poor conditions." For Bocage, the name *Bayonia* meant claiming scientific capability over the vertebrate fauna of Portuguese Angola, and also the chance to have a keen, hopefully systematic, collector. To name a whole new genus after Bayão was a huge opportunity for the Lisbon museum to assert its own name, and Bocage's, in the international arena.

[61] Or even paratypes. A museum that holds paratypes, or specimens which came from the same collection as the holotype specimen also partially retain some of the aura of the original holotype (Walter Benjamin). Topotypes, specimens from the same geographical location as the original specimen, are another way for researchers to get better approximations to the holotype.

5.

A museum on paper

Amidst the permanent scent of alcohol evaporating from glass jars, and the surreptitious presence of beady glass-eyes on mounted specimens, a great part of a naturalist's work is surrounded by paper. Scientific books and catalogues, journal issues and offprints, notebooks filled with drawings and measurements, and specimen tags are but a few of the paper items essential for the work inside a zoology museum. Not to mention the vast amount of correspondence written and received every week. Paper technologies played a considerable role in daily routines, as well as in their final products, be they specimen collections organised in shelves and drawers; or the myriad of different types of published articles. Writing papers and books, revising them, and finally publishing them was supported by an intense use of paper notes, index cards, and constantly updated catalogues.

The main purpose of this chapter is to illustrate the diversity of the published materials of the zoological museum of Lisbon, and some of the paper tools of the trade behind the publication of catalogues, scientific books and journal articles. The rooms, cabinets, and specimens of the nineteenth-century Lisbon museum are long gone, however, all of them still dwell on the pages of books and articles published by its naturalists, and the many paper notebooks and specimen listings kept in its archive. Script and print on paper are the focus of this chapter.

Requisition for 2 paper notepads N. 3
Lisbon, January 15, 1886. J. A. de Sousa
Requisition for 4 paper notepads N.2; four N.5,
and a bundle of envelopes letter D.
Lisbon, January 23, 1886. A. Furtado
Requisition for 1 notepad N.3, a bundle of envelopes letter D,
three envelopes letter E.
Lisbon January 29, 1886. Lima e Lemos[1]

A small notebook ledger on the requirements of glass eyes and paper offers an interesting window into taxonomical practices (Figure 5.1). Each month every naturalist requested more paper, notepads and envelopes. This is part of an interesting set of bookkeeping documents of various sorts from the period of 1883-1886 held in the historical archive.[2] This notebook was one of the instruments used for the monthly tally of paper utilised by naturalists, assistants, and curators. It was also used to register another supply in great demand: glass eyes. These were bought in different shapes and sizes, to be used in the different mounted specimens of birds or mammals.[3] In the archive, the notebook is stored today in a larger folder containing similar logbooks with tables recording the usage of alcohol, glass jars of different dimensions, glass eyes of birds and of mammals, paper notepads, and envelopes. One entry log lists the different sizes of glass eyes used and the ins and outs of glass jars from the "jars room."[4] This type of documentation reflects the material needs and procedures occurring daily in a zoological museum, that will easily elude even the most attentive visitor of the exhibit rooms.

For the general public, the main outcome of the work done by naturalists were its public rooms covered with shelves and cabinets full to the brim with specimens mounted in stands, preserved in glass jars or pinned down in display cases. During its first decades, the zoological museum of the MNL, was mostly reserved to EPL students or special visitors such as fellow naturalists. Although irregularly, it was also opened to the broad public on Thursdays.[5] As a

[1] See Figure 5.1, AHMUL/AHMB/Div223, "Requisições de olhos d'aves e de papel," [Requisition notebook for glass eyes and paper]. Paper requests page for January 1886 signed by curator of birds José Augusto de Sousa; assistant naturalist Arruda Furtado; and curator of the royal collections José Maria de Lima e Lemos.
[2] The provenance of the documentation in the AHMB is not clearly established. It can, however, be posited that there is no coincidence between this chronological large set and the fact that Bocage was not working in the museum in the same period, while he was Minister.
[3] Glass eyes for taxidermy were handcrafted and produced by a handful of companies, and still today are a highly specialised object. Jack Thiney, 'Les Yeaux Artificiels des Animaux Naturalisés,' in *Mort Ou Vif. Chronique d'une Taxidermie Contemporaine* (Paris: Éditions de la Martinière / Muséum National d'Histoire Naturelle, 2014).
[4] The reference AHMUL/AHMB/Div467 is not a single document and indicates a set of tables and logbooks for the period 1883-1887. The "glass jar rooms" is referred in AHMB DIV 467(1) "Museu Zoologico. Relação dos Diversos Utensilios pertencentes á casa dos frascos. 1883," that lists the instruments that belonged to that room. That list also includes "23 alphabet letters opened up in zinc plate"; and "1 zinc plate with the name Anchieta," suggesting a special plate was made exclusively for the specimens sent by the naturalist Anchieta (see chapter 6).
[5] There are few references to the opening of the museum other than the directors' complaints of not being able to open it to the public due to budgetary constraints. Presumably there was no entrance fee. In 1865, the museum had not opened to the public

specialised museum, its main focus was on the work with collections, and at the Lisbon museum there was almost no distinction between research collections and public collections. The number of glass-eyes purchased and used suggested by these documents indicates that a large part of the vertebrate collections of birds and mammals was mounted. This in turn suggests that a large portion of the space of the museum was set as public rooms, confirming the distribution in the 1880s map by Arruda Furtado (Figure 1.3).

The organisation and identification work going on behind the scenes was first published as a partial catalogue of the bird collections in 1869. Several other catalogues, inventories and partial listings of specimens in the collections were written, filled in, and updated on a regular basis on manuscript notebooks or separate pages. These were not published, although they could be sometimes shared with other naturalists in Portugal and abroad, in order to communicate specific holdings, or to exchange duplicates. In print, although the most notorious author was Bocage, all the assistant-naturalists and the keeper of the zoological museum published work on new shipments and new species added to the collections. By 1877, Bocage gathered funding for a three-book project that would hold all known data on the vertebrate fauna of Angola (chapter 6). The data gathered in this project was accumulated on sheets of paper, index cards, handwritten and printed catalogues, and many journal articles before it took the format of monographs. Between receiving shipments and the publication of printed knowledge, there were intermediary stages of coordinated management of information.

This chapter focuses on the relationship between printed materials and script documents such as manuscript catalogues and correspondence. The first section of this chapter will contextualise the bird catalogues published by José Augusto de Sousa, the museum bird curator, and by ichthyologist Felix de Brito Capelo. Catalogues were and still are crucial documents in museums, libraries, and archives, for they demonstrate its possessions and are testimony to its riches. Printed catalogues of the museum were usually made in sections, by each curator, and are constantly being updated. The second section offers an overall description of the periodical *Jornal de Sciencias Mathematicas Physicas e Naturaes* (1866-1923), (henceforth *Jornal*). I will focus on the zoological papers written by the Lisbon museum naturalists printed on the *Jornal* which were the predominant topic of this periodical.

yet, but was opened probably around 1869, and definitely in 1877 according to AHMUL/AHMB/Div158, Bocage to EPL director, 1877.11.29. In 1883, there is one mention to the museum opening on Thursdays, continuing a tradition set at least since the Royal Museum of Ajuda of opening on that weekday: "the public goes on Thursdays to the School to visit the precious zoological riches." Serpa Pinto, 1883, p.1. Original text: "o publico (...) vae ás quintas-feiras á Escola visitar as preciosas riquezas zoologicas."

The catalogue as a "faithful mirror"

A zoological museum has a fixed location. Although it receives shipments from possibly the whole world and it circulates parts of its collections within the network of naturalists it works with, it is still a fixed structure in a specific building. In order to become visible to its counterparts in other museums in other buildings in other cities, a museum needs to publish its catalogues and let the world know of its holdings. Catalogues are the determination of a museum's physical matter, size, and power. Or, as Bocage put it, "the faithful mirror where it is portrayed the importance of these establishments of uncontested utility."[6] Certain catalogues focused on the revision of a specific taxonomic group, others described all the known animals of a specific family. Others focused on a museum's holdings and mentioned its type-specimens. These were the specimens selected by the first describer to write and publish the original diagnosis of a certain species. The platonic shadow that represents all the series. Type-specimens are the highlight of a museum's collections and a measure of its success. To accumulate significant numbers and series of specific species was of course relevant in itself, for geographical distribution was one of the nineteenth century's scientific agendas. But type-specimens are the treasures of a museum's collection. To ascertain priority in description, as I have shown in the previous chapter, publishing as promptly as possible in a periodical article format was paramount. But to ascertain the range and authority of a museum from the whole of its collections, a museum needed to publish catalogues.

In its first decade the Lisbon zoological museum published partial catalogues of the ornithological and the ichthyological collections. José Augusto de Sousa, the curator of the ornithological collections, and Felix Brito Capelo, the assistant naturalist in charge of the fish collections published catalogues in 1869, 1873 and 1880. Sousa's published work was very different from Capelo's work. Sousa published in 1869 and 1873 partial catalogues of the parrots, birds of prey, pigeons, and land fowl collections existing in the Lisbon museum.[7]

The 1869 catalogue, the first published by the museum, had a three-page introduction by the museum's director. In it Bocage put forward that the role of that catalogue was to stimulate and "attract the attention of the less competent for many objects they would not notice." As a substitute for a tour guide, the catalogue was a "discreet and complacent cicerone" to visitors

[6] Sousa and Bocage, 3. Original text: "[os catálogos] são (...) o espelho fiel onde se retrata a importancia d'estes estabelecimentos de incontestavel utilidade."
[7] José Augusto Sousa and José Vicente Barbosa du Bocage, *Catalogo das Collecções Ornithologicas I. Psittaci – Papagaios, Accipitres - Aves de Rapina* (Lisboa: Imprensa Nacional, 1869). José Augusto Sousa and José Vicente Barbosa du Bocage, *Catalogo das Collecções Ornithologicas II. Collumbae - Pombos, Gallinae - Gallinaceos* (Lisboa: Imprensa Nacional, 1873).

of the museum.[8] He characterised the visitors to the museum as the "averagely educated" social class. Bocage usually dismissed museum audiences and was often frustrated with the lack of interest on the museum from the EPL's students. Nonetheless, according to Bocage the publication of catalogues was "one of the conditions for the better usage of the zoological collections of our national museum." Bocage took the opportunity to claim the importance and utility of the Lisbon museum as of "uncontested utility" and the catalogues as the "faithful mirror" that portraits it.

As previously stated Bocage's nationalistic agenda was reinforced by the program of the MNL, to study national fauna. To present publicly the work of the museum in a catalogue meant to "attract attention" and reach out to the bourgeois Lisbon publics. The 1869 catalogue was nevertheless primarily a scientific document and absolutely impenetrable for those not initiated in the procedures of a taxonomic list. Contrarily to Bocage's suggestive "cicerone," this catalogue was a statement of the museum as a research institute dedicated to expert knowledge. Or, as Bocage put it, in order not to be excessive in volume, he "had to restrict [the catalogue] to the enumeration of the species and the specimens that represent it."[9]

Because this was a catalogue of holdings, i.e. referring to the actual physical specimens that the museum held, the catalogue mentioned for each species, each specimen. The catalogue lists 204 species in the *Psittaci* order (today *Psittaciformes*, parrots), and 223 different species in the *Accipitres* order (today *Accipitriformes*, rapacious birds). Each of these 427 species was followed by an indication of the individual specimens owned by the museum. When there was more than one specimen of the same species, they usually represented different geographical locations, and/or the variations between male, female and young. A catalogue of this type, however, did not include duplicates.[10] For each species, the relevant synonymy references were added, and, for each specimen, the list carried geographical provenance and how the specimen was included in the collection. For example, specimens that had been acquired from the transferral of the Academy's museum to the EPL carried the signifier "C.A.," for *Colecção Antiga* (old collection), and the specimens that had been bequeathed from the royal collections

[8] Sousa and Bocage, *Catalogo I*, 3. Original text: "Servem estes catalogos de cicerone discreto e complacente para os frequentadores do museu que estão em circunstancias de dilatar a sua instrucção pelo exame dos documentos scientificos ali coordenados, attraem a attenção dos menos competentes para muitos objectos de que aliás se não aperceberiam, concorrem para promover nas classes sociaes medianamente cultas o gosto por uma das mais bellas sciencias da natureza(...)"

[9] Sousa and Bocage, 4–5. Original text: "Para não avolumar demasiadamente estes catalogos, tive de os restringir á enumeração das especies e dos exemplares que os representam."

[10] Museums maintain as many duplicates as possible with which to trade with other museums. See, for example, Catarina Madruga, 'The Zoological Collections of the Museu de Lisboa and the Networks of Scientific Correspondence and Exchange (1858-1898),' in *The Circulation of Science and Technology: Proceedings of the 4th International Conference of the ESHS, Barcelona, 18-20 November 2010*, ed. Antoni Roca-Rosell (Barcelona: SCHCT-IEC, 2012), 928–33.

were identified with "M.R.," for *Museu Real* (Royal Museum). Thus, for each entry, a list of the available specimens was presented as follows:

> 200. Ptilopsis leucotis. (Temm.)
> Strix leucotis, Temm. – Scops leucotis, Sw. – Ephialtis leucotis, Bp. – Pl.col.16 – Consp. Av. p. 45
> a. Africa. C.A.
> b. Abyssinia. Compr. a mr. Verreaux.
> c. Angola. (Rio Chimba.) Nome vulgar *Cucôto*. Exploração do sr. Anchieta.
> d. Nubia Superior. M.R.
> e. Soudan. M.R.
> f. Abyssinia. M.R.[11]

In this example, the Northern white-faced owl was given a sequential number (200) under the larger heading of the Order *Accipitres*. The number was followed by its most updated nomenclature, *Ptilopsis leucotis*, and referenced to its author (Temm.), the Dutch ornithologist Conrad Temminck.[12] A proper taxonomical designation also included the reference to the very useful earlier names and descriptions with their bibliographical mentions. In this case, the reference book, Charles Bonaparte's *Conspectus Generum Avium*, published in 1850, was mentioned in its abbreviated form "Consp. Av.," recognisable to all ornithologists and a part of the discipline's jargon. From this stub, a nineteenth-century as well as a twenty-first century ornithologist can learn that *Ptilopsis leucotis* was the updated designation that Temminck gave to three earlier other names, *Strix leucotis*, given by Temminck himself; *Scops leucotis*, given by "Sw.," i.e. William John Swainson; and *Ephialtis leucotis*, named by Bonaparte.[13] The three names correspond to the three times the same species is thought to have been described before. The different names are called synonyms and, as I have described in the case of the *Potamogale velox* (see previous chapter), every known describer receives credit and recognition through the endless reiteration that catalogues provide. The listing of synonymy is also an indicative of how this particular mode of science is dependent on books and bibliographic references in order to compare and produce new knowledge.[14] As Alex Csiszar has noted, bibliographical search for printed sources sometimes in foreign periodicals had considerable impact in the practices of systematics and taxonomical science. Csiszar wrote that zoologists were concerned with the

[11] Sousa and Bocage, *Catalogo I*, 59.
[12] *Ptilopsis leucotis* is a valid nomenclature and still in use. On Temminck, see Gassó Miracle, 'Temminck's Order.'
[13] The Northern white-faced owl existed in several European collections and was described by the Dutch Conrad Temminck (1778-1858), the French Charles Bonaparte (1803-1857), and the British William John Swainson (1789-1855).
[14] Alex Csiszar, 'Seriality and the search for order: Scientific print and its problems during the late nineteenth century,' *History of Science* 48, no. 3/4 (2010): 9.

"scourge of synonymy, whereby species were constantly being renamed by new discoverers, not simply because of bad etiquette, but because there were few systematic means of ascertaining prior discovery." Each new name a species was ever given corresponds to a specific printed page. New names derive from new information, more specimens or more complete ones, but they can also originate from changes in the placement of the biological families as systematics gets revised over time.

The comprehensiveness of this format enabled a partial reconstitution of the bird collection size and provenance range. This catalogue was, in fact, a repository of all the information gathered on the specimens featured. The curator's work was delivered in full via this type of listing catalogue. It was a direct result of the knowledge of each specimen of each identified species. This catalogue could be considered a "faithful mirror" because it allowed a shelf by shelf account, meant for a very interested reader who could in theory follow the physical room of the ornithological collection. However, as it becomes clear from a careful reading of the listed items, the jargon used limited the readership to ornithologists, excluding the lay visitor of the museum. The proposed "cicerone" was not more helpful than the reading of the specimens' labels in the museum room itself. So, it was not in fact a popularisation tool. Once again, the zoological section, even though occasionally opened to the public maintained its position as a research museum.

This type of listing was completely contingent to the holdings of the museum. In Bocage's words, a "methodical catalogue, where the specimens are indicated by the scientific order adopted in their definite placement in the galleries."[15] They needed to be updated as more specimens entered the collections, as well as in the case when any specimens were irretrievably damaged and were eliminated. The printed pages of catalogues represented the ongoing work of the curatorship and, most relevantly, remind us of how a scientific collection becomes shared and replicable knowledge.

The catalogue of the bird collection was one of the national museum's responsibilities and, accordingly, it was printed at the Imprensa Nacional. In contrast, Felix Brito de Capelo's catalogue of fishes was posthumously published as a memoir presented at the ACL, and printed by the Academy's typography.[16] In fact, Capelo published with the ACL press his work on the

[15] Sousa and Bocage, *Catalogo I*, 3.
[16] Felix Brito Capelo and José Vicente Barbosa du Bocage, *Catalogo dos Peixes de Portugal* (Lisboa: Typographia da Academia, 1880).

fishes of Portugal, since 1865.[17] And he eventually became, just like Bocage, a member of the ACL.[18] According to Bocage's prologue to the posthumous Portuguese fishes catalogue, the final manuscript was compiled by Sousa after Capelo died. Bocage described with some sadness the untimely loss of his "colleague and friend" with whom he had worked and published.[19] Seemingly, Felix Capelo had a "natural and excessive modesty" that prevented him from promoting his new findings and publishing in his own name.[20]

This was a different sort of catalogue. Capelo's catalogue of fishes of Portugal was geographically determined and therefore was not contingent on the existing specimens in the Lisbon museum. It could eventually even include descriptions of specimens existing in other collections. This was a common practice in larger museums that accumulated fauna from all over the world and had large reference collections. Capelo's catalogue listed 267 fishes, however Bocage claimed that "future research would increase that number of species."[21] Differently from the bird catalogues, this publication contained in the final pages the list of former articles published, an index of families, genera, and species, as well as an appendix of the common names mentioned in an earlier publication.[22]

Capelo's catalogue was the culmination of several years working on new and existing species of fishes of Portugal for which he solicited the help of Bocage. By this I mean that Capelo's work was also to be in contact with local fishermen and to try and get new species for the museum's collections. As early as 1864, Bocage had had contact with the Viennese naturalist Franz Steindachner while he was visiting the Iberian Peninsula.[23] According to Bocage, Steindachner requested to "examine [and identify] the fishes from our rivers that existed in the museum," and Bocage "authorised him to publish in his own name any species he found to be new." This meant that, as with many zoological collections, the rate of incorporation of specimens overcame the pace of the curator's identification abilities. Indeed,

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[17] José Vicente Barbosa du Bocage and Felix Brito Capelo, 'Diagnose de algumas especies ineditas da familia «Squalidae," que frequentam os nossos mares,' *Memorias da Academia Real das Sciencias de Lisboa. Classe de Sciencias Mathematicas, Physicas e Naturaes* 3, no. 2 (1865).

[18] Felix Brito Capelo was made member of the ACL in 08.11.1866. This information I owe to José Alberto Silva whom I once again thank.

[19] Capelo and Bocage, *Catalogo dos Peixes*, iii. Original text : "nosso saudoso collega e amigo."

[20] Reserve and self-effacement were characteristics highly prized by Bocage and Capelo's was a sorrowful passing, the first of five assistants that Bocage outlived. Capelo and Bocage, ii. Original text : "modestia natural e excessiva."

[21] Capelo and Bocage, ii. Original text: "ulteriores investigações hão de elevar o numero das especies que ahi ficam apontadas."

[22] Capelo and Bocage, 55–73.

[23] Franz Steindachner (1834-1919) was a Viennese ictiologist and herpetologist, who travelled extensively. During 1864 and 1865 he visited the Iberian Peninsula and met with Bocage in Lisbon. Bocage, *Relatorio*, 10. Between 1870 and 1873 he was in Cambridge, MA, invited by Louis Agassiz. A series of duplicates from the Thayer expedition organised by Agassiz were sent to the Vienna Museum as result. Mary P. Winsor, *Reading the Shape of Nature. Comparative Zoology at the Agassiz Museum* (Chicago and London: The University of Chicago Press, 1991), 76.

in 1864, Steindachner published a new species, which he named in honour of Bocage, *Luciobarbus Bocagei*, the Iberian Barbel. The Lisbon museum often had its collections identified and described by foreign naturalists.[24] By arranging trustworthy associations with other naturalists Bocage could boast, in this case, that "our museum possesses the collection of all river fishes hitherto discovered in the country, determined by a most competent person."[25] National rhetoric notwithstanding, in the social space of the production of natural knowledge and systematics all hands were useful and, indeed, necessary.

Systematic catalogues were the location to lay down the scientific organization adopted in the "definitive placement in the galleries."[26] We are compelled to imagine that Sousa's catalogues somewhat followed the shelves of the cabinets in the museum galleries. However, not all collections were on display, and the catalogue was probably a reflection of the series of mounted birds of the display collection. For the taxonomical work, however, not every bird needed to be mounted and displayed, and bird skins fitted nicely into closed drawers occupying less storing space.

The hierarchical structure of taxonomical rank underlying the catalogues published by Sousa corresponds to the manuscript catalogues of the Royal Museum. Each Order has a sequence number, and the first was *Psittacci*.[27] Specimens in the Royal collections maintained their identity as such, because provenance and origin in museum catalogues could also include the original owner, or donor. When manuscript catalogues were organised by species, such as these ones, they used a column for a sequenced reference number, a column for genera and species names, a column for geographical location, and a column for provenance (collector).

The same underlying hierarchy of taxonomic rank can be observed in manuscript catalogues even when they served different purposes. Some were organised by physical location within the museum itself. Like today, each specialization within zoology was reflected in the curation of the collections. There were rooms, cabinets, and boxes dedicated to birds,

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[24] The Lisbon museum kept a constant exchange of specimens with other European museums, particularly dedicated to Angolan collections, see for example the exchange between Bocage and Alphonse Milne-Edwards (1835-1900). Paris, Archives Patrimoniaux Documentals Muséum d'Histoire Naturelle, Ms.2472/18. Bocage to Milne-Edwards, 1866.07.08. "As you will see these crustaceans are for the most of them from Western Africa, but there are also a few from Portugal." Original text: "Comme vous verrez ces crustacées sont pour la plupart de l'Afrique occidentale, mais il ya a aussi quelques uns de Portugal."

[25] Bocage, *Relatorio,* 10. Original text: "Um zoologista alemão, bem conhecido por muitos e interessantes trabalhos, e que ocupa no célebre museu de Viena o cargo de naturalista-adjunto, o Sr. Steindachner, por ocasião de uma viagem que fez recentemente a Portugal, pediu-me que o deixasse examinar os peixes dos nossos rios que existissem no museu. Acedi com viva satisfação a este pedido, e autorisei-o a publicar em seu nome as espécies que encontrasse novas. Assim fez, e hoje possui o nosso museu a colecção de todos os peixes de água doce até aqui descobertos no país, determinados por pessoa competentíssima."

[26] Sousa and Bocage, *Catalogo I*, 3.

[27] See AHMUL/AHMB/Rem035, "Catalogo das Aves do Museu Real."

mammals or reptiles, for example. Each glass jar in the wet collections (i.e., preserved in alcohol) had sequential numbers and their catalogues listed how many specimens of each species were in each jar. Dried skins collections were organised in boxes or drawers, which were also given numbers. Some organisation was required in order to manage so many thousands of specimens and occasionally logbooks were opened to assure a correct tally of the many drawers and cabinet space. One catalogue referred to the number of the box, and the number of the cabinet it was stored in.[28] Like many other natural history museums, the display cabinets in the museum's exhibition rooms had locked drawers which stored research collections. Not all groups of animals existed in the same quantities nor occupied the same amount of space, and cabinets in the reptile room accommodated, at some point, a part of the bird skin collections, an evidence of the large numbers of the ornithological collections.[29]

Most of the catalogues produced were manuscript and, therefore, meant for internal organisation and not for publication or for the museum's general audiences. Indeed, that the museum was able to publish a printed catalogue of its ornithological collections in 1869 was an important feat. The Lisbon museum's catalogues, although being essentially the result of Sousa's "unsurpassed zeal" as the responsible for the ornithological collections, were not signed.[30] Instead, both catalogues had introductions authored by Bocage who clarifies that Sousa was behind the catalogue. He added that because the work was so "conscientious" that he was "sure of its exactitude" and that was why he, as the museum director, authorised its publication.[31] A museum's catalogue does not necessarily need to have an author, however London's natural history museum for example regularly published its catalogues and they were signed by each of the specialised curators.[32] In Lisbon, it was not only the difference of scale and budget that was behind this practice but also the social distinction existing in the EPL between its professors, who were educated in the University of Coimbra such as Bocage, or in the EPL, and the museum personnel who lacked academic distinctions despite their expertise. José Augusto Sousa had published before while he was still an employee in the Necessidades Palace's collections and garden, and as keeper for the MNL published many articles under his

[28] AHMUL/AHMB/Rem009, "Catalogo Pelles de Mammiferos d'Angola em Deposito."
[29] AHMUL/AHMB/Rem077, "Lista das aves d'Africa occidental portugueza que estão nas gavetas da sala dos reptis" (s/d); and AHMUL/AHMB/Rem078, "Lista das aves da collecção geral existentes nas gavetas da 1ª e 3ª sala, e no gabinete verde" (s/d).
[30] Sousa and Bocage, *Catalogo I*, 3–4. Original text: "zelo inexcedivel."
[31] Sousa and Bocage, 4. Original text: "Por considerar este trabalho consciencioso, e estar seguro da sua exactidão quanto m'o permittem os meios do exame e confrontação do que posso dispor, é que auctoriso a sua publicação."
[32] An example was the Catalogue of Fishes in the British Museum produced by Albert Gunther between 1862 and 1870.

own name. Sousa was also in correspondence with European naturalists who knew his published work and would often acknowledge him in their correspondence with Bocage.

Other types of catalogues, which were not meant to be published were produced as reference for the collection management. Incoming shipments needed to be acknowledged, the specimens sorted and identified, and properly tagged. The information in the tags was typically copied to a list of holdings. More lists needed to be drafted to register the physical location of the specimens in the museum rooms, or in a specific cabinet. Specific lists could refer to a box that stored a specific shipment.[33]

Some of the listings and partial catalogues were published as articles in periodicals. Both manuscript and printed listings can be arranged into different typologies depending on different criteria. Physical location, provenance (collector or provider), and geographical origin were the main factors behind scripted records of the collections. The printed catalogues authored by Sousa and Capelo were two of the several produced by the Lisbon museum. They revealed distinct purposes and different organisations of knowledge. Sousa's was limited by the physical holdings of the museum on a specific hierarchical group of birds; while Capelo's was focussed on a geographical group within the fish collection. Both catalogues represented the museum's collections and their scope, and together with the many articles in periodicals, the printed listings consolidated the work done behind the scenes by the museum's assistant-naturalists. Publications contained new additions to knowledge, and delimited, updated, and established collections of specimens. Book-keeping as well as publishing were crucial to the definition of the place of the Lisbon museum within the European network of museums. The circulation of scientific periodicals and offprints was decisive in the making of taxonomical science in the nineteenth century.

The crucial role of the *Jornal*[34]

> Unfortunately, in our country there is no easy means of publication and vulgarisation of the facts interesting to science. We don't have a single journal (...) where one could find writings of descriptive zoology. We also don't have in the museum's meagre stipend room to make these publications on our own. The royal academy of sciences is our only refuge, when it honours us by printing the works we present; but it is

[33] AHMUL/AHMB/Rem080, "Caixa F. Lista das aves d'Africa Occidental portugueza offerecidas pelo Snr. Dr. Jacintho Antonio de Sousa Junior e pelo Snr. Francisco Newton" (s/d).

[34] This section is based on my research for the chapter in the forthcoming edited volume on nineteenth-century science, technology and medicine in Portugal, organised by CIUHCT, "A Comunidade Portuguesa de Naturalistas: museus, periódicos e redes de circulação."

> obvious that the memoirs of our academy, irregular and slow in their publication are not able to entirely supress this lack.[35]

Complaints about the Lisbon museum's "meagre stipend" were common and usually invoked when Bocage wanted to draw attention to how understaffed the zoological museum was. In the 1865 report Bocage also mentioned the need to publish in a periodical way the "writings of descriptive zoology." The EPL did not possess its own press, and thus the catalogues mentioned earlier were either printed by the national press or by the Academy of Sciences. For episodic publications this was sufficient perhaps, however the "irregular and slow" pace of publication of the Academy's memoirs and minutes presented problems to a periodical publication of the museum's work. Other European museums that Bocage used as gauge for his museum's progression published regularly their catalogues, listings, and their findings not just in monograph format but also in periodicals such as the *Revue et Magasin de Zoologie Pure et Appliquée*, edited and founded by Félix Edouard Guérin-Méneville, or the *Proceedings of the Zoological Society of London*, edited by Sclater. Bocage knew these periodicals well because since 1865 that he was a published author on both of them.

A periodical and regular way of publication was an urgent need for the museum's work. It was as a conduit to publish materials, and secure priority when describing new species, but also a way to exchange periodicals with other institutions. Publishing the "facts interesting to science" was also possible within the scope of more generic periodicals, but it would not present the best conduit for a relationship with other museums and scientific institutions with periodical bulletins. Within the EPL, the discussion about publishing a yearbook was on going since its beginning in the late 1830s.[36] One of its several scientific bodies, the meteorological institute, published its tables and reports since 1853, and after 1863 in their own publication.[37] However, the publication of weather maps and associated observations had a longer tradition and perceived utility than the works of "descriptive zoology" could aspire. If the zoological museum could not find support within the school's budget, it sought "refuge" in the ACL's publications.

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[35] Bocage, *Relatorio [1865]*, 20. Original text: "Infelizmente não ha no nosso paiz meios fáceis de publicação e vulgarização dos factos que interessam á sciencia. Não temos um só jornal, não digo já consagrado exclusivamente á zoologia, mas onde caibam e onde se vão procurar escriptos sobre zoologia descriptiva. Não temos também na escassa verba do museu margem para fazer por conta do nosso estabelecimento estas publicações. É nosso único refugio a academia real das sciencias, quando nos faz a honra de auctorisar a impressão dos escriptos que lhe apresentâmos; mas é obvio que as memorias da nossa academia, irregulares e demoradas em sua publicação, não estão no caso de poderem suprir inteiramente a falta que apontei."
[36] AHMUL/EPL Livros de Actas do Conselho da Escola Politécnica, (Council minutes) Book 2, meeting 1839.06.01.
[37] Joaquim Henriques Fradesso da Silveira, 'Introducção,' *Annaes do Observatorio do Infante D. Luiz* 1 (1863): v–viii.

Traditionally the ACL published the proceedings and the minutes of its meetings in the form of a serialised publication titled *Memorias da Academia*, Memoires of the Academy, hereafter *Memorias*.[38] After the opening to new members in 1854, and during a brief period between 1857 and 1858, the ACL issued a new title. The new periodical was the *Annaes das Sciências e das Lettras. Sciências Mathematicas, Physicas, Histórico-Naturaes e Médicas*, Annals of Sciences and Letters. Mathematical, Physical, Natural-historic and Medical Sciences, hereafter ASL, an all-inclusive title that embodied the recent new rules of the First Class of the Academy.[39] The editor, João de Andrade Corvo, was one of the new members of the Academy and proposed a middle ground for the publication of works of scientific and technical interest.[40] In his editorial he claimed that, after centuries of fostering an elitist background, science was "of all and for all."[41]

Together with the reformation attempts inside the Academy of Sciences, this new journal was meant to enlarge the scope and reach of the work in the Academy. Unlike the longer essays published in the *Memorias*, this short-lived experience introduced new article typologies more akin to other, more general, weekly publications. For example, the section *Variedades*, a section on miscellaneous topics, contained short articles that showcased and popularised technical and scientific novelties. Other sections were the *Revista Estrangeira*, a foreign review, and the *Revista dos Trabalhos Chimicos*, a review of chemical works review, where Andrade Corvo and Júlio Máximo de Oliveira Pimentel signed reviews describing recent events, findings and results achieved by foreign scientists in other academies and scientific societies. The ASL also published meteorological synoptic charts of the recently created observatory of the EPL. In fact, even when the authors in the ASL were either members of the ACL or professors at the EPL, the shorter format of the articles suggests their aim at a broader readership. [42]

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[38] On the first decades of the ACL, see José Alberto Silva, *A Academia Real das Ciências de Lisboa (1779-1834): Ciências e hibridismo numa periferia europeia*, CIUHCT 8 (Lisboa: Edições Colibri, 2019).

[39] The ACL engaged new members from 1854 onwards opening up to the crescent professionalisation in the sciences, see chapter 1.

[40] João de Andrade Corvo was a prolific author, editing generic periodicals, publishing on science popularisation matters, and theatre plays. He was a student at the EPL, where he became professor, and responsible at some point of the Botanical course and Botanical Garden. He also taught in the Instituto Agronomico de Lisboa, and was elected member of the ACL in the same date as Bocage, and a personal friend. He was also an accomplished politician, a member of parliament, a minister for many years, and a diplomat.

[41] João de Andrade Corvo, 'Introducção,' *Annaes das Sciencias e Lettras* 1, no. 1 (1857): v. Original text: "a sciencia é de todos e para todos."

[42] An abridged version of this section, where I summarised the various periodicals and museums of natural history was submitted as chapter "A Comunidade Portuguesa de Naturalistas: museus, periódicos e redes de circulação" in the projected *História da Ciência, Tecnologia e Medicina em Portugal* edited volume coordinated by Ana Carneiro, Isabel Amaral and Teresa Salomé Mota (forthcoming).

In 1866 the *Jornal das Sciencias Mathematicas Physicas e Naturaes* (Journal of Mathematical, Physical and Natural Sciences, henceforth *Jornal*) became the new scientific periodical of the ACL. It was to become the most durable and consistent scientific periodical publication in Portugal, apart from the scientific and literary *O Instituto. Jornal Scientifico e Litterario*, The Institute. Scientific and Literary Journal, published in Coimbra.[43] The *Jornal* included all the scientific areas comprised in the academic section: mathematics, physics and chemistry, and natural history – geology, botany, and zoology.[44]

The first proposal for its creation was put forward in 1864 by several members, including Bocage who suggested the title *Bulletin da Primeira Classe da Academia Real das Sciencias de Lisboa* (Bulletin of the first class of the Royal Academy of Sciences).[45] Creating a bulletin would mean a narrower relationship exclusively with the members of the ACL. And even if the new title of the *Jornal* was still a vestige of the full name of the ACL section, it left more room to open up publication to non-members. It was nevertheless commonly referred to as the Academy's journal or the Lisbon Academy journal, and Bocage often imprecisely abbreviated its title as *Jorn. da Acad. das Sc. de Lisboa*, as the Journal of the Academy of Sciences of Lisbon.[46]

The *Jornal* was regularly published from 1866 to 1923, with a larger interruption between 1910 and 1917. The first series ran from November 1866 to August 1888, lasting almost 22 years, comprising twelve volumes and 48 issues, with at least one issue per semester. The second series ran from March 1889 to November 1910, containing seven volumes and 28 issues. However, between issue number 27, and the final issue number 28, there was a gap of over four years. The third and final series was resumed seven years later and ran between January 1917 and January 1923, producing only three volumes. The third series updated the title according to the new orthography to *Jornal de Ciências Matemáticas, Físicas e Naturais* but, by them, the overall range of authors and disciplines was strikingly different. The gap between the last number in the second series and the beginning of the third was according to

[43] *O Instituto: jornal scientifico e litterario* (Coimbra, 1853-1981) published by the University of Coimbra, contained literary as well as scientific papers. See Daniel Pires. *Dicionário da imprensa periódica literária do século XX* (Lisboa: Grifo, 2000).
[44] Excluding the medical community, whose medical papers continued to be published in the *Memorias* and who also had their own *Gazeta Medica de Lisboa*. Occasionally the *Jornal* published medical papers as well, including some by Antonio Barbosa, member of the ACL, doctor to the royal family and Bocage's brother-in-law.
[45] Ana Patrícia Morais da Fonseca Martins, 'Daniel Augusto da Silva e o Cálculo Actuarial' (Ph.D. dissertation, Universidade de Lisboa, 2012), 177.
[46] See, for example Bocage's bibliographical list published in 1901 where this abbreviation is used. José Vicente Barbosa du Bocage, *Publicações Scientificas (1857-1901)* (Lisboa: Typographia da Academia Real das Sciencias, 1901). Many of Bocage's correspondents referred to the *Jornal* in this way, and several zoology scientific papers also cite it this way.

the editors of the third series precipitated by Bocage's demise in November 1907, followed by the death of Nery Delgado in August 1908, substantially weakening the editorial board.[47]

When it first appeared, the *Jornal* received high praise by the weekly *O Panorama,* an illustrated newspaper dedicated to general scientific and literary instruction. The new "exclusively scientific" periodical was described as a "beautiful thought" of the Academy aimed "not only [at] the associates of that corporation, but rather [where] other learners of science in Portugal can issue their writings," quoting directly from Coelho's introduction.[48] The creation of the *Jornal* was also picked up by European naturalists, and was received with enthusiasm by the more specialised French periodical *Revue et Magasin de Zoologie Pure et Appliqué* where Bocage had previously published. Reviewer and naturalist Félix E. Guérin-Méneville described the new periodical as "showing that the Portuguese scholars have put their heart into not being left behind by other nations, proving they are at the same height of the scientific movement of all countries." [49] In the following analysis I concentrate on the first series of the *Jornal*, spanning from 1866 to 1910. These first two series were published in the second half of the nineteenth century and represent the main scientific interests as well as the shifting disciplinary boundaries.

The first numbers were mostly inspired by the same organisation of the *Memorias*, with a sequence number for each article, and each paper starting in an odd numbered page. This was useful when the articles circulated as off-prints, each with their own page number starting afresh. There was also an indicator of the internal divisions by subject matter before each of the categories, that followed the title of the *Jornal*: Mathematics, Physics and Chemistry, Zoology, Botany, Geology, and Varieties or Bibliography. For the most part physics and chemistry were under the same heading. From the ASL, the *Jornal* maintained the end section *Variedades* where some of the authors wrote short texts on recent publications. Similarities with the ACL's *Memorias* include the publication of feedback on proposals made to the ACL's

[47] Interestingly, the editor of the new series offers no mention to the radically different political regimes between one series and the next, nor does he correlate any of the gaps with the February of 1908 assassination of King D. Carlos I, and the 1910 final issue with the almost contemporary Republican Revolution in October 1910. João Maria de Almeida Lima, 'Advertência,' *Jornal de Sciencias Matemáticas, Físicas e Naturais*, 3rd Series, 1, no. 1 (1917): v–vi.

[48] José Silvestre Ribeiro, 'Secção Bibliographica,' *O Panorama: jornal litterario e instrutivo da sociedade propagadora dos conhecimentos uteis*, 5, 17, no. 19 (1867): 154. Original text: "Foi por certo um bello pensamento, o da Primeira Classe [...] de fundar um Jornal exclusivamente scientifico, no qual, não somente os socios daquella corporação, senão os demais cultores da sciencia em Portugal podessem estampar os seus escriptos." This review also called attention for how the market for "these publications wouldn't even pay printing costs."

[49] Félix Édouard Guérin-Méneville, 'Analyses d'ouvrages Nouveaux,' *Revue et Magasin de Zoologie Pure et Appliquée*, 1867, 375. Original text: "C'est un intéressant recueil de travaux originaux, analogue aux jornaux scientifiques des autres pays, montrant que les savants portugais ont à coeur de ne pas se laisser distancer par ceux des autres nations, et prouvant qu'ils sont aussi à la hauteur du mouvement scientifique de tous les pays."

section, for example.[50] Over the years, the *Jornal* also comprised relatively recent scientific fields such as ethnology and innovation in photographic processes. The presentation of novelty and the usage of the adjective "new" was frequent in articles of many different disciplines. Zoological papers published in the *Jornal* tens of descriptions of new species for science.

The creation of the *Jornal* brought with it two innovations. The first was the exclusive dedication to scientific matters and to the article format, which also depended on regularity of print. The second was the opening up of the scope of authors. The large majority of the authors of the *Jornal* were indeed members of the Lisbon Academy, however the field was open to authors that were not members of the ACL, and even some nonprofessional scientists. Indeed, the first issue of the *Jornal* opened with an introduction written by the Academy's secretary José Maria Latino Coelho (1825-1891). In it, Coelho delineated the new periodical's agenda and announced that publication was extended to all "cultivators of science in Portugal."[51]

The *Jornal* had a big impact in the naturalists' community in Portugal. Still, the Academy's periodical had a relevant role for other communities as well. Renowned authors such as the physician Francisco da Fonseca Benevides (1835-1911), the mathematicians Daniel Augusto Silva (1814-1878) and Francisco Ponte Horta (1824-1892), and the director of the EPL's chemical laboratory, António Augusto Aguiar (1838-1887) published their scientific work in the *Jornal*. Aguiar published not only several articles on chemistry on his own, but also authored papers in collaboration with his assistants, the chemistry demonstrators at the Lisbon EPL chemical laboratory Édouard Lautemann and Alexandre G. Bayer with great impact on the development of his later career.[52] The mathematician Daniel Silva got engaged with the editorial project and, in 1877, suggested that the articles should all be published in French to guarantee a larger internationalisation.[53] Although his articles were published in Portuguese, when it came to articles in zoology, a large set of them – forty percent – were indeed published in French. French was used especially for priority claims such as the description of a new species, and for important listings. Sometimes, the same article was published in Portuguese and in French. The English language was only used once by a

[50] Francisco da Fonseca Benevides, 'Parecer ácerca do microphotometro electrico do Sr. Virgilio Machado,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 7, no. 28 (May 1880): 255–60.
[51] José Maria Latino Coelho, 'Introducção,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 1, no. 1 (November 1866): vii.
[52] On their collaboration see Bernardo Jerosch Herold and Wolfram Bayer, 'A Transnational Network of Chemical Knowledge: The Preparadores at the Lisbon Polytechnic School in the 1860s and 1870s,' *Bulletin for the History of Chemistry* 39, no. 1 (2014): 26–42.
[53] Martins, 'Daniel Augusto da Silva e o Cálculo Actuarial,' 191.

Portuguese naturalist.[54] Many of the Portuguese authors of zoological papers wrote in French. As Assistant Naturalist António Roberto Guimarães (1843-1885?) noted, it was important to "remind the readers that [he was] writing in a foreign language."[55]

Counting titles, authors, and disciplinary fields, published in the *Jornal* between 1866 and 1910 reveals an overwhelming majority of zoological papers. The first two series of the *Jornal* count over 600 individual papers in every subject, of which a little over 300 were published by naturalists exclusively working at the Zoological Section of the MNL. Of those, José Vicente Barbosa du Bocage authored 155 titles. Another striking figure is the number of zoological papers specifically dedicated to geographical territories of so-called Portuguese Africa. In terms of specific topic, as a result, most papers in the *Jornal* are on Angolan fauna and are, therefore, a reflection of the Lisbon museum's collections and work. Not all of the authors of zoological papers are strictly attached to the Zoological Section of the Lisbon museum. Some reflect collaborations of the museum with other professional naturalists, others reflect the dynamics of the amateur community and, as the decades advance, the growing body of work produced in the zoological museums in Coimbra and Porto.

Even if this was never stated clearly, and remained unstudied so far, Bocage took a prominent role in the direction of the *Jornal*. A close reading of the book reviews, and other commented pieces that appear scattered in the various volumes of the first two series, suggests that Bocage occupied a central role. Even in his last years, in a "precarious physical state and blindness," Bocage continued editing the *Jornal*.[56] His correspondence with fellow foreign naturalists and the publication of their papers also speaks to his commitment to this editorial project. In Bocage's correspondence with Wilhelm Peters and with Marcos Jimenéz de la Espada, his role as editor becomes obvious, as well as how he used the *Jornal* both as an outlet for the museum's work, and as a bulletin of the museum where Bocage could invite other naturalists to publish on.

In March 1870, Bocage wrote to his friend and fellow museum director in Madrid, Marcos Jimenéz de la Espada urging him to send an article "with haste" in order to "be published in the next number" of the journal "published under my direction." In this letter

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[54] Fernando Mattoso Santos, 'On a New or Critical Species of Monkey, and a Systematical Arrangement of a Group of Cercopithecus,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 11, no. 42 (July 1886): 95–98.

[55] António Roberto Pereira Guimarães, 'Description d'un nouveau poisson du Portugal,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 8, no. 31 (December 1881): 224. Original text: "je profite de cette occasion pour rappeller aux lecteurs, que j'écris dans une langue étrangère."

[56] Lima, 'Advertência,' v. Original text: "precário estado físico, e cegueira, que flagelaram o então director daquela publicação."

Bocage added a useful note: "[y]ou can give this article the extension you want, since our *Jornal* does not have a determined number of pages." [57] Espada sent his article in Latin and Bocage, also acting as reviewer, had some notes regarding the Latin declinations used by Espada, who thanked for the suggestion and vowed to adopt them in future works.[58] Espada was to receive 50 copies of his article's offprint.[59] Differently, when Bocage published at the *Proceedings of the Zoological Society*, he asked for 25 copies of his work, so Bocage was clearly making an effort to make publishing on the *Jornal* as attractive as possible.[60]

Later that year, Bocage wrote to his Prussian friend Wilhelm Peters apologising "for the interruption of the publication of the journal of the Academy" caused by his prolonged illness. He added, "I will do all in my power to print the numbers of the journal where your interesting article appears."[61] Bocage was referring to a paper written by Peters describing 27 species from Portuguese Africa, with descriptions in Latin and notes in Portuguese (translated by Bocage). According to a footnote in the beginning of the article made by the "redacção," ie. Bocage, Peters described a collection of chiropters, insectivores, and rodents that the Lisbon museum "received from its correspondents in Western Africa, mostly from Mr.s Anchieta and Bayão." This collection was sent to Peters for identification and the result was an article published in December 1870.[62]

The list of authors of zoological articles in the *Jornal* contains a fair number of foreign naturalists. This was not just a case of establishing a network of authors. Whenever large collections of specimens were available and expertise was not, foreign naturalists were asked

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[57] Correspondence between Bocage and Espada began in late 1869, and in the Lisbon archive and the Madrid CSIC Museo Nacional de Ciencias Naturales, I have indentified a total of 16 letters. CSIC, Madrid. Bocage to Espada 1870.03.03. Original text: "Ponho com o maior prazer á disposição de V.S. o Jornal de Sciencias, que se publica sob m.ª[minha] direcção. Bom seria que V.S. me podesse mandar com brevidade o seu artigo afim de ser publicado no proximo numero. Póde V.S. dar a este artigo a extensão que quiser, pois que o nosso Jornal não tem numero determinado de paginas."

[58] Marcos Jimenéz de la Espada, 'Faunae Neotropicalis Species Quaedam Nondum Cognitae,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 3, no. 9 (June 1870): 57–65. AHMUL/AHMB/CE/E013. Espada to Bocage, 1870.05.18. Original text: "Veo q[ue] V.S. es de opinion q[ue] no deben acentuar-se las voces latinas p[ara] distinguir los casos de la declinacion y otros accidente en la frase y por ello me felicito, pues aunque el acentuar-las es tradicion de los humanistas españoles en … filosofia es una redundancia que en eso se comete en beneficio del lector, no una exigencia de la indole del idioma que como … nadie pude augurar como sonaba o se pronunciaba - El ejemplo de V.S. me anima a adoptar p[ara] en adelante ese sistema antes en las publicaciones q[ue] se me ocurran."

[59] "Pray (...) tell me when the 50 [copies] of my article [are sent]," AHMUL/AHMB/CE/E013. Espada to Bocage, 1870.05.18. Original text "Rogo (...) avisar-me cuando las 50 [copias] de mi articulo [sean enviadas]"

[60] Library and Archives NHM London, Albert Günther Collection. Letters 16, 16/1/105. Bocage to Günther, 1865.04.08. Original text: "Si la Societé Zoologique autorisait la publication de ma Notte, j'en serais trés flatté. Dans ce cas je vous prierais de m'en faire parvenir 25 copiés."

[61] Berlin, Museum für Naturkunde, MfN, ZM_S_II_BocageJV_000-112. Bocage to Peters, 1870.11.21. Original text: "Ma maladie à éte cause de l'interruption dans la publication du journal de l'Acad de Lisbonne. Cependant je fais maintenant tout mon possible pour faire imprimer les numeros du journal ou doit paraître votre interessant article."

[62] Wilhelm Peters, 'Lista de Mammiferos das Possessões Portuguezas da Africa Occidental e diagnoses d'algumas especies novas,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 3, no. 10 (December 1870). In the paper Peters described new species such as the *Nyctinomus angolensis* (p124) that had been sent by Toulson; *Vesperugo pusillulus* (p124); *Vespertilio Bocagii* (p.125); *Mus (Isomys) nudipes* (p.126).

to review and identify collections of specimens from the Lisbon museum, just like Peters. In exchange for describing any new species as their own, naturalists were asked to publish their findings at the *Jornal*. The Spanish naturalist Ignacio Bolívar, for example, was asked to help with a collection of 48 orthoptera from Angola in 1881.[63] As the Lisbon collections augmented, with successive more shipments from the same geographical region, Bocage regularly kept his colleague and friend informed and almost a decade later, "new data and observations" resulted in an updated zoo-geographical listing. Bolivar published in Spanish his first findings on the "Ortópteros de Africa nel Museo de Lisboa," in three instalments on the first volume of the second series of the *Jornal*. In it, Bolivar described several new species for science and gave Bocage's name to a new genus, *Bocagella*. Some of the new species were illustrated with drawings Bolivar made himself.[64]

Most authors in the *Jornal* were members of the ACL, as well as professors in the EPL, but over a fifth of the total of 118 different authors were not members of the ACL (see Appendix). Both the inclusion of extra members in 1854 in the Academy's class and the publication of this new periodical format greatly impacted the natural history community. For example, Jacinto da Silva Mengo (1806-1866) and A. Luso da Silva (1827-1902) were two amateur malacologists that were invited to publish their work on the *Jornal*. Mengo's paper was the description of a new Portuguese species of *Helix*, published posthumously with a note signed by Bocage.[65]

It has often times emphasised how the professionalization of natural history and biology in the nineteenth century was based on a very dynamic relation with amateur communities.[66] The demarcation between amateur and professional naturalists has often raised concern in the

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[63] AMNCN-CSIC, Madrid Archivo del Museo Nacional de Ciencias Naturales. Archivo del Museo Nacional de Ciencias Naturales – Centro AMNCN-CSIC, Madrid. Bocage to Bolivar, 1881.05.21. Original text: "Votre article sur les orthoptères d'Angola que vous avez dèjá [sic] examinés paraitra bientot dans le prochain numero du Journal de l'Academie des Sciences. Je serais bien aise de savoir combien d'exemplaires de votre publication vous désirez recevoir. Les auteurs ont droit à recevoir 50, mais je vous ferai parvenir davantage, si vous les désirez." The paper was published in French: Ignacio Bolivar, 'Études sur les insectes d'Angola qui se trouvent au Museum National de Lisbonne, Ord. Orthoptères,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 8, no. 30 (June 1881): 107–19.

[64] Ignacio Bolivar, 'Ortópteros de Africa nel Museo de Lisboa,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 1, no. 2 (September 1889): 74; Ignacio Bolivar, 'Ortópteros de Africa nel Museo de Lisboa,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 1, no. 3 (December 1889): 161; Ignacio Bolivar, 'Ortópteros de Africa nel Museo de Lisboa,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 1, no. 4 (March 1890): 211–32.

[65] Jacinto da Silva Mengo, 'Descripção de um «Helix» novo de Portugal,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 1, no. 2 (March 1867): 170–71.

[66] For a close reading of the relation between the establishment of periodicals and scientific community building, see Matthew Wale, 'Editing entomology: natural-history periodicals and the shaping of scientific communities in nineteenth-century Britain', *British Journal for the History of Science* 52, no. 3 (2019): 405-23; and the chapter "The Journal Brotéria, the Book of Nature, and the Greater Glory of God" in Francisco Malta Romeiras, *Jesuits and the Book of Nature: Science and Education in Modern Portugal* (Leiden: Brill, 2019), pp. 101–28.

literature.[67] Entomology, conchology, and ornithology are some examples of communities that have prominent contributors from outside of the professional museum worker or researcher. The concept of amateur is used here to describe people who were contributors to the knowledge of Portuguese fauna working without formal training or salary.

Catalogues and Lists

As with catalogues, naturalists working at the Lisbon museum published different formats of articles. Some were listings of updated holdings of the museum, others presented new species for the first time. Differentiating between the different categories of printed works helps clarify their singular characteristics and their limitations. For example, in any article listing specimens received from the colonies the representation of the museum work as well as of the territorial expansion of the Portuguese empire in the Angolan hinterland were visible in each mention of a collector or supplier's name, and the shipment's locality. It is the very work on geographical distribution of animal species (the scientific agenda) that reinforced the crucial role of participation of colonial agents in the field and publicly displayed the presence of the Portuguese empire in increasingly contested territories (political agenda). It is often the political context that explains the style in which some scientific papers were written, and in turn they are evidence of the interest of the Portuguese elite in the African Question.

Lists and catalogues were the basis for taxonomic work. Lists are epistemological tools that allow to organise materials under the same heading. As I have mentioned above, manuscript catalogues were constantly produced and updated depending on physical location of specimens in the museum, such as a room or cabinet, or their material properties as artefacts, inside jars, mounts, or hide; they could also be arranged in lists based on criteria derived from their characteristic, such as artificial groups like birds, or mammals; or geographical provenance, like Cape Verde or Angola. Lists allowed to create new relationships between discrete specimens. Rooms dedicated to mammals, for example, create an artificial context that could never exist in the wild, where a dolphin can share the floor with a bat. Catalogues of physical locations that followed the artificial hierarchy used by naturalists produced that effect. But they were, and still are useful from the point of view of the curatorship. Most natural history

[67] S. L. Star and J. R. Griesemer, 'Institutional Ecology, `Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39,' *Social Studies of Science* 19, no. 3 (1989): 387–420, Samuel J. M. M. Alberti, 'Amateurs and Professionals in One County: Biology and Natural History in Late Victorian Yorkshire,' *Journal of the History of Biology* 34 (2001): 115–47; David E. Allen, 'Amateurs and Professionals,' in *The Cambridge History of Science. Volume 6: The Modern Biological and Earth Sciences*, ed. John V. Pickstone and Peter J. Bowler (Cambridge: Cambridge University Press, 2009), 13–33.

museums have specialised curators who work within each of the animal groups. Although these groupings are conventional, they have a big influence in most museums' room arrangements. In 1880s the Lisbon museum's rooms dedicated to the so-called reference collection were separated by large groups such as birds, reptiles, fish. The museum, as most, also featured its geographical span in rooms destined to African fauna, by which was meant Portuguese possessions in the African continent; and the reference collection for Portugal. Just like Brazilian collections from Brazil had been the highlight of the Palacio da Ajuda collections in the eighteenth century, so too the Angolan collections were the highlight of the nineteenth-century museum.

The arrangement of lists that was the foundation of the collection-based work of taxonomy was echoed in the types of articles the naturalists published in the *Jornal*. There were geographical listings, the building blocks for regional, national and colonial faunas. These listings aimed to generate a comprehensive list of the distribution of animals in a specific geographical area. But since all knowledge was provisional, ie. naturalists were well aware that their task was one of updating knowledge with new data, new sightings, and new specimens, most of these lists were produced out of a limited set of, for example, a new shipment from a specific location. The study of zoogeography, the analysis and theorisation of the distribution patterns of species according to their territories, was only possible after such upkeep practices. In order to contribute to zoogeography a naturalist just needed to pursue the taxonomical routines of identification and classification. But new knowledge was produced in every iteration since a new sighting of a familiar species in an uncharted region constituted relevant information on the geographical range of said species.

Printed zoological papers were built from the analysis and management of other manuscript paper tools. Catalogues, lists, and new findings started as jolted scribbles of pen on paper. The maintenance and management of the information relied on paper tools of management of information. Without the periodical opportunity to print the same catalogues, lists, and findings, the background museum work could never see the light of day and its relevance would be obscured. In Portugal, the steady publication of the *Jornal* was reflected in the growth of the community of naturalists, encompassing nationals and foreigners; amateurs and professionals. The role of the assistant naturalists, their curatorial concerns and taxonomic work, was made visible through published materials and fixated forever in the printed page.

6.

Explorers of the Rose-Coloured Map[1]

> [Books on] African travels always partake, more or less, of romance, however much they may take the form of a scientific work.[2]

The year of 1881 saw the publication of three significant books on Portuguese Africa. Two were the result of the 1877 government funded "first scientific expedition" to Portuguese Africa, by A. Serpa Pinto, *Como eu atravessei Africa*, followed by Hermenegildo Capelo and Roberto Ivens', *De Benguella às Terras de Yacca*, both translated immediately to English as *How I crossed Africa* and *From Benguella to the territories of Yacca*.[3] The third, *Ornithologie d'Angola*, or *Ornithology of Angola*, was a book on the known birds from the Angolan territory subsidised by the Portuguese Ministry of Navy and Overseas and written by Bocage, in

[1] Sections of this chapter were presented at a Global Histories workshop, organised by Cambridge History Department Ph.D. students; in a discussion group on global histories organised by Professor Sujit Sivasundaram; and in 2019 in Cambridge in a double panel I organised on "Collecting Histories—national narratives and imperial agendas."

[2] Alexandre Alberto Rocha Serpa Pinto, *How I Crossed Africa: From the Atlantic to the Indian Ocean, through Unknown Countries; Discovery of the Great Zambezi Affluents, Etc.; Translated from the Author's Manuscript*, trans. Alfred Elwes (London: Low, Marston, Searle and Rivington, 1881), xxii. Alfred Elwes (1819-1888) was a translator of French, Italian and Portuguese literature to English. The Portuguese version was published simultaneously, and by the same printing house in London, with the title *Como eu atravessei África: do Atlântico ao mar Índico, viagem de Benguella á contra-costa a-través regiões desconhecidas; Determinações geographicas e estudos ethnographicos*. Pinto's book was translated into 9 different idioms during this period.

[3] Serpa Pinto, *How I crossed Africa*, 1881. Hermenegildo Capelo and Roberto Ivens, *De Benguela às terras de Iacca: descripção de uma viagem na África central e Occidental comprehendendo narrações, aventuras e estudos importantes sobre as cabeceiras dos rios Cu-Nene, Cu-Bango, Lu-Ando, Cu-Anza, e Cu-Ango, e de grande parte do curso dos dois ultimos; alem da descoberta dos Rios Hamba, Cauali, Sussa e Cu-Gho, e larga noticia sobre as terras de Quiteca N'bungo, Sosso, Futa e Iácca*, 2 vols (Lisboa: Imprensa Nacional, 1881); Hermenegildo Capelo and Roberto Ivens, *From Benguella to the Territory of Yacca. Description of a Journey into Central and West Africa*, trans. Alfred Elwes (London: Sampson Low, Marston, Searle & Rivington, 1882). For citation purposes I use the English version of the books.

French.[4] In the same year a leaflet published by the African Committee of the Society of Geography of Lisbon, SGL, instigated a fundraiser campaign for future "Civilising Stations" in the hinterland between Angola and Mozambique and reified the idea for the Portuguese occupation of the whole of the hinterland between the coasts of Angola and Mozambique, known as the "Rose-coloured Map."[5] The almost simultaneous dissemination of these projects is easily explained by a background context of renewed interest in the African colonies and in new policies for the organization of the empire encouraged by the earlier creation of the SGL in 1875 and its first initiatives. With this chapter I want to compare similarities between the rhetoric deployed in these books and pamphlet and explore how these publications functioned between "romance" and "scientific work."

All the three books were based on the work of "heroic" explorers of the African hinterland. Although the *Ornithologie d'Angola* was, at a first glance, an illustrated list of species and the sum of earlier work done in the Lisbon zoological museum, this book was, most of all, the result of the work done on the field by explorer-naturalist José de Anchieta. By 1881, his shipments from Angola were eagerly awaited for in Lisbon and elsewhere in Europe where the naturalists in Bocage's network had also heard of Anchieta's work. The preface and introduction to the *Ornithologie* were imbued with the typical nationalistic tones of the scientific exploration of "our" possessions in Africa. Anchieta's name was forever linked with the success and growth of the Lisbon zoological museum, and he was celebrated in scientific as well as political circles.

While Anchieta was a contracted naturalist working almost exclusively for the zoological museum, for over thirty years, H. Capelo, Ivens, and Serpa Pinto were primarily geographical explorers responsible for measurements and observations that would contribute to studies in African hydrography, ethnography, meteorology, etc. They were on a political and scientific mission, on the one hand carrying the Portuguese flag with them, and on the other contributing with their reports to a more detailed knowledge of Portuguese West Africa. These explorers, and others who followed, shipped botanical and zoological collections to Lisbon's institutions where they were studied. This chapter unpicks why and how the zoological museum in Lisbon received zoological shipments from such high-profiled collectors. Looking at the political and

[4] José Vicente Barbosa du Bocage, *Ornithologie d'Angola. Ouvrage publié sous les auspices du Ministère de la Marine et des Colonies* (Lisboa: Imprensa Nacional, 1881).
[5] Sociedade de Geografia de Lisboa, *Ao Povo Portuguez em nome da honra, do direito, do interesse e do futuro da patria. A Commissão do Fundo Africano creada pela Sociedade de Geographia de Lisboa para promover uma subscripção nacional permanente destinada ao estabelecimento de estações civilisadoras nos territórios sujeitos e adjacentes ao domínio Portuguez em Africa* (Lisboa: Imprensa Nacional, 1881).

scientific results of these explorations, I argue that there was a durable entanglement, or co-construction in Sheila Jasanoff's words, between the renewed Portuguese diplomatic agenda for its African possessions, and the scientific agenda of a museum specialised in African fauna.[6]

The Fauna of Angola

After eight years of museum publications in the Academy's *Jornal* and of field work in the hinterland of Angola by Anchieta, the first contracted colonial collector of the MNL, Bocage designed a large editorial project called the Fauna of Angola. This would be more visible than the articles in the *Jornal*, which continued to be published, and a much more symbolic project. In December 1873, he wrote to the acting Minister for Navy and Overseas, his close friend and colleague from the EPL, João de Andrade Corvo, to request funds for a "Fauna das Possessões Portuguezas da Africa Occidental," a Fauna of the Portuguese possessions in Western Africa. In Bocage's words, this project would "attest to the solicitude of the Government for our scientific progresses and demonstrate with irrefutable evidence that our country has the right, independent of its geographical position, to be included in civilised Europe."[7] It was meant as more than a project of the museum, but rather a commitment from the Portuguese government. Once again, national ethos was put to the test and scientific achievements were depicted as crucial endeavours to sustain Portugal's place in Europe, in both a scientific and political sense.

As further justification, Bocage praised the work of ornithologists Otto Finsch (1839-1917), Gustav Hartlaub (1814-1900), and Theodor Von Heuglin (1824-1876), all of whom worked with African ornithology.[8] But above all, Bocage wanted to emulate the work done by Wilhelm Peters, who had by then become a correspondent and friend. As was mentioned before, Peters was a German explorer-naturalist who was commissioned by the Prussian government to travel to East Africa (mostly Mozambique, a Portuguese colony) and collect for the Berlin natural history museum. Bocage admired his work and saw it as complementary as what he was doing in the Lisbon museum regarding the Angolan fauna, although Peters actually visited Africa and collected himself, while Bocage never went to Africa.

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[6] Sheila Jasanoff, 'The Idiom of Co-Production,' in *States of Knowledge: The Co-Production of Science and Social Order* (London: Routledge, 2006), 1–12.

[7] AHMUL/AHMB/Div130, Bocage to the Ministry of Navy and Overseas (draft), 1873.12.02. Original text: "attestar a sollicitude do Governo pelos nossos progressos scientificos e demonstrar com provas irrecusaveis que o nosso paiz tem mais alguns direitos, alem da sua posição geographica, a ser incluido na Europa civilisada."

[8] Finsch, and Heuglin were both associated with German colonialism in Africa, and Hartlaub created alogside Jean Cabanis the *Journal für Ornithologie*.

In another instance he said of Peters that: "with the help of this renown naturalists we shall be able to include in the fauna of the western regions of Africa several new species, either completely inedited to science, or consider up to here as belonging to other regions instead."[9] Peters was still publishing his *Reisse nach Mossambique*, the result of his explorations of Mozambique. Earlier, in a review of this work, Bocage wrote:

> In the face of science, the frontiers that divide peoples disappear, and the barriers that radicalise nationalities fall. That a foreign savant would consume the best years of his youth visiting inhospitable and savage regions to add some more pages to the archives of science, that he would expose his health a thousand times over and risk his life to the uninterested service to such noble cause, is doubtless enough reason not to pity that he was not born in our land and was with foreign help exploring what is ours, but rather to welcome him with brotherly affection and to greet him as our countryman.[10]

As was mentioned earlier, Peters had, unlike Bocage, travelled to Mozambique to explore and collect zoological and botanical collections for the Prussian government. Bocage relied on Anchieta to accomplish that side of the work. Peters did both, and after his return to Europe, Peters organised, identified, and published the results of his exploration in a multi-volume work, *Reise nach Mossambique*. Books, Bocage was aware, were very different from publishing the occasional article in a periodical. And now that Anchieta had worked so hard for so many years, Bocage wanted to replicate Peters' work. Using the universalistic rhetoric that overcomes "frontiers that divide peoples," Bocage inserted his work in what was understood to be the civilising mission of the nineteenth century: a use of the epistemic virtues of science and scientific endeavour that were often represented as independent and objective. Science was seen as un-political in the sense of un-biased but could, at the same time, be patriotic.

> I propose to begin henceforth the redaction of the Mammalogy, Ornithology, and Herpetology of Western Africa, by analogous terms, albeit in more modest execution conditions, to those followed in the publication of the "Fauna of Mozambique," publication commanded by the Prussian Government, and which comprises as Y. Exc. well knows,

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[9] José Vicente Barbosa du Bocage, 'Aves das possessões portuguezas d'Africa occidental, 4ª Lista,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 2, no. 8 (1869): 335. Original text: "com o auxilio deste abalisado zoologista esperamos poder em breve incluir na fauna das regiões occidentais d'Africa varias espécies, ou totalmente inéditas para a ciência, ou consideradas até aqui como próprias doutras regiões." In this same article, Bocage mentions his collaboration with Finsch and Hartlaub to whom he also sent specimens for evaluation.

[10] José Vicente Barbosa du Bocage, 'Bibliographia. Dr. W. Peters. Viagem a Moçambique. Zoologia. IV. Peixes,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 2, no. 7 (August 1869): 253–54. Original text:

> the results of the exploration of these Portuguese possessions by Dr. Peters of Berlin.[11]

The long quote contextualises Bocage's request in all its form. To emulate what others have already done, and they were many and of proven expertise. Moreover, to replicate what other sovereign governments had already done, in Portuguese possessions, no less. National and imperial rhetoric were the crux of the matter. And Corvo should bear in mind, Bocage carefully mentioned, that Anchieta was doing all his accomplishments on government expenses and with a government contract. It then followed that such scientific commitments should be reified in a book project. Bocage took Peters as a friend, admired his courage, and considered him as his "countryman," but even when the scientific community had the power to overcome "frontiers," at the end of the day national pride and international representation were always at stake.

The land vertebrate Fauna books would include several parts dedicated to birds, reptiles and amphibians, and mammals. The project'a aim was to publish the Angolan vertebrate fauna in several parts.[12] In Bocage's words, the *Ornithologie* constituted "the first volume of a work destined above all to make known the results of the zoological exploration of Mr. J. d'Anchieta (...) on that part of our African possessions."[13] He had a long project in mind. From the beginning it was meant as, at least, two illustrated books on the vertebrate fauna of Angola that would be divided into Bocage's expertise on ornithology, herpetology, and mammalogy. Occasionally Bocage mentioned the second book as being on "reptiles and mammals of Angola and the Loango [Congo] coast."[14] In the end, only two books on two divisions of the animal kingdom were actually published, the *Ornithologie d'Angola* and the *Herpétologie d'Angola et Congo*.[15] The first completed volume of the Fauna project was the *Ornithologie*. It is a 576-page list containing the descriptions of 673 species of birds. It was published in two instalments, the first was published in 1877 (pages 1-256); and the second and final part in 1881 (Figure 6.2). With 10 coloured plates, it was a luxurious quarto hardback that was

[11] AHMUL/AHMB/Div130 Bocage to the Ministry of Navy and Overseas (draft), 1873.12.02. Original text: propor-me-hei a encetar desde já a redacção da Mammalogia, Ornithologia e Erpetologia de Africa occidental, por modo analogo, se bem que em condições de execução muito mais modestas, ao seguido na publicação da «Fauna de Moçambique», publicação ordenada pelo Govº da Prussia, e na qual se acham (...) como V Ex mto bem sabe, os resultados da exploração zoologica destas possessões portuguesas pelo Dr Peters, de Berlim."

[12] Bocage's project of the *Fauna* was mentioned for the first time in "Expert at a Distance." Madruga, 2017.

[13] Bocage, 1881, "Avertissement." Original text: "doit constituer le premier volume d'un ouvrage destiné surtout à faire connaître les résultats de l'exploration zoologique que M. J. d'Anchieta (...) dans cette partie de nos possessions africaines."

[14] AHMUL/AHMB/Div140, Bocage to Direcção Geral do Ultramar (draft), 1881.07.15. Original text: "Mui brevemente tenciono começar a impressão do 2º volume da Fauna angolense, o qual comprehenderá os Mammiferos e Reptis de Angola e da costa de Loango."

[15] Both were printed in Lisbon by the Imprensa Nacional, sponsored by the Navy and Overseas Ministry.

intended to register the museum's work on African birds, in the illustrated book format. The *Herpétologie* was 203-page long and listed 185 species, 47 of which were depicted in the 19 engraved plates. The two books of the Fauna were written in French, in order to make the work "accessible to a greater number of readers."[16]

The research work on Angolan mammals, which had begun in 1865 with the *Potamogale velox* specimens was, in the end, not included in the second book. It became a project for a third book, that was indeed never finished; however, it was more than a forgotten plan. The historical archive holds still today the index cards, i.e. the manuscript foundation of the unpublished book that would be Bocage's third book of the Fauna, the *Mammalogie d'Angola et Congo* (Figure 6.3).[17] Author Staffan Müller-Wille recently published on what he called the "hot topic" of paper tools or paper technologies.[18] Crucial for the understanding of natural history practices through history, this refers to the usage of print or script, ink on paper, type of technologies used for bookkeeping and organization of large quantities of data. It concerns the physical production, arrangement and preservation of herbarium sheets, manuscript or printed specimen labels, catalogues, and index cards. Information on specimens and species were numbered and organised by geographical provenance or inter-relations between families and genera. Müller-Wille studied how the Linnean reform of nomenclature allowed for a system that permitted interchangeability, compatibility, and accommodated changing the placement of contents within the format. Compiling new data was simplified due to binomial nomenclature, but it was the materiality of unbound paper slips that provided the perfect resource.

As alluded to in chapter 5, listing data can be made with different objectives in mind and it can result in different epistemic organisations. In the space of a museum, specimens can be organised differently as well. The reference collection of the Lisbon museum, for example, comprised a large Birds room, which indicates how certain spaces were organised according to a designated "place" in the artificial organization of life, where mammals are separated from birds, even though they could belong to the same habitat. On the other hand, the Lisbon museum also had a sizeable Angola room where birds shared the room with mammals and reptiles, which denotes the importance of the Angolan collections within the whole of the

[16] Bocage, 1881, "Avertissement." Original text: "rendre ce modeste travail accessible à un plus grand nombre de lecteurs."
[17] I thank once again for all the help I had from archivist Vítor Gens for bringing these documents to my attention, and for his welcoming me to take a part in the cleaning and identification process of these materials.
[18] Staffan Müller-Wille, 'Linnean Paper Tools,' in *Worlds of Natural History*, ed. Helen A. Curry et al. (Cambridge: Cambridge University Press, 2018), 205–20.

zoological museum, and the relevance of territorial units (even if not corresponding exactly to habitat correlations).[19] This room (Figure 6.4) was a representation of the key research just as the books on the Fauna provided with an additional platform for international representation of the geographical field collection, and the taxonomical identification of thousands of specimens. The *Mammalogie* manuscript paper slips (Figure 6.3) were all loose, while at the same time organised into envelopes of mammal families like, "I. Primates," or "VIII. Hyraces" drawing attention to what has been said about Linnaean reform and the practical purpose and theoretical thought behind unbundled herbaria of loose sheets instead of bounded volumes of static, restricted specimen arrangement.[20] Listings and catalogues, just as cabinet organization, constitute a specific type of knowledge administration which results in particular natural history epistemologies. But the preceding attempts of grasping the information overload of tens or hundreds of new specimens in every shipment and transforming them into coherent and structured ideas about how nature can be divided into artificial but cogent slots, drawers, or, in this case, envelopes, can point us into new avenues of research on the history of taxonomic practices. Hence the relevance of the recent approach on paper technologies. In these envelopes, Bocage included one "finished" index card per species, as well as many other types of annotated papers. For each species there could also be stored items of correspondence where the species or genera was discussed, calling cards with notes on bibliographical references that could be useful, or just more paper slips with annotations such as measurements of a specific specimen, or other relevant information still in the course of being processed into the final index card. The index cards were quite large, the size of the envelope, and there was one for each species, containing the text in almost its final version, just like in the finalised books. This arrangement into families was also a physical demonstration of the quantitative numbers of genera, or species in each genus, another preoccupation of zoogeography.

Illustrated books covering a unique geographical location, are a typology of publication with distinct properties and uses. Bocage described the *Herpétologie* as the "enumeration and description of the reptiles thus far found in the vast territory of our African possession," in his 1882 plea for funds to the Director General for the Overseas.[21] The aim was undoubtedly

[19] Anne Secord, 'Containers and Collections,' in *Worlds of Natural History*, ed. Helen A. Curry et al. (Cambridge: Cambridge University Press, 2018), 289–303; Robert Felfe, 'Spatial Arrangement and Systematic Order,' in *Worlds of Natural History*, ed. Helen A. Curry et al. (Cambridge: Cambridge University Press, 2018), 185–204.
[20] Staffan Müller-Wille, 'Linnaeus' Herbarium Cabinet: A Piece of Furniture and Its Function,' *Endeavour* 30, no. 2 (2006): 60–64.
[21] AHMUL/AHMB/Div144, Bocage to Direcção Geral do Ultramar (draft), 1882.03.11. Original text: "O numero de especies já convenientemente estudadas é assaz considerável."

political, and the term "our" was deployed often by Bocage. That scientific research was also an instance of territorial possession that was thus clearly enunciated.

For each of the books, Bocage wrote to ask for printing expenses to be covered by the government bodies. They were expensive books to print and to illustrate. The books were to be printed in Lisbon, in the national printing house, but the illustrations had to be procured elsewhere for lack of specialists in Portugal. Bocage obtained from his friends in Paris, Paul Gervais, and in London, Richard Bowdler Sharpe, the names of John Gerrard Keulemmans, and of Huet as potential illustrators.[22] Keulemanns was a renown Dutch bird illustrator who had been working from London, and he was the selected illustrator for the *Ornithologie*. Keulemanns' illustrations in the 10 plates represent 14 species, 13 of which were inedited according to Bocage.[23] Bocage's request included the idea that a sample should be commissioned in order to better evaluate the costs and the results (Figure 6.5). Probably for the same purposes, Felix Brito de Capelo, produced two illustrations (drawn and engraved) for Bocage's "herpetology of the Fauna," in 1875.[24] In the first interactions with the overseas general director Bocage aimed at 24 plates for each volume, even if it was not possible to publish figures for all the new species.[25] And indeed in 1874, there was a resolution from the government to print 500 copies of each book; and that each of the two volumes planned could contain 24 plates.[26] Later, when discussing the *Herpétologie*, he suggested there should be between 12 to 18 illustrated plates, and in the end, the *Herpétologie* had 19 plates. [27] These plates were not as colourful as the ornithological ones, and most are diagrammatical details of external features such as scales, legs, head, and mouth.[28] Some of the plates were signed with Enrique Casanova's monogram "CA" while others were not signed. The fact that Felix de Brito Capelo produced illustrations for the *Herpétologie* in 1875 suggests he authored some or parts of the plates as well, as it was his style to produce specific detailed diagrams.

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[22] AHMUL/AHMB/Div135. Bocage to Direcção Geral do Ultramar (draft), 1874.03.09. Nicolas Huet the younger (1788-1827) was a French natural history illustrator who worked for the Paris museum, although by 1874 he no longer was alive there were, possibly, other illustrators who maintained his workshop. John Gerrard Keulemans (1842-1912) was a prolific Dutch draughtsman and scientific illustrator who moved to London in 1869 and worked in over a hundred ornithological books. Penny Olsen, *Feather and Brush: Three Centuries of Australian Bird Art* (Collingwood: Csiro Publishing, 2001).

[23] Bocage, 1901, page 16. Original text: "qui représentent 14 espèces dont 13 inédites."

[24] AHMUL/AHMB/Div136, Felix de Brito Capelo receipt of payment received, 1875.06.10. Original text: "Recebi do Ex.mo Snr. Dr. José Vicente Barbosa du Bocage a quantia de desoito mil reis pelo Desenho e lythographia de duas estampas de reptis para a Erpetologia da Fauna d'Angola."

[25] AHMUL/AHMB/Div137. Bocage to Direcção Geral do Ultramar (draft), 1874.08.12.

[26] AHMUL/AHMB/Div139, Direcção Geral do Ultramar to Bocage, 1874.10.17.

[27] AHMUL/AHMB/Div144, Bocage to Direcção Geral do Ultramar (draft), 1882.03.11.

[28] Some of the plates featured the whole animal and there exist coloured versions: see coloured plate #72 featuring a note on the illustrator Enrique Casanova (1850-1913) for which I contributed to in Kraig Adler, ed., *Contributions to the History of Herpetology. Volume 1 (Revised and Expanded)* (Ithaca, NY: Society for the Study of Amphibians and Reptiles, 2014).

The *Fauna* project was meant to sponsor new research, but most of all to showcase and compile the museum's findings, especially when it came to add new species to the previous knowledge on Angolan fauna. The books were, as it seems, being prepared and written to come out at the same time. However, the ornithological book was ready first. The *Ornithologie* contained a two-page foreword titled "Avertissement," which acted as an introduction for the first instalment; and an introduction seven pages long with a summary of the book and detailed acknowledgements. The *Ornithologie*'s first instalment was publish around September 1877, as confirmed by a note from the Commissão Central Permanente de Geographia (Central Permanent Commission of Geography) to the museum informing that Bocage was receiving 26 author's copies of his book.[29] The first instalment was rushed, possibly, due to the fact the Portuguese government funded another scientific research endeavour on Angola: the first scientific expedition to Africa, led by H. Capelo, R. Ivens, and Serpa Pinto. In fact, the "Avertissement" was signed by Bocage in the serendipitous date of 7/7/77, the same Saturday when Capelo and Serpa Pinto left Lisbon in the Zaire steamer heading to Africa.

The *Ornithologie* was the sum of the scientific work published piecemeal in the periodical format on the *Jornal*. Bocage published between 1867 and 1882, 24 lists of birds from Portuguese Western Africa, ie. Angola.[30] So, even before the hardcover illustrated *Ornithologie* was published, the ornithological community already had access to over twenty titles describing the numerous Angolan species kept and studied in Lisbon. In his scientific correspondence, Bocage often replied to fellow naturalists who desired to have the complete numbers of the *Jornal* that contained the Lists, and to whom he was sometimes able to ship the individual missing numbers. Before the *Ornithologie*, all taxonomical papers on birds described in it, were referred to the *Jornal* volume and number. Cambridge Professor and ornithologist Alfred Newton, for example, was not so much interested in the *Ornithologie d'Angola* when he received it – he had already access to the lists; he was interested, though, in the initial table with the list of the species included, with their geographical distribution (Figure 6.2). Newton annotated exclusively this synoptic list, with markings for specimens he presumably already had in his collection. The book carried the description of new species as well, but the work was not finished when the final instalment came out, in 1881. Ornithological

[29] AHMUL/AHMB/Div143(g), Comissão Central Permanente de Geografia para Bocage, signed by José Augusto Sousa, 1877.09.12.

[30] First and last of the lists were: José Vicente Barbosa du Bocage, 'Aves das possessões portuguezas d'Africa occidental que existem no Museu de Lisboa,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, no. 1 (1867): 129–53; José Vicente Barbosa du Bocage, 'Aves das possessões portuguezas d'Africa occidental, 24ª Lista,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 9, no. 34 (1882): 80–84.

work on Angolan species continued at the museum, and articles with further lists followed and, later, other papers as well, including "Additions et corrections à l'Ornithologie d'Angola."[31]

Under the title "Mélanges Ornithologiques. Espèces Nouvelles d'Angola," Bocage continued to publish full descriptions when he thought there were new species to be added. When describing new species, Bocage published in French, whether in the *Jornal* or the *Proceedings of the Zoological Society of London*, or other specialised journals.[32]

Anchieta, thirty years studying nature "face-to-face"

The original zoological work produced by the Lisbon museum was largely due to an extended network of collectors distributed along the Portuguese empire. The most important contributor, however, was José Alberto de Oliveira Anchieta, Bocage's counterpart in the hinterland of Angola and whom he referred to as "our indefatigable voyageur."[33] For over thirty years, from 1866 to 1897, Anchieta studied nature "face-to-face" as the first contracted Portuguese field naturalist.[34] None of the other previous colonial explorations, such as those undertaken in the eighteenth century under the supervision of Vandelli endured for such an extended period of time or with such results.[35]

Anchieta came from a well-off family; his father was a general and he was entitled to an allowance. According to his friends, he was not interested in university training at all and managed to fail most classes he took in Coimbra University, and at the EPL. When he took Bocage's class in Zoology, he got his first and only positive grade.[36] At some point he is said

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[31] José Vicente Barbosa du Bocage, 'Additions et Corrections à l'Ornithologie d'Angola', *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 2, no. 8 (1892): 248–64; and 'Additions et Corrections à l'Ornithologie d'Angola (Suite)', *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 3, no. 9 (1893): 6–16.

[32] His ornithological work on Angolan birds was also translated to German. Bocage's friend and counterpart Hans Gadow translated Bocage's work on African birds into a two-part paper: José Vicente Barbosa du Bocage, 'Die im Museum zu Lissabon befindlichen Vögel der westafrikanischen Besitzungen Portugals (Schluss.),' trans. Hans Gadow, *Journal für Ornithologie* 24 (1876): 401–41. José Vicente Barbosa du Bocage, 'Die im Museum zu Lissabon befindlichen Vögel der westafrikanischen Besitzungen Portugals (Schluss.),' trans. Hans Gadow, Journal für Ornithologie 24 (1876): 285-317.

[33] José Vicente Barbosa du Bocage, 'Description d'un Saurien Nouveau de l'Afrique Occidentale,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 3, no. 9 (1870): 66. Original text: "notre indéfatigable voyageur."

[34] See the biography based on the set of letters, today in unknown location, from Anchieta to Bocage. António Alberto Banha de Andrade, *O Naturalista José de Anchieta* (Lisboa: Instituto de Investigação Científica Tropical, 1985). Other biographical notes include J. Bettencourt Ferreira, 'José de Anchieta,' *Mala da Europa*, 1897; José Vicente Barbosa du Bocage, 'José d'Anchieta,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 5, no. 18 (1897): 126–32; Gastão Sousa Dias, *José de Anchieta*, Pelo Império 58 (Lisboa: Agência Geral das Colónias, 1939); Raymundo Bulhão Pato, 'José Maria de Anchieta,' in *Memorias. Tomo I. Scenas de Infancia e Homens de Lettras* (Lisboa: Perspectivas e Realidades, 1986), 45–48; Nuno Borges de Araújo, 'Fotografia científica em Angola no último quartel do século XIX: O caso do naturalista José de Anchieta,' in *O Império da Visão: Fotografia no Contexto Colonial Português: 1860-1960*, ed. Filipa Lowndes Vicente (Lisboa: Edições 70, 2014), 171–81. Quote "face-to-face" in Andrade, 1985, pp.39-40 (citing from Ferreira, 1897, p.2). Original text: "entregue exclusivamente ao rude trabalho de estudar a natureza face a face, corpo a corpo."

[35] Felismino, *Saberes, Natureza e Poder.*; Roque and Torrão, *De Cabo Verde para Lisboa;* João Brigola, *Colecções, Gabinetes e Museus Em Portugal No Século XVIII*.

[36] Andrade, 1985, p.4.

to have renegaded his family trust, and although he received no formal degree, contemporaries claim he studied in London and Paris before he started his contract with the museum. As mentioned in chapter 3, Bocage wanted to hire someone more permanently to collect in Portuguese Africa. He first asked Bayão, who at the time suggested Anchieta's name instead, since he had been exploring Cape Verde and Angola on his own and demonstrated great skills as a collector. During his travels in the Angolan hinterland he collected and preserved zoological collections including a set of insects that, in the words of Bayão, were "astonishingly well preserved, with such wholeness and freshness, that they seemed alive."[37]

Anchieta began his contract with the zoological museum in 1866. The contract for a "naturalist-explorer" was meant at first only for four years, but Anchieta stayed until his death, precipitated by his explorations, in 1897.[38] As a contracted collector, Anchieta hunted, preserved, and collated information and specimens in bulk and the museum collections grew with the his shipments from the geographical locations he explored in the Angolan hinterland. Because he accumulated so much experience, his observations and metadata were trusted blindly by Bocage. He represented the museum's interests, and therefore legitimated further the scientific value of the Portuguese collections. His work was impressive and the "almost exclusive basis" for the publication of the *Ornithologie*.[39]

In his correspondence with Bocage, transcribed by Banha de Andrade, and in the scope of three decades, Anchieta described all sorts of events unrelated to strict scientific businesses. He informed Bocage on details about his daily life, his often debilitated health, his troubles and needs; the personal disagreements he often had with the Angolan local administration and the corruption that went on in the cities; the various indigenous communities and the raids and wars that sometimes took place, and why; the differences between the metropole and the colonies, and how happy or frustrated Anchieta felt about them. In sum, Anchieta described

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[37] AHMUL/AHMB/CN/B024. Correspondence from Bayão (in [Fortress of S. Francisco] Penedo, Luanda) to Bocage, 1865.10.01. Original text: "Chegou o Anchieta, e esteve morando comigo nesta fortaleza em que me acho. Traz uma coleção feita em regiões ao norte da Província [...]. Os insetos desta coleção estão admiravelmente conservados, e com tal inteireza e frescura, que parecem vivos."

[38] According to Bulhão Pato, Anchieta returned to Lisbon only once, to get married. Anchieta was married in Lisbon and his wife went with him tto Angola, only to come back to Lisbon sometime later. Pato, 1894. She died in 1883, according to the correspondence between Bocage and Ferreira do Amaral, the Governor General of Angola at the time. Bocage wrote "Não sei se escreverei nesta data ao Anchieta. Não quero ser eu quem lhe dá a triste nova da morte da mulher. Prefiro que o saiba d'outro modo." ANTT/Fundo Família Ferreira do Amaral/ Caixa 4, doc. 4: Bocage to Ferreira do Amaral, 1883.04.24-25-26.

[39] Anonymous, 'Bibliographia. J. V. Barbosa du Bocage, «Ornithologie d'Angola», 2e Partie, 1881,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 8, no. 31 (1881): 232. Original text: "As collecções ornithologicas remettidas por José de Anchieta serviram portanto de fundamento quasi exclusivo á publicação de que damos noticia, e comprehendem não menos de 500 espécies, das quaes 50, proximamente, novas para a sciencia." The fact that this note focuses on Anchieta and does not mention Bocage by name, and that Bocage's own name is written down as "Barboza" suggests that Bocage was the author of this unsigned review.

Angola's territories, landscape and habitats, rivers and mountains, but also how the colonial administration of the distant hinterland was being managed. By reading these letters Bocage gained second-hand experience on the colonial dealings, just as historians do today.

Anchieta lived a long time in Caconda, where he established his house and "field-laboratory" (Figure 6.8). For his preservation tasks he had materials, tools, and chemicals. He was known as a doctor to the locals, who brought him food and supplies in return for medical assistance.[40] When he himself was sick, Anchieta described his self-administrated arsenic and quinine, and he also took long and periodical baths of rainwater.[41] During his time spent in the hinterland, Anchieta was often requested to perform other scientific tasks. He reported on climate, orology and hydrography, botany, geology, and on chemical analysis on a water spring. Most of these studies were reported on the official bulletins of Angola. In the interim when Bocage was Minister and away from the museum (1883-1886), Anchieta sent a report to Lisbon about some geological findings that was published in the Bulletin of the SGL.[42] According to the literature, this was the first work on the Angola geology written by a Portuguese.[43] Nevertheless, his greatest contributions were in zoology and zoogeography.

Anchieta's explorations were indeed so significant for the museum's holdings that there were specimen tags and a zinc plate made specially with the denomination "Anchieta," as shown in Fig. 6.2 (also see chapter 5, note 4). Over the years more labels were needed for all the incoming shipments, and they were produced specifically for Anchieta's collections. The tags existing today kept in the historical archive reveal what were the most relevant observations to take note for each specimen: the collection Reference Number; the Date (although it is uncertain whether the date of collection and the date of shipment's arrival were not sometimes conflated); the Habitat (meaning locality and geographical provenance); the Vulgar name (in most instances referring to indigenous nomenclature); and the main characteristics (usually referring to accompanying critical information from the collector such as eye colour, a character missing from the dried skin). Especially for bird specimen, there is often the indication of gender with a ♀ or a ♂, as shown.

During his long hours of exploration and daily field and museum work, Anchieta was prone to his own observations and reflections. He often shared with Bocage intense dialogues

[40] Andrade, 1985, p.68.
[41] Andrade, 1985, p.73.
[42] José de Anchieta, *Traços Geologicos da Africa Occidental Portugueza* (Benguela: Typographia Progresso, 1885).
[43] José Manuel Brandão, 'O Acervo Colonial das "Comissões Geológicas" de Portugal (1857-1918). Nota Preliminar,' in *Colecções e Museus de Geologia: Missão e Gestão*, ed. José Manuel Brandão et al. (Coimbra: Museu Mineralógico e Geológico da Universidade de Coimbra (MMGUC), Centro de Estudos de História e Filosofia da Ciência (CEHFCi), 2010), 113–20.

on much more than taxonomical or geographical distribution. Anchieta pondered on what could consist the "elements that could become a branch of Biology, the Philosophy of Zoological Geography." He mused:

> Within a given exploration time, in order to get as many new species as possible, it is necessary to meditate on the physio-natural conditions that may be the cause of the distribution of the species in a certain location.[44]

In the 1870s zoogeography, or animal distribution studies, was based on an increasingly more accurate information on geographical provenance, especially when it came to non-European localities. Since Alexander von Humboldt's works that connections were made between the existence of certain genera in different continents, where the latitude provided similar climates. Local faunas were now studied under the lens of their geographical distribution, and new questions arose. Why could such distant territories provide adequate conditions to the same type of animals, and, more importantly, why were some similar climates and altitudes not populated with the same conjugation of animals? There was not enough evidence yet to understand and justify why the same geographical conditions in separate continents, for example, did not share the same distribution of species. Naturalists were convinced it was a matter of time and accumulation of more data, and that inductive reasoning provided the right method, and was the more cautious manner, to deal with the progressive income of information. Bocage's position regarding speculative ideas was always of prudence. Anchieta, on the other hand, left to his cogitations, had other intuitions.

In order to surpass the difficult hurdle of zoogeography Anchieta believed that, via meditation and even aesthetical intuition, it was possible to extract more information from each location. Earlier, in 1867, Anchieta wrote that, when finding a new species, it was possible to find, some distance away, the same genus, "however the species, although the sensitive concurrence of analogous conditions, will often never be found elsewhere." [45] His many years of field experience led to reflections and deductions that museum work alone could not reach. He wrote of one area he explored, that it was "very uneven, offering many differences in altitude which continue for large extensions of the terrain: therefore encompassing diverse

[44] Andrade, 1985, p.129-130. Letter from Anchieta to Bocage in 1893.06.27. Original text: "elementos que poderão constituir um ramo de Biologia, a Philosophia da Geographia Zoologica. (...) Para em um certo tempo de exploração conseguir maior número de especies novas, é necessario meditar o possivel nas condições Physico-Naturaes que podem convir como causa do caber em distribuição a especie ao lugar."

[45] Andrade, 1985, p.80. Original text: "Mais longe aparece o seu genero, porem a especie, a pezar de sensivel concorrencia de condições analogas, algumas vezes, nunca mais se encontra em outra parte."

climates and diverse local faunas."[46] In other occasion, manifesting his discontent, during a stay in Mossamedes, he described how the fauna "which should be most interesting," was poor in mammals, mediocre in reptiles, reduced in insects and, as for birds, he only found water birds in abundance.[47] Anchieta's disappointment was linked to his anxiety about finding new species, or those hitherto unknown to Angolan regions. He was not exploring in the hinterland to hunt game or birds already described and registered as belonging to that geography. He was a naturalist, and an explorer. In fact, geographical charting was "the inevitable background to the collection of geological, ornithological or botanical specimens."[48]

Because he shared his musings with Bocage, it is possible to imagine that Anchieta was much more than a submissive collaborator to his decade long friend. The epithet of "naturalist-explorer" was actually his professional engagement with the Portuguese government and with Bocage. Although he never felt the need to publish in his own name, he was a true field naturalist who experimented, compared different faunas, and took note of nature's changes and rhythms. In most papers, and certainly in *Ornithologie*, Bocage used more than Anchieta's findings and collecting work. He cited directly from his letters to such an extent that certain papers are a collective work although not a co-authored work. In the social makeup of their close relationship, Bocage was always the professional naturalist and it was always him who published and gathered credit as the director of the museum, even when he constantly reiterated Anchieta's role.

A representation of Anchieta's dwellings shows indeed the making of a field station (Figure 6.8). In 1877, Anchieta was living and working in Caconda when he met explorers Capelo, Ivens, and Serpa Pinto. The label read "Intérieur de la demeure d'Anchieta (voy. p. 218). Dessin de É. Bayard d'après un croquis du major Serpa Pinto."[49] The portrayal was possibly informed by the textual description of Anchieta's quarters as well as by Serpa Pinto's drawings. The engraving work was done in France for the illustrated periodical *Au tour du Monde* which published *Comment j'ai traversée l'Afrique* in 1881, translated to French.[50] The illustrated periodical published the translation in segmented episodes and added new

[46] Andrade, 1985, pp.80-81. Original text: "Esta região é muito accidentada, offerecendo muitas differenças de altitude que se continuão durante grandes extensões de terreno: por isso, diversos climas e diversas faunas locaes."
[47] Andrade, 1985, p.82
[48] Anderson, 'Natural History and the Scientific Voyage,' 304.
[49] Alexandre Alberto Rocha Serpa Pinto, 'Comment j'ai traversé l'Afrique de l'océan Atlantique à l'ocean Indien,' *Le Tour du Monde: nouveau journal des voyages* 41 (1881): 217.
[50] Pinto, 'Comment j'ai traversé l'Afrique de l'océan Atlantique à l'ocean Indien." The French version of Serpa Pinto's book was translated from the original English by Jules Belin de Launay, the translator of the works of African explorers Livingstone, Stanley, Speke as well as of Louis Agassiz.

illustrations to the original editions in Portuguese and English. The Anchieta depiction was one of the new engravings, signed by French illustrator Émile-Antoine Bayard, who also engraved the famous portrait of a bearded Serpa Pinto after the completion of his intrepid crossing.[51]

The image shows a chaotic arrangement of a darkened interior with Anchieta siting behind a huge table, while his local collaborators, at least two females, are illuminated with outside light and standing or sitting on the ground at the floodlit threshold, neither inside nor outside. A multitude of scientific instruments and tools are distinguishable in the image, evidence of varied scientific practices. In fact, Anchieta was always expanding his work and in 1884 he requested an increase in his exploration budget in order to be able to "have intelligent employees to help [him] in the search and conservation of the specimens," for "alcohol for conservation," and so that he could buy more instruments.[52]

As Serpa Pinto put it, "[o]f nippers, scalpels, and microscopes there were not a few."[53] The image, even though a representation derived from Serpa Pinto's narrative, shows the array of practices with which Anchieta occupied himself with: the usual explorer's theodolite, telescope, and rifles, but also a display of taxidermy mounts. In the picture there is what appears to be a botanical field work vasculum, weaved baskets that could be used as traps for live animals, a watering can that suggests the upkeep of living plants, books and possibly notebooks, a microscope, a photographic camera, glass instruments and containers of various kinds. All of this "confused heap" is left in the contrasted darkness in the image, only the workers are illuminated by the light beams. While the workers on the right carry out more menial tasks as skinning the various dead mammals on the ground, Anchieta is in the dark, absentmindedly sitting on a chair behind the table, with his hat on, providing a stark contrast with the depiction of his workers relaxed and illuminated by the sun light.

Exploring the Rose-Coloured Map

In December 1875, motivated by the growing international geographical movement, 74 individuals met with the journalist and entrepreneur Luciano Cordeiro to lay the foundations of the Society of Geography of Lisbon, SGL. By the end of 1876, when the SGL's bulletin was

[51] Émile-Antoine Bayard (1837-1891) also worked with other science popularisation works besides the *Au Tour du Monde*. G. Vapereau, 'Émile-Antoine Bayard,' in *Dictionnaire Universel des Contemporains* (Paris: Librairie Hachette et C.ie, 1880).
[52] Andrade, 1985, p.31. Original text from Dias, 1939, pp.60-62, "um aumento de cinquenta mil réis mensais para poder ter empregados inteligentes que me auxiliem na procura e conservação dos exemplares, e uma quantia para duzentas e cinquenta libras de álcool para a conservação das numerosas e interessantes espécies ichtiológicas do Cubango, e para a acquisição dos instrumentos." More on Anchieta's negotiations of his contract with the help of Bocage on Andrade, 1985, pp.9-34.
[53] Pinto, 1881, p.74. Quote from the English edition.

first published, the society had already gathered over 200 individuals, including members and external correspondents. It was organised into seven different working sections according to various scientific topics. To spur the interest and attention of the public sphere towards the so-called colonial movement, especially taking care of the national claims of territorial possessions in Africa, the SGL encouraged research on and publication of cartographical and historical studies supporting Portugal's position in the diplomatic arena. Luciano Cordeiro and the SGL signed multiple pamphlets, books, transcripts of original documents, and newspaper articles arguing in favour of Portugal's political and diplomatic claims for some highly disputed areas such as the Congo or the Zambezi basins.

The nexus between the creation of geographical societies in the nineteenth century and imperial anxieties in Europe and elsewhere has been reiterated in the literature.[54] In the case of the Portuguese society, its role was of immense prominence as a surrogate for state initiative and external representation. For instance, in 1885, the SGL replaced the Portuguese government in the international exhibition of Anvers, sponsoring a specially designed pavilion together with the Banco Nacional Ultramarino, the overseas national bank.[55]

Almost simultaneously, in early 1876, and just before the organization in Brussels of the international conference on slave trade, that paved the way for the establishment of the International African Association, a second new centre of colonial discussion was created within the Ministry of Navy and Overseas. The acting minister, João de Andrade Corvo, created the Central Permanent Commission for Geography, with the purpose of collecting and publishing documents from scientific areas ranging between Ethnology, Archaeology, Anthropology or History, Geography and the Natural Sciences. This commission was dedicated to act as a repository supporting "both science and nation."[56] This ministerial commission was later merged with the SGL, and the geographical society took, from then on, a definite role as advocate for Portuguese rights and claims overseas, often substituting for the government and the ministries. The SGL stood above the dividing partisan lines and was able to congregate civic interest through its many public actions.

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[54] Dominique Lejeune, *Les Sociétés de Géographie en France et l'expansion Coloniale au XIXe Siècle* (Paris: Albin Michel, 1993); Marie-Claire Robic, 'Approches actuelles de l'histoire de la géographie en France. Au-delà du provincialisme, construire des géographies plurielles,' *Inforgeo*, no. 18/19 (2006): 53–76; Ute Wardenga, 'Writing the History of Geography: What we have learnt – and where to go next', *Geographica Helvetica* 68 (2013): 27–35.

[55] Maria Helena Souto, *Portugal Nas Exposições Universais, 1851-1900* (Lisboa: Edições Colibri, 2012).

[56] H. Gabriel Mendes, "As origens da Comissão de Cartografia e a acção determinante de José Júlio Rodrigues, Luciano Cordeiro e Francisco António de Brito Limpo. A história política das explorações africanas de Hermenegildo Capelo, Roberto Ivens e Serpa Pinto," *Separata da Revista do Instituto Geográfico e Cadastral*, 2 (1982), 7-48.

The appearance of a new institutional arena, dominated by the SGL, permitted new actors and new practices to emerge. Around the society, civic iniciatives were developed by engaged civil servants, writers, and military man, many with technical training. Together they produced an institution with an astounding library and map collection, which published treaties on colonial medicine, colonial language learning, and gathered the historical documents to argue for the centenary presence of Portugal and of Portuguese in more than just coastal Africa. The SGL published many reports from its various sections and from its hundreds of members, it promoted series of public conferences, and many pamphlets which together with the periodical press, brought the colonial agenda definitely into the public domain.

As for the Central Permanent Commission for Geography, it continued to hold advisory meetings for the government. Most members of the commission were also prominent members of the SGL, but not the minister Andrade Corvo (who, in fact, was never a member). However, it still seemed the Portuguese government was not able to aggregate the scientific elite and to publish scientific studies on colonial matters at the same rate, and so the commission maintained a close relation with the work developed by the Society, until it was definitely merged with one of the sections of the Society of Geography. In 1883, when Barbosa du Bocage became the Minister for the Navy and Overseas, directly from the seat of the presidency of the SGL, Luciano Cordeiro congratulated the SGL for having such a prominent former President. However, as soon as Bocage created, as part of his ministry, the new Commissão de Cartographia (Cartographic Commission) in order to regulate the production of cartographic material, and to promote more research on the cartography of the Portuguese domains, Luciano Cordeiro persuaded the SGL to repudiate this new committee. Cordeiro was upset and dissatisfied for the SGL's omission in the commission; and, in turn, Bocage was dismayed by Cordeiro's conduct.[57]

Africa was the main topic of the international political and diplomatic agenda, and geography was the all-encompassing science that held together hydrographical, geological, ethnographical, and medical knowledge about the colonies with the political and symbolic studies of historical geography. This was shown in the composition of the sections of the SGL and in its publications. Renowned experts in somewhat distant fields such as anthropology,

[57] ANTT/Fundo Família Ferreira do Amaral/ Caixa 4, doc. 4: Correspondence Bocage to Ferreira do Amaral (Governor of Angola), 1883.04.24-25-26. Bocage wrote: "E nestas circunstancias ha-de V. Exª accreditar que homens de quem eu era amigo, a quem tinha dado constantes provas de amisade, se declaram offendidos por eu os não consultei sobre a organisação de uma Comissão p[ara] publicar umas cartas geographicas e se declaram em guerra aberta contra mim? Pois olhe que quem acaba de fazer isto é o Luciano Cordeiro. E sabe V. Exª porque é que eu o não consultei ácerca de tal comm[issão]? É porque me pareceu o assumpto tam insiginficante que me esqueci de que tinha feito tal coisa. Assim vou accumulando disabores sobre disabores!"

statistics, linguistics, botany, meteorology, and history were all included under the oversight of geography. In a period of scientific congresses, internationalization, definition of boundaries between expertise, and establishment of standards, this conceptualization of geography was ambitious. Discussing the role of institutions such as geographical societies, Helen Tiley quotes Crawford, Shinn and Sörlin's study on internationalism to reiterate that the "[i]mpetus towards international science was fuelled by national pride, the professional ambitions of a country's leading scientific personalities, and government policy."[58] Tiley's work has had a big repercussion in the topic of science and empire, and she indeed studied briefly the role of African commissions created inside geographical societies in the 1870's. The creation of geographical societies in the nineteenth century was strongly connected with imperial pursuits and included the many sciences which contributed to colonial appropriation.

A great day, "sunny and fresh, bright and stimulating," July 7, 1877 was the perfect auspicious date to launch a scientific exploration of Portuguese Africa.[59] Hermenegildo Capelo and Serpa Pinto were leaving for Angola, and Roberto Ivens was going to join them some weeks later. A boat was rented in the Tejo by the SGL in order to take some 200 people to meet the steamer that would carry the explorers. Four hundred years before, on July 8, 1497 the Vasco da Gama expedition set sail to India on what was considered the triumph of the Portuguese age of maritime voyages. Times were certainly different, yet it was crucial that this expedition was a successful enterprise to counteract other European nations interests in sub-equatorial Africa hinterland regions. The new expedition was wrapped in a patriotic reprise of meaning and pride in national narrative, and the nineteenth-century imperial agenda sought to carry on the same story of success. The newspaper *Illustração Portugueza*, published a report on the expedition's departure, in which the author had no reservations in relating a number of events to the celebration of the ominous date: Vasco da Gama's historical departure, Anchieta's eleven years in Angola "already celebrated in history," and the coincidence between the name of the steamer that was taking the explorers to Africa, *Zaire*, with their destination the Zaire river (Congo).[60] Before departure, the expedition was offered two signifiers of the underlying political campaign and land appropriation: a hand stitched flag of the Portuguese Crown, and

[58] Helen Tiley. *Africa as a Living Laboratory. Empire, Development, and the Problem of Scientific Knowledge 1870-1950* (Chicago and London: The University of Chicago Press, 2011), 9.
[59] Luciano Cordeiro, 'A Expedição Geographica Portugueza á Africa Austral,' *O Occidente* 1, no. 1 (1 January 1878): 6.
[60] 'Partida da Expedição,' *Diario Illustrado*, 8 July 1877.

a golden quill pen marked "Happy Success! 7-7-77."[61] The quill was "destined to mark and immortalise [the explorers'] names in the agreements they should sign, claiming important discoveries, new pearls to substitute those missing from the bare Portuguese diadem."[62] As president of the SGL, Bocage was present at the launch of the exploration. Almost simultaneously, as the director of the zoological section of the MNL, Bocage published the first instalment of the *Ornithologie d'Angola*, the preface of which he symbolically signed on the same July 7, 1877, linking both the launch of the exploration and the publication of his book for posterity.

Amidst all the symbolic and political context of the expedition, the three men chosen to lead this scientific exploration had specific instructions to make observations, take measurements, and collect data and specimens from the regions explored. After some weeks in Africa, divisions concerning the meanings and the means of the enterprise resulted in a split into two different expeditions which, in practice, followed the two different opinions held and debated in Lisbon before the expedition sailed away. There were many debates on what exactly the specific aim of this expedition should be: whether to explore a specific location (or river course), or whether to attempt an all-daring crossing of the continent. There were many disagreements in Lisbon, but in the end, a suspicion that the local conditions would impose on the explorers' actions left the final goals of the mission open-ended and the explorers were given freedom to decide on the ground how and where to proceed exactly.[63] Those discussions were indeed prophetic, for just after their arrival in Angola the explorers heard news of Henry Stanley's successful return after a survey of the Congo river: to the dismay of the Portuguese, the expedition's first goal had been accomplished, and by such a high profiled explorer. The Portuguese explorers arranged a meeting with fellow Stanley, that was described in their books. After some weeks, and disagreements regarding the new course to set, army officer Alexandre Serpa Pinto decided to attempt a coast to coast crossing of the continent, while navy officers Hermenegildo Capelo and Roberto Ivens studied the particular hydrography of the Angolan hinterland.[64] The prominent expedition of 1877 was followed by other, less famous, initiatives from the government, namely by the engineer corps to Angola and to Mozambique, to study

[61] Mendes, 'As Origens da Comissão.'
[62] Sociedade de Geografia de Lisboa, 'Sessão Em 30 de Julho de 1877,' *Boletim da Sociedade de Geografia de Lisboa* 1, no. 4 (1878): 258. Original text: "Esta penna é destinada a firmar-lhes e a immortalisar-lhes os nomes nos autos que houverem de lavrar, affirmando importantes descobertas, novas perolas que hão-de substituir as que faltam no engaste do despojado diadema portuguez, que de tantas e tão preciosas fôra enriquecido no século quinze e no século dezesseis."
[63] Mendes, 'As Origens da Comissão.'
[64] Mendes, 1982.

the implementation of the railroad from Luanda to Ambaca; and in Mozambique from Lourenço Marques to the Transvaal.[65]

Geography was the overarching field of knowledge that connected all other sciences. In a context of imperial domination its scientific justification stood on geography. However, geography is built from observations, facts, and data associated with collections of all sorts of materials. In the 1877 expedition while the explorers were busy pursuing their different routes, they amassed all sorts of collections. For the expedition, instructions were produced on the different scientific matters and observations that should be made daily. The zoological instructions taken with the expedition were not made for the occasion, since they already existed: the explorers took in their suitcases a copy of Bocage's *Instrucções.*[66]

Upon their return, their work was inscribed in two different two-volume books, one for each expedition. Both sets of books, published in large octavo, contained illustrations of typical African flora and fauna, landscape and ethnographic notes, as well as tables of observations of variation in magnetism, meteorology, altitude, and geographical coordinates of the regions visited. Animals collected during both politically charged expeditions were shipped to the Lisbon zoological museum where museum naturalists published the identification of the new collections.

Serpa Pinto's book cover depicted a row of local carriers crossing one of the obstacles of the journey, a river, transporting bundles of cargo on their heads (Figure 6.7). This image contradicts the title "How I crossed Africa" where Serpa Pinto was keen to use the first person, in order to emphasise the loneliness of command that so terribly afflicted him.[67] At the beginning of the expedition, after he separated from his fellow leaders Capelo and Ivens, and in order to justify his lonely undertaking, he wrote to Bocage:

> To send an expedition with more than one man who can take the height of the sun, is to send him to death. Stanley discovered the Zaire because he was alone. Cameron crossed Africa because he was alone. Livingstone crossed alone, and it is alone that a man can do what he should do.[68]

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[65] Maria Paula Diogo, 'Um Olhar Introspectivo: A Revista de Obras Públicas e Minas e a Engenharia Colonial,' in *A outra face do Império. Ciência, Tecnologia e Medicina (Sécs. XIX-XX),* ed. Maria Paula Diogo and Isabel Maria Amaral (Lisboa: Edições Colibri, 2012), 71.
[66] Mendes, 1982.
[67] For a nuanced characterisation of Serpa Pinto, see Soledad Rodrigues, *O Mito do Herói Explorador: A Aventura de Travessia de África de Serpa Pinto* (Lisboa: Prefácio, 2009).
[68] Burnay, 2008, Lote 255. Confidential correspondence Serpa Pinto to Bocage, Benguella, 1877.10.21. Original text: "Mandar uma expedição com mais de um homem que souber tomar alturas do sol, é mandal-a para a morte. Stanley descubrio o Zaire porque vinha só. Cameron atravessou Africa porque vinha só. Livingstone atravessou só, e é só que um homem pode fazer o que deve fazer."

It becomes clear from this quote how passionate Serpa Pinto was about the idea of the heroic crossing and to fulfil the ideal of the romantic traveller who overcomes all hurdles accompanied only by himself. With the shared tripartite leadership of the 1877 expedition, that was not possible for no one person could rise to the leading role. When reviewing Serpa Pinto's book, famous explorer Richard Burton while acknowledging the "new order" of the Portuguese administration in relation with its African possessions, under the influence of the SGL and the Central Commission. He praised the "admirable style" of the book while still criticising Serpa Pinto's title for being "somewhat banal and echoing other books of travels."[69]

The English version of Capelo and Ivens' book opened with the dedication "To the Portuguese Nation," and the following verse:

> This is my happy land, my home, my pride,
> where, if the Heavens but grant the prayer I pray
> for glad return and every risk defied,
> there may my life-light fail and fade away.
>
> Camoes. The Lusiads, Canto III. v. 21.
> (Captain Burton's Version)

The dedication conflates two authors: Luiz de Camões, the sixteenth-century poet who glorified the Portuguese nation of sailors and explorers in an epic poem called *Os Lusíadas* (The Lusiads), and their fellow African explorer and known orientalist Burton, who had just published his English translation of the poem. Their second volume was dedicated to Anchieta, with a whole page dedicated to a reproduction of his photograph and his signature. The explorers reserved this page to the "enlightened, untiring, and modest naturalist and explorer."[70]

For the Capelo and Ivens' hydrographical expedition, the balance between the overall management of the expedition, the different daily observation tasks, and the collecting opportunities was not always easy to find. In a literary passage, the explorers described their duties thus:

> At the outset, the explorer is feverishly impatient to see everything, to note down everything - rushes from geography to meteorology, and thence to the natural sciences - is in a constant flutter of excitement, and

[69] Richard Francis Burton, 'How I Crossed Africa. By Major Serpa Pinto,' *The Academy* (May 21), no. 472 (1881): 365–67.
[70] Capelo and Ivens, 1882, dedication.

> bewildered with his theodolite, his scalpel, his presses for plants, and his paper for maps and plans.
>
> Then comes the more sober stage. He first throws over the insects, then the birds, gives the plants the go-by, and as he nears the end of the journey sticks to geography alone.[71]

With this justification the explorers excused themselves for not having the means to collect and transport samples of all they saw and encountered on their way. As it was customary with travel literature, however, their book is ripe with illustrations of particular animals and plants, as well as with ethnographic drawings and descriptions. The artworks were the typical renderings of exciting accidents, magnificent landscapes, and exotic looking ethnographic objects. Some of them were drawn by Ivens himself.[72] Other were engraved from actual photographs taken by the explorers (Figure 6.7). The text is also interwoven with comments on specific animals and plants, associated for the most part with the Latinised version of their scientific names. Like Du Chaillu and other explorers, Capelo, Ivens and Serpa Pinto probably received help with certain parts of the text from Lisbon's naturalists.

Naturalists in the Lisbon museum and the EPL had a prominent role in receiving the various shipments sent by the explorers. The explorers had some basic training on preparation of specimens and carried instructions and materials in order to collect and ship specimens back to Lisbon. Geographical explorers have different priorities than, for example, a contracted collector such as Anchieta. They were always moving and had limited time to explore each region's fauna. Their sampling of the terrain originated mostly on hunting trips and was constrained by the means of transportation and number of carriers and resulted in collections that were biased and unsystematic. Another issue is, of course, preservation which on the field often lacked correct tools and materials, such as alcoholic formulae for liquid conservation. Most of their collections were reported disappeared during the many accidents the exploration had.

Collections shipped by Capelo and Ivens as well as by Serpa Pinto were received with great expectation. As soon as the shipments arrived, they were duly studied and published by Lisbon naturalists. The expedition shipments acquired both scientific and political relevance. In the case of animal shipments, the museum's naturalists, and not the explorers, sorted the various specimens, and identified the new species. They also contributed to the book by writing

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[71] Capelo and Ivens, 1882, pp.202-203

[72] Ivens was a talented draughtsman. His drawings are featured in the biographical profile: Manuel Ferreira, *O Explorador Micaelense Roberto Ivens* (Nova Gráfica, Lda, 2004).

appendixes with the zoological findings, which they also published in the *Jornal*. These lists were the result of careful identification and conversion of shipments of odd crates and barrels that arrived at the museum, into intelligible lists of specimens of identified species.

The botanical shipments made by the two expeditions were studied by Conde de Ficalho and William Philip Hiern, a fellow of the Linnaean Society of London. In June 16, 1881 the work "On Central-African Plants collected by Major Serpa Pinto" was read at the Linnaean Society of London.[73] The article had four monochrome plates and was published in the *Proceedings*, as well as a separate offprint. The authors mentioned the difficult logistics of transport, and the collection's bias towards plants that are easy to herborize and more transportable, such as Gramineae, and the fact that a tree mentioned in the book as abundant was not sampled or included in any form in the shipment.

A review of Capelo and Ivens' book considered the work was "a great addition to our knowledge of western Central Africa in the shape of two separate maps."[74] The review acknowledged Bocage and Ficalho as the "authorities" in their respective sciences:

> Considerable attention was also paid by the travellers to zoological and ethnological matters: not only are various species of mammals, birds, amphibians, crustaceans and insects figured and referred to in the text, but there is a special Appendix, 'Subsidios para a Fauna e Flora da Africa Central e Occidental,' by Dr. Barbosa du Bocage and other authorities, extracted from the 'Jornal de Sciencias' of Lisbon, describing the zoological objects collected and observed, and a list of the plants by the Conde de Ficalho. [75]

Two zoological shipments from the Capelo and Ivens' expedition arrived in Lisbon before the explorers, and Bocage readily published the list of specimens in the *Jornal*.[76] In this paper, the different species were enumerated according to the geographical location they were collected on, and not corresponding to any other taxonomical order. Highlighting the geographical locations in this way had a double usage: to organise the zoogeographical knowledge in the museum and to support the Portuguese presence in the consecutive territories.

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[73] Conde de Ficalho and W. P. Hiern, *On Central-African Plants Collected by Major Serpa Pinto* (London: Taylor and Francis, 1881).
[74] Proceedings of the Royal Geographical Society, Vol. 4, No. 4 (Apr. 1882), pp. 246-247.
[75] *Ibidem*.
[76] José Vicente Barbosa du Bocage, 'Subsidios para a Fauna das Possessões Portuguezas d'Africa Occidental,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes* 7, no. 26 (1879): 85–96.

In 1881, the African Commission of the SGL published a nation-wide leaflet addressed "To the Portuguese People" in support of a national fundraiser for the creation of "Civilising Stations in the territories subject and adjacent to the Portuguese dominions in Africa."[77] Annexed to it was a foldout map with the legend "Map of Africa indicating the projected civilising stations" (Figure 6.1). In the same map, the exploration routes of Capelo and Ivens and of Serpa Pinto were also represented. All the established territorial areas considered Portuguese are coloured in carmine. The horizontal strip of land between the two coasts of Angola and Mozambique is also coloured carmine.

The "Civilising Stations" project aimed to demonstrate the effective presence in and occupation of the hinterland, promoting the idea of emigration and settlement in the African hinterland as a profitable commercial initiative. For centuries these territories were the place of forced labour trade and of imprisonment of criminals, and metropolitan Portuguese needed some incentive to consider Angola and Mozambique as a popular destination. The leaflet stated that the stations should be establishments directed by "energetic, dedicated, patriotic men" who, together with their European servants, would "educate and serve as model" to the local populations who would become "trained and disciplined."[78] The leaflet continued claiming the stations would create "schools and workshops", test "agricultural products and processes of acclimatisation" and establish "friendly relations and honest commerce with the indigenous."[79] The fundraiser was not entirely successful, but some stations were actually put in place, and were given names of leading figures associated to this movement.[80] The main success of this publication and project was the overall dissemination of what came to be known as the "Rose-Coloured Map." This appended map was the visual and material reification of the underlying narrative of the wholesome connection between the two African coasts as one homogeneous territory under Portuguese dominion. The "civilising stations" was a strategy to effectively occupy this vast territory, and the map was a visual simplification of the Portuguese Third

[77] Sociedade de Geographia de Lisboa, *Ao Povo Portuguez em nome da Honra, do Direito, do Interesse e do Futuro da Patria, a Commissão do Fundo Africano creada pela Sociedade de Geographia de Lisboa para promover uma Subscripção Nacional Permanente destinada ao estabelecimento de Estações Civilisadoras nos territórios sujeitos e adjacentes ao domínio Portuguez em Africa* (Lisboa: Imprensa Nacional, 1881).

[78] SGL. *Ao Povo Portuguez*, 7. Original text: "dirigidos por homens energicos, dedicados, patrioticos, ajudados por um certo numero de serviçaes europeus para ensino e para exemplo de um [numero] maior de indigenas, que iriam sendo assim praticamente adestrados e disciplinados."

[79] SGL. *Ao Povo Portuguez*, 7. Original text: "Crear-se-hão escolas, officinas; ensaiar-se-hão culturas, processos de acclimação e se procurará estabelecer relações amigas e de trafico honesto com os indigenas."

[80] See Henrique Dias de Carvalho, *A Lunda, ou os estados do Muantiânvua. Domínios da soberania de Portugal* (Lisboa: Adolpho, Modesto & C.ª, 1890) for mentions of Civilising Stations: "Paiva de Andrade," "Costa e Silva," "Luciano Cordeiro," "Cidade do Porto," and "Ferreira do Amaral" in the year 1885.

Empire in Africa. The persistence of the idea of the "Rose-Coloured Map" as a shorthand for the Portuguese intentions for African domination still lingers in present day textbooks.

This same document calling for the participation of financial contributors for the project of the civilising stations cited Serpa Pinto's journey as having "laid emphasis on extensive territories on which information was scattered, confusing, incomplete, and not enough to give them the importance they have today."[81] The African Commission of the SGL stressed the role played by Serpa Pinto when he symbolically brought two oceanic coasts together, and as a conduit for a new expression of the Portuguese colonial occupation policies that focussed on the territories imagined as cohesive possessions.

National heroes

The work of these high-profile collectors was framed by the context of the diplomatic sustainment of the Portuguese African empire. All of these publications helped legitimate the explorations and the scientific reputation of the explorers. Both travel books were published amidst the context of patriotic exaltation of the 1880 commemorations of the third centennial of the death of national poet, Luis Vaz de Camões. This was a nation-wide celebration, with much pomp and circumstance centred in Lisbon that lasted for three days, culminating in June 10, 1880. The poet of the fatherland was cited and celebrated everywhere. Significantly the SGL's motto was "Por mares nunca d'antes navegados," (in Burton's translation "over the waters never by seaman crost [crossed]"), the Lusiads' third line in the first verse, which all Portuguese know by heart. Luciano Cordeiro, the founder and mentor of the SGL was also one of the founders of the *Associação dos Jornalistas e Escriptores Portugueses*, alongside many prominent intellectuals. This professional class association, founded to assist and protect its members, journalists and writers was solemnly founded at 10am on June 10, 1880, in a room at the SGL. The celebrations of 1880's Camões anniversary were endorsed by the crown as a national holiday and promoted by the municipality of Lisbon with the help of many professional and commercial associations. The celebration's main sponsor was the journalists' association, a recent but strong member of a society which boasted having a free press, and a liberal government increasingly concerned with popularization. Journalists in different political sides were to retain a key role in public opinion throughout the African Question and the several

[81] *Ao Povo Portuguez* p.13. Original text: "A exploração de Serpa Pinto veio pôr em relevo extensos territorios de que havia noticias dispersas, confusas, incompletas, que não bastavam para lhes dar a importancia, que hoje teem aos olhos dos estudiosos dos interesses nacionaes."

colonial disputes of this period, including a big focus on transcripts of parliamentarian discussions. Illustrated press such as *O Occidente* (1878-1915) regularly showed scenic images in the Portuguese Africa series. And many other newspaper titles would follow focusing exclusively in the topic of Africa colonization, some of the most emblematic being as *Colonias portuguesas: revista illustrada* (1883-1891), and the *África illustrada: archivo de conhecimentos uteis*, (1892-1893), both created by the African explorer Henrique de Carvalho (1843-1909), and the long-lasting *Portugal em África: revista scientifica* (1894-1973) initially edited by Quirino Avelino de Jesus (1865-1935).

Some years later, in 1884-1885, both Serpa Pinto as well as Capelo and Ivens were deployed to lead new expeditions. Capelo and Ivens were in charge with attempting a new crossing of the continent west to east, and subsequently published *De Angola à Contra-costa* (*From Angola to the other coast*), in 1886. And Serpa Pinto led an exploration of Mozambique with Augusto Cardoso, intended to establish border demarcations which led to contentious diplomatic provocations between Portugal and Britain. Another explorer, Henrique de Carvalho, led from 1884 to 1888 a systematic geographic and ethnographic survey of north interior Angola to the Lunda region and published several books on its colonisation.[82] He also shipped specimens to the zoological museum.[83] Several other naturalist-explorers were later hired as colonial collectors for Portuguese zoological colonial collections. As the Coimbra and the Porto zoological museums grew in importance and number of naturalists doing specialised work, more collectors were employed. Adolfo Möller (1842-1920), Francisco Newton (1864-1909) and José Pereira do Nascimento (1860-1913) were some of them. The sum of their contributions is to this day the kernel of Portuguese nineteenth-century botanical and zoological collections with colonial provenance. Baltasar Osório, who was by 1891, assistant professor and curator of the fish collections was more straightforward about the significance of the collectors' role as seen through the rhetoric of the civilising mission:

> another evidence of the work of those [collectors] who obscurely yet endlessly try to maintain, like soldiers, the dominion that was once kept using guns but which we today seek to defend by cultivating science.[84]

[82] Carvalho's works and photographic albums are available online in http://purl.pt/23746/1/intro.htm.
[83] For example, AHMUL/AHMB/Rem022c. "Mammiferos da viagem do Major Carvalho," s/d; and AHMUL/AHMB/Div256. Carvalho to Bocage, 1888.
[84] Balthazar Osório, 'Estudos ichtyologicos ácerca da fauna dos dominios Portuguezes da Africa. 2ª Nota. Peixes Marítimos d'Angola,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 2, 2, no. 10 (September 1891): 128. Original text: "mais uma prova de trabalho dos que obscura mas perseverantemente tentam manter como soldados o domínio que outr'ora se sustentou terçando as armas, mas que hoje procuramos defender cultivando a sciencia."

A hundred years after the *Ornithologie d'Angola* was published, ornithologist Augusto Rosa Pinto published *Ornitologia de Angola*, a revision of the ornithological fauna of Angola, which by 1983 was still valuable to the scientific research done not only in the zoological museum but also in the Zoological Garden of Lisbon, and the overseas institute Centro de Zoologia da Junta de Investigações Científicas do Ultramar.[85]

In a meeting of the SGL in January, 20, 1883, under the presidency of Bocage, four names were suggested as the first honorary members of the society. They were Hermenegildo Capelo, Serpa Pinto, Roberto Ivens, and José de Anchieta.[86] The association of the four explorers was not isolated and continued inside and outside the SGL. The four names belonged to the pantheon of national heroes and are still present in Lisbon's toponymy on four streets in the neighbourhood of Chiado, all of which once surrounded the headquarters of the SGL. That the contracted naturalist of the zoological museum was in such a way associated with the heroic names of geographical explorers was at the time a natural link between the accumulation of scientific knowledge on Portuguese Africa and the geographical appropriation of the same imperial territories, or, between science and empire.

[85] António Augusto da Rosa Pinto, *Ornitologia de Angola. Vol I (Non Passeres)* (Lisboa: Instituto de Investigação Científica Tropical, 1983), x.
[86] 'Sessão em 20 de Janeiro de 1883', Boletim da Sociedade de Geografia de Lisboa 4 (1883): 57–68, p.67.

Conclusions. To study "what is ours"

Porto Bocage was not just a new nomenclature for a portion of the Fernão Veloso bay suggested in 1884 by explorers Serpa Pinto and Augusto Cardoso. During their forced sojourn for lack of carriers, the explorers of the Nacala port also captured and shipped to Lisbon a collection of local birds. The results of this shipment were published in an article where Sousa described four of the specimens as caught in Porto Bocage.[1] Porto Bocage was now more than a port, it was an "authentic" provenance, attested by the scientific authority system that connected the Portuguese explorers in Mozambique, the storage rooms in the Lisbon museum, and the scientific publications of the Museum naturalists shared with the international scientific community at large.

An important feature of how natural history museums were dependent on imperial logistics is visible in specimen tags and catalogues, on the names of collectors and locations associated with the provenance of the specimens. "Authentic" provenance, as Bocage defined it, was as much of scientific as of political relevance. The coordination of a large network of collectors, correspondents, and incoming shipments was the daily responsibility of curators. In the case of the Lisbon zoological museum this network included a fair number of contributors located in the Portuguese overseas territories orchestrated by Bocage, a scientific expert who never set a foot in Africa but who played both scientific and political roles in the national and international arenas. Most of those contributors were not necessarily stationed permanently in

[1] José Augusto Sousa, 'Lista das aves colligidas pelo sr. Serpa Pinto no Ibo em 1885,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 11, no. 42 (July 1885): 82–85.

the same location, they travelled like geographical explorers or army officers who were often transferred between localities and even continents. The locality of their shipments was nevertheless considered "authentic" in Lisbon, because it constituted evidence of the range of geographical distribution of a certain animal. In turn, publications of scientific papers mentioning such locality, associated with a name of a Portuguese officer, and often a local and indigenous name became representative of the extension of the Portuguese presence in that territory. Therefore, zoogeographical details worked in multiple ways, attesting the capacities of Portuguese naturalists in Lisbon, and of Portuguese colonial officers stationed in the Empire, and contributing to assert the Portuguese presence in Africa in ways in which science and politics became interconnected.

As we have seen, in its first decades, the Lisbon zoological museum built its collections with a strong bias towards African fauna, especially towards Angola. Arruda Furtado, one of the few naturalists not particularly interested in the African collections wrote:

> [Africa] is the 'mysterious continent' where everything is large, fascinating, and unknown. Now, in the zoology of Africa we have done enough, and we may say that the zoological section of the Museum of Lisbon is an African museum.[2]

In this plea, Arruda Furtado was unhappy that the museum had such a strong African agenda and defended that the museum work could also be directed into other areas. In fact, what Furtado called an "African museum" was the result of a set of opportunities and intentions, including the opportunity for the Lisbon museum to become more visible in the European network of museums, and to participate in the political legitimation of the Portuguese African Empire, even during the period previous to the Berlin Conference and the scramble for Africa. Throughout this dissertation I aimed to show how the interest in Portuguese Africa fuelled the scientific work of the Lisbon zoological museum, while the scientific practices and zoogeographical research bolstered the overall nationalistic and imperial rhetoric and praxis. The topics addressed were chosen to illustrate how the microscale of daily practices were inextricably connected with the macroscale of imperial anxieties and actions.

Scientific questionnaires, and instructions to travellers for the collecting of various specimens were, for example, historically linked to long-distance control over colonial territories, while at the same time created a manifest social space that asserted the hegemony

[2] Francisco Arruda Furtado, 'Catalogo geral das collecções de moluscos e conchas da Secção Zoológica do Museu de Lisboa,' *Jornal de Sciencias Mathematicas, Physicas e Naturaes*, 1, 11, no. 43 (1886): 105–50.

of the museum of Lisbon as their recipient, and the privileged interlocutor of other national and international institutions and museums.

The role of imperial collectors for natural history museums, already addressed in the literature, was expanded in this thesis revealing the potential of looking at different empires other than the canonical ones. I included detailed examples of governors, who by their job requirements were expected to contribute to the national museums of colonial artefacts; military and medical officers who were keen to engage with the metropole's institutions and to enhance their social position by participating in the tasks of collecting, preserving and shipping animals to Lisbon; and geographical explorers who with their expeditions contributed to amassing data as well as material evidence of mineralogical, zoological, and botanical riches. Contracted collectors, such as Anchieta, continued the eighteenth-century efforts of collecting and possessing the empire. If it were not for the 1978 fire which destroyed partially the building of the EPL, his legacy would still be studied today.

The publication of catalogues, periodical articles, as well as illustrated books was as much the responsibility of the naturalists as it was to sort, identify, and organise the specimens in the museum's collections. Given that the physical specimens, shelves, and rooms are no longer available, the museum publications can still provide insights into the scientific practices behind the published papers. Publishing an article could mean to gain naming priority over a new species, to organise the collection in a different manner than its physical accommodation in the museum, or to promote a specific collector's contribution to the museum. All these are distinct modes of knowledge production. The order in which the physical specimens were stored in the museum rooms, shelves, drawers and other containers was not the same as the order in which the respective species were organised in the metaphorical tree of life. Manuscript catalogues were produced for different purposes, depending on the epistemological outcomes desired: for instance a catalogue book could be opened to write down all the bird specimens existing in the ornithological collection, and another, different catalogue could be made listing all the different bird species known (of a certain geographical demarcation for example), alongside their bibliographical references. These two catalogues create different types of correlations: one refers to physical specimens, that occupy a certain amount of space and contain attached a specific provenance history, and which need to be preserved under the right conservation conditions; the other refers to the updated knowledge shared by the ornithological community. Individual species index cards, specimen tags, as well as other notebooks and catalogues still kept in the historical archive consist an exciting source to work from the point of view of paper technologies, a topic receiving increasingly more attention.

During his work as museum director, Bocage aimed to accomplish a "permanent establishment" which would, contrarily to its predecessors, stand the test of time. In 1905, the naturalists of the zoological section of the MNL asked the government to create a new name for the section. As a tribute to its first director, the zoological museum was to take the name "Museu José Vicente Barboza du Bocage," or "Museu Bocage," as was regularly used. Recently however, the new organisation of the museums of the University of Lisbon which coordinates all the different scientific departments removed this epithet and there is no longer place for a "Museu Bocage." The current scientific collections still retain the internationally acknowledged "MB" acronym in their reference system; there is still a cast bust of Bocage in the old library reading room (which is now going through renovations), but the plaque that announced the "Museu Bocage," as a separate location in the building was removed since the moniker of the department disappeared in recent institutional reorganizations. And just as new names create new things and new ideas, the elimination of names can produce irretrievable loss of memory and history. With the physical loss of the collections forty years ago in a fire, let us hope that the historical archive of the University of Lisbon museums continues to promote and support new research on the history of the scientific institutions that were once part of it.

This dissertation was meant as a contribution to the study of archival materials in order to contribute for a history of the Lisbon collections and it did not exhaust all the possibilities this archive holds for history of science. Future lines of enquiry may include further research on the historical archival materials of the museum of Lisbon, especially when analised in comparison with other zoological museums with organised archives; Bocage's international correspondence as well as many auxiliary documents offer a promising path to the discussion of how not only ideas but also specimens circulated among naturalists in Europe; the logistics of circulation, including postal fares, steamboat and railway transportation, but also the cost attached to those exchanges can be studied from the many receipts and correspondence held at the museum's archives. Many notes regarding collections lost in transport or damaged by poor storage are still left to explore; and the study of other types of suppliers of the museum, such as the Verreaux brothers, will possibly open up a line of investigation on the economic trade of zoological specimens in Europe.

The institutional and personal relationships between the museum and the Polytechnic School, the Academy of Sciences, and the Society of Geography of Lisbon, are still to be explored further. How much money was spent on the purchase of collections compared with the budget for books, or didactical materials, and how it changed overtime; how the respective budgets were negotiated, whether the museum was financially sustainable or not, what were

indeed the editorial policies and practices of the *Jornal* over the years, how was the Academy's printing press organised and paid for, and what was Bocage's role in it, are some of the questions left unanswered.

The next generations of naturalists who were to become the first biologists in Portugal is still understudied and should provide many clues as to how the specialization of the discipline developed. Although the museum was to lose some of its representational power after Bocage's passing, the collections were once again used as representation of the empire under the direction of Artur Ricardo Jorge (1886-1974), but our knowledge of the connection between the nineteenth century and the twentieth century museum is still sparse and unconnected. The in-between generation of naturalists/biologists maintained professional connections between national institutes such as the Zoological Garden of Lisbon (created in 1883), the Aquarium Vasco da Gama (inaugurated in 1898) the museums of Porto and Coimbra, and the future Tropical Research Institute (Instituto de Investigação Científico Tropical) which will also be most interesting to study.

Future research on these and other topics will show the various dimensions of the natural sciences practiced over time with collection-based knowledge, and will furthermore connect science with society, politics and empire, in ways which offer the promise to establish a solid bridge between history of science and cultural and political history. Additionally, it will provide new contexts which will enrich and eventually enable to revise received views on this confluence as addressed by the international community of historians of science and empire.

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Appendix

- List of authors of the *Jornal de Sciencias Mathematicas, Physicas e Naturaes*
- List of Bibliographical References of the *Jornal de Sciencias Mathematicas, Physicas e Naturaes* by volume

non ACL	[AUTHOR]
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	ALMEIDA, Carlos Augusto Moraes d' (1843-1919)
	ALMEIDA, D. Antonio de (?-?)
	ALMEIDA, Machado de (?-?)
	AVILLEZ, Jorge Frederico de (1872-1916)
	BARBARIN, Paul (1855-1931)
	BARBOSA, António Maria (1825-1892)
	BARBOSA, Ignacio de Vilhena (1811-1890)
*	BAYER, Alexander (?-?)
	BENEVIDES, Francisco da Fonseca (1835-1911)
	BENSAUDE, Alfredo Bensaude (1856-1941)
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*	BERGROTH, Ernst Evald (1857-1925)
	BOCAGE, José Vicente Barbosa du (1823-1907)
*	BOLIVAR y Urrutia, Ignacio (1850-1944)
	BOURGEOIS, Jules (1847-1911)
	BREYNER, Francisco Manuel de Melo [Conde de Ficalho] (1837-1903)
	CABREIRA, Antonio (1868-1953)
	CAPELLO, Felix de Brito (1828-1879)
*	CASPARY, Johann Xaver Robert (1818-1887)
*	CASTRO, José da Silva e (?-?)
	CHOFFAT, Paul (1849-1919)
	COELHO, José Maria Latino (1825-1891)
	COELHO, Sabino Maria Teixeira (1853-1938)
	CORVO, João de Andrade (1824-1890)
	COSTA, Francisco António Pereira da (1809-1889)
	COTTER, Jorge Cândido Berkeley (1845-1919)
*	CUNHA, Henrique de Lima e (1843-1915)
	CUNHA, Pedro José da (1867-1945)
	DAVEAU, Jules (1852-1929)
	DELGADO, Joaquim Filipe Nery (1835-1908)
	DIAS, Emilio (?-?)
*	ESPADA, Marcos Jimenéz de la (1831-1898)
	FERREIRA, Júlio Guilherme Bettencourt (1866-1944)
	FERREIRA, Luiz Feliciano Marrecas (1851-1928)
	FIGUEIREDO, Filipe Eduardo de Almeida (1858-1930)
	FRANÇA, Carlos (1877-1926)
	FRANCO, Enrico Emilio (1881-1949)
*	FURTADO, Francisco Arruda (1854-1887)
	GIRARD, Albert Alexandre (1860-1914)
*	GOEZE, Edmond (1838-1929)
	GOMES, Bernardino Antonio (1806-1877)
	GOMES, Bernardino Barros (1839-1910)
	GOMES, Joaquim Eleutério Gaspar (1824-1896)
	GOMES, Henrique de Barros (1843-1898)
	GOUPILLIÈRE, Haton de la (1833-1927)
	GRIFFITHS, A.-B. (?-?)
*	GUIMARÃES, Antonio Roberto Pereira (1843-1885?)
	GUIMARÃES, Rodolfo Ferreira Dias (1866-1918)
	HENRIQUES, Júlio (1838-1928)
*	HOPFFER, Frederico (1828-1919)
	HORTA, Francisco da Ponte (1818-1899)
	JARDIM, Cypriano (1841-1913)
	LAISANT, Charles-Ange (1841-1920)
*	LAUTEMANN, Eduard (?-?)
	LEBON, Ernest (1846-1922)
	LEMOS, Rui de (?-?)
	LIMA, J. M. de Almeida (?-?)
	LIMA, João Maria d'Almeida (1859-1930)
	LOURENÇO, A. V. (?-?)
	MACHADO, Achilles Alfredo da Silveira (1862-1942)
*	MACHADO, Carlos Maria Gomes (1828-1901)
	MACHADO, Virgilio (1859-1927)
*	MACPHERSON y Hemas, Jose (1839-1902)
	MARRE, Aristide (1823-1918)

*	MARSEUL, Sylvine Auguste (Abbé) (1812-1890)
*	MARTIN, José Martin (?-?)
	MASTBAUM, Hugo (1859-?)
	MENEZES, Carlos Azevedo de (1863-1928)
*	MENGO, Jacinto da Silva (1808-1866)
*	MEUNIER, Fernand (1868-1926)
	MONTEIRO, Alfredo Schiappa (1838-1919)
	MONTEIRO, Antonio Augusto Carvalho (1848-1920)
	MOTTA, Eduardo Augusto (1837-1912)
	NOBRE, Augusto (1865-1946)
	OCAGNE, Maurice d' (1862-1938)
*	OLIVEIRA, Manuel Paulino d' (1837-1899)
	OOM, Frederico Augusto (1830-1890)
	OSÓRIO, Balthasar (1855-1926)
	PAIGE, Constantin le (1852-1929)
	PEGADO, Luiz Porfirio da Motta (1831-1903)
*	PETERS, Wilhelm (1815-1883)
*	PINTO, M. V. da Silva (?-?)
*	PUTZEYS, Jules (1809-1882)
*	QUEDENFELDT, Gustav (1817-1891)
*	RADOSZKOVSKY, Octavy Ivanovich (1820-1895)
	REY-PAILHADE, Joseph de (1850-1934)
	RIBEIRO, Carlos (1813-1882)
	RODRIGUES, José Júlio (1849-1923)
	RODRIGUES, José Manuel (?-?)
*	ROELOFS. Willem (1822-1897)
*	SANTOS, Fernando Mattozo Santos (1849-1921)
*	SCHMIDT, Ernst (1877-1933)
	SEABRA, Anthero Frederico de (1874-1952)
	SILVA, A. J. Ferreira da (1853-1923)
*	SILVA, Wenceslau da (?-?)
*	SILVA, Augusto Luso da (1827-1902)
	SILVA, Daniel Augusto da (1814-1878)
*	SILVA, J. A. Martins da (?-?)
	SILVA, João Fagundo da (?-?)
	SILVA, Luiz Antonio Rebello da (1855-1946)
*	SILVA, Otto de Alencar (1874-1912)
	SILVA, Roberto Duarte da (1837-1889)
	SILVEIRA, Joaquim Henriques Fradesso da (1825-1875)
*	SOUSA, José Augusto de (1837-1889)
	SOUSA, Manuel Bento de (1835-1899)
	TEIXEIRA, Francisco Gomes (1851-1933)
	TEIXEIRA, J. Pedro (?-?)
	THÜMEN, Felix de (1939-1892)
	VASCONCELLOS, Alberto Osorio de (1842-1881)
	VEIGA, Sebastião P. Martins Estacio da (1838-1891)
	VIDAL, Adriano Augusto de Pina (1841-1919)
	WAGNER, Mário Basto (1885-1922)

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1	Nov 1866	i-vii	Editorial	José Maria Latino Coelho	Introducção
1	Nov 1866	pp.1-5	Mathematics	Daniel Augusto da Silva	Nota sobre alguns teoremas novos de statica
1	Nov 1866	pp.6-12	Mathematics	Francisco da Ponte Horta	Nota sobre a igualdade dos polygonos
1	Nov 1866	13-25	Physics and Chemistry	A. V. Lourenço & António Augusto de Aguiar	Investigações acerca da synthese dos alcools monoatomicos
1	Nov 1866	26-36	Botany	Carlos Maria Gomes Machado	Catalogo methodico das plantas observadas em Portugal
1	Nov 1866	37-56	Zoology	José Vicente Barboza du Bocage	Lista dos reptis das possessões portuguezas d'Africa occidental que existem no Museu de Lisboa
1	Nov 1866	57-78	Zoology	José Vicente Barboza du Bocage	Reptiles nouveaux ou peu connus recueillis dans les possessions portugaises de l'Afrique occidental, qui se trouve au Muséum de Lisbonne
1	Nov 1866	79-88	Zoology	Felix de Brito Capello	Especies novas ou pouco conhecidas de arachnidios d'Africa occidental
1	Nov 1866	89-92	Zoology	José Vicente Barboza du Bocage	Variedades. A ornithologia dos Açores
2	Mar 1867	97-105	Mathematics	Francisco da Ponte Horta	Nota sobre alguns theoremas de geometria
2	Mar 1867	106-112	Physics and Chemistry	António Augusto de Aguiar & E. Lautemann	Investigações sobre as naphtalinas nitradas e bases polyatomicas derivadas
2	Mar 1867	113-128	Botany	Carlos Maria Gomes Machado	Catalogo methodico das plantas observadas em Portugal
2	Mar 1867	129-153	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental que existem no Museu de Lisboa (1ª Lista)
2	Mar 1867	154-169	Zoology	Felix de Brito Capello	Peixes novos de Portugal e da Africa occidental, e caractéres distinctivos d'outras especies já conhecidas
2	Mar 1867	170-171	Zoology	Jacinto da Silva Mengo	Descripção de um «Helix» novo de Portugal
2	Mar 1867	172-173	"Variedades"	Francisco da Ponte Horta	Observações relativas à Nota da pag. 97
2	Mar 1867	173-174	Bibliography	ACL	Bibliographia
3	Ago 1867	175-187	Mathematics	Daniel Augusto da Silva	Amortisação annual media das pensões nos principaes montepios de sobrevivencia portuguezes
3	Ago 1867	188-197	Mathematics	Luiz Porfirio da Motta Pegado	O logar geometrico dos pontos que distam egualmente de duas rectas dadas é um «paraboloide hyperbolico isosceles»
3	Ago 1867	198-208	Physics and Chemistry	António Augusto de Aguiar & E. Lautemann	Investigações sobre as naphtalinas nitradas e bases polyatomicas derivadas
3	Ago 1867	209-216	Botany	Edmond Goeze	Sur la variabilité des espèces. Examen de la doctrine des espèces dans le règne végétal, de M. Herder
3	Ago 1867	217-228	Zoology	José Vicente Barboza du Bocage	Segunda lista dos reptis das possessões portuguezas d'Africa occidental que existem no Museu de Lisboa
3	Ago 1867	229-232	Zoology	José Vicente Barboza du Bocage	Diagnoses de quelques reptiles nouveaux de l'Afrique occidentale
3	Ago 1867	233-264	Zoology	Felix de Brito Capello	Catalogo dos peixes de Portugal que existem no Museu de Lisboa
3	Ago 1867	265-268	Bibliography	Bernardino Antonio Gomes	Relação do que existe impresso e em via de publicação ácerca da Flora e Fauna Angolense, com respeito á viagem do dr. Fr. Welwitsch, emprehendida e executada na Africa occidental por determinação e com auxilio do governo portuguez
3	Ago 1867	269-271	"Variedades"	Francisco da Ponte Horta	Exercicio de geometria analytica
3	Ago 1867	271-273	"Variedades"	António Augusto de Aguiar	Quelques observations sur le procedé photographique au collodium sec de M. le major Russell
3	Ago 1867	274	"Variedades"	António Augusto de Aguiar	Explicação das Estampas
4	Dez 1867	275-278	Mathematics	Francisco da Ponte Horta	Nota sobre algums proposições arithmeticas
4	Dez 1867	279-282	Mathematics	A. Osorio de Vasconcellos	Nota sobre um problema de hydraulica
4	Dez 1867	283-291	Physics and Chemistry	António Augusto d'Aguiar	As balsas dançantes (Considerações ácerca dos processos de vinificação)
4	Dez 1867	292-306	Botany	Carlos Maria Gomes Machado	Catalogo methodico das plantas observadas em Portugal
4	Dez 1867	307-313	Zoology	Felix de Brito Capello	Catalogo dos peixes de Portugal que existem no Museu de Lisboa (continuação)
4	Dez 1867	314-317	Zoology	Felix de Brito Capello	Descripção de dois peixes novos provenientes dos mares de Portugal
4	Dez 1867	318-323	Zoology	Felix de Brito Capello	Description de trois nouveaux poissons des mers du Portugal
4	Dez 1867	324-339	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental que existem no Museu de Lisboa (2ª Lista)
4	Dez 1867	340-342	Bibliography	Bernardino Antonio Gomes	Monographia molluscorum terrestrium, fluvialium , lacustrium insularum Madeirensium, auctore barone de Castello de Paiva
4	Dez 1867	343-347	Bibliography	Bernardino Barros Gomes	Viagem historico-natural feita a Moçambique por ordem de sua magestade el-rei Frederico Guilherme IV nos annos de 1842 a 1848 por Guilherme C. H. Peters

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
5	Ago 1868	pp.1-32	Mathematics	Francisco da Ponte Horta	Nota sobre uma proposição de statica
5	Ago 1868	pp.4-6	Mathematics	Francisco da Ponte Horta	Nota sobre um problema de geometria
5	Ago 1868	pp.7-18	Botany	Bernardino António Gomes	Flora fossil do terreno carbonifero das visinhanças do Porto, serra do Bussaco, e Moinho d'Ordem proximo a Alcacer do Sal. Apontamentos pelo dr. Geinitz
5	Ago 1868	19-37	Botany	Carlos Maria Gomes Machado	Catalogo methodico das plantas observadas em Portugal
5	Ago 1868	38-50	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental que existem no Museu de Lisboa (3ª Lista)
5	Ago 1868	51-63	Zoology	Felix de Brito Capello	Catalogo dos peixes de Portugal que existem no Museu de Lisboa (continuação)
5	Ago 1868	64-69	Zoology	Felix de Brito Capello	Noticia ácerca de um peixe pouco conhecido proveniente do Brasil
5	Ago 1868	70-74	Bibliography	Edmond Goeze	Bibliographie botanique
5	Ago 1868	75-79	"Variedades"	F. A. Pereira da Costa	Noticia de alguns martellos de pedra, e outros objectos,que foram descobertos em trabalhos antigos da mina de cobre de Ruy Gomes no Alemtejo
5	Ago 1868	80-88	"Variedades"	ACL	Livros offerecidos á Academia Real das Sciencias de Lisboa ou por ella comprados desde 7 de março até 12 de agosto de 1868
6	Mai 1869	89-94	Mathematics	Luiz Porfirio da Motta Pegado	Deducção da fórmula que dá o volume limitado pelo «intradorso» d'uma abobada de «aresta», por o plano das impostas e por os planos verticaes que conteem os quatro arcos de testa da mesma abobada
6	Mai 1869	95-97	Mathematics	Luiz Porfirio da Motta Pegado	Deduccção da fórmula que dá o volume limitado pelo «intradorso» d'uma «abobada de barrete», por o plano das impostas e por os quatro planos verticaes correspondentes aos pés direitos da «abobada»
6	Mai 1869	98-100	Physics and Chemistry	António Augusto de Aguiar & E. Lautemann	Investigações sobre as naphtalinas nitradas e bases polyatomicas derivadas
6	Mai 1869	101-119	Botany	Carlos Maria Gomes Machado	Catalogo methodico das plantas observadas em Portugal
6	Mai 1869	120-130	Botany	Sebastião P. Martins Estacio da Veiga	Plantas da serra de Monchique observadas em 1866
6	Mai 1869	131-153	Zoology	Felix de Brito Capello	Catalogo dos peixes de Portugal que existem no Museu de Lisboa (conclusão)
6	Mai 1869	154	Zoology	Felix de Brito Capello	Sur l'identité du Prometteus paradoxus. Ca et du Nesiarchus nasutus. J. Y. Johnson
6	Mai 1869	155-156	Zoology	A. Luso da Silva	Molluscos terrestres e fluviaes de Portugal
6	Mai 1869	157-158	Zoology	José Augusto de Sousa	Sobre duas especies de Plectropterus (Pato-ferrão) da Africa occidental portugueza
6	Mai 1869	159-162	Zoology	José Vicente Barboza du Bocage	Éponges siliceuses nouvelles de Portugal et de l'île Saint-Iago (archipel de Cap-vert)
6	Mai 1869	163-167	Bibliography	Edmond Goeze	Bibliographie botanique
6	Mai 1869	168	Bibliography	José Vicente Barboza du Bocage	Bibliographia zoologica

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7	Ago 1869	169-181	Mathematics	Francisco da Ponte Horta	Nota sobre algumas proposições de geometria
7	Ago 1869	182-188	Physics and Chemistry	António Augusto de Aguiar	Factos novos para a historia das naphtalinas nitradas
7	Ago 1869	189-191	Physics and Chemistry	Francisco da Fonseca Benevides	Sobre um novo apparelho para a demonstração das propriedades physicas do vapores
7	Ago 1869	192-213	Botany	Sebastião P. Martins Estacio da Veiga	Plantas da serra de Monchique observadas em 1866
7	Ago 1869	214-219	Zoology	José Vicente Barboza du Bocage	Algumas observações e additamentos ao artigo do sr. A. C. Smith intitulado Sketch of the Birds of Portugal (Ibis, 1868, pag. 428)
7	Ago 1869	220-222	Zoology	José Vicente Barboza du Bocage	Sur une espèce de Cephalophus à taille plus forte, d'Afrique occidentale, qui parait identique au C. longiceps. Gray
7	Ago 1869	223-228	Zoology	Felix de Brito Capello	Appendice ao Catalogo dos peixes de Portugal que existem no Museu de Lisboa
7	Ago 1869	229-232	Zoology	Felix de Brito Capello	Lista de algumas especies de peixes colligidos ou observados na bahia de Lagos (Algarve)
7	Ago 1869	233-238	Zoology	Felix de Brito Capello	Memoria relativa a um exemplar de Squalus maximus. L. pescado nas costas de Portugal
7	Ago 1869	239-242	Zoology	A. Luso da Silva	Molluscos terrestres e fluviaes de Portugal (continuação)
7	Ago 1869	243-252	Geology	Carlos Ribeiro	Breve noticia ácerca da constituição physica e geologica da parte de Portugal comprehendida entre os valles do Tejo e do Douro
7	Ago 1869	253-254	"Variedades"	José Vicente Barboza du Bocage	Bibliographia
7	Ago 1869	255-306	"Variedades"	Daniel Augusto da Silva	Contribuições para o estudo comparativo do movimento da população em Portugal
8	Dez 1869	307-319	Physics and Chemistry	António Augusto de Aguiar	Nota sobreas diaminas derivadas das binitronaphtalinas α e β
8	Dez 1869	320-	Physics and Chemistry	Alex. Bayer	Nota sobre uma nova base homologa da kyanéthina
8	Dez 1869		Physiology	M. Bento de Sousa	Funcções do nervo de Wrisberg
8	Dez 1869	333-352	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (4ª Lista)
8	Dez 1869	353-361	Geology	Carlos Ribeiro	Breve noticia ácerca da constituião physica e geologica da parte de Portugal comprehendida entre os valles do Tejo e do Douro
8	Dez 1869	362	"Variedades"	A. [Aguiar]	Apparelho de distillação

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9	Jun 1870	pp.1-41	Mathematics	Francisco da Ponte Horta	Algumas propriedades das conicas deduzidas da geração parallelogrammica
9	Jun 1870	42-47	Physics and Chemistry	M. V. da Silva Pinto	A filtração accelerada e o novo rarefactor ou machina hydropneumatica
9	Jun 1870	48-52	Physics and Chemistry	António Augusto de Aguiar e Alex. Bayer	Novo dissolvente da indigotina
9	Jun 1870	53-56	Physics and Chemistry	António Augusto de Aguiar	Reacções caracteristicas dos compostos de naphtyldiamina α e β
9	Jun 1870	57-65	Zoology	Marcos Jiménez de la Espada	Faunae neotropicalis species quaedam nondum cognitae
9	Jun 1870	66-68	Zoology	José Vicente Barboza du Bocage	Description d'un Saurien nouveau de l'Afrique occidentale
9	Jun 1870	69-70	Zoology	José Vicente Barboza du Bocage	Sur l'existence de la Holtenia Carpentri. Wyv. Thomson dans les côtes du Portugal
9	Jun 1870	71-72	Zoology	José Vicente Barboza du Bocage	A vida animal nas grandes profundidades do oceano
10	Dez 1870	73-114	Mathematics	Henrique de Barros Gomes	A astronomia moderna e a questão das parallaxes sideraes
10	Dez 1870	115-117	Physics and Chemistry	António Augusto de Aguiar e Alex. Bayer	Nota sobre a reducção do tannino
10	Dez 1870	118-120	Physics and Chemistry	António Augusto de Aguiar e Alex. Bayer	Nota sobre o acido amidosalycilico
10	Dez 1870	121-122	Physics and Chemistry	António Augusto de Aguiar	Sobre a formação dos corpos nitrados
10	Dez 1870	123-127	Zoology	Wilhelm Peters	Lista de mammiferos das possessões portuguezas da Africa occidental e diagnoses d'algumas especies novas
10	Dez 1870	128-134	Zoology	Felix de Brito Capello	Algumas especies novas ou pouco conhecidas de crustaceos pertencentes aos generos Calappa e Telphusa
10	Dez 1870	135-138	Bibliography	Bernardino António Gomes	Bibliographia
11	Mar 1871	139-151	Mathematics	Henrique de Barros Gomes	A astronomia moderna e a questão das parallaxes sideraes (continuação)
11	Mar 1871	152-158	Physics and Chemistry	António Augusto de Aguiar	Novos factos para a historia das naphtalinas nitradas
11	Mar 1871	159-165	Physics and Chemistry	Alex. Bayer	Nota sobre uma nova base homologa da kyanéthina
11	Mar 1871	166-174	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques. - Description d'un Pelican apparemment nouveau d'Afrique occidentale et observations sur quelques espèces du même genre
11	Mar 1871	175-179	Zoology	José Vicente Barboza du Bocage	Sur l'existence et l'habitat du Francolinus rubricollis (Lath. Nec. Rü)
11	Mar 1871	180-193	Zoology	A. Luso da Silva	Molluscos terrestres e fluviaes de Portugal
11	Mar 1871	194-202	Zoology	Felix de Brito Capello	Primeira lista dos peixes da Ilha da Madeira, Açores e da possessões portuguezas d'Africa, que existem no Museu de Lisboa
12	Dez 1871	203-231	Mathematics	Henrique de Barros Gomes	A astronomia moderna e a questão das parallaxes sideraes (continuação)
12	Dez 1871	323-235	Mathematics	Adriano Augusto de Pina Vidal	Sobre o numero de imagens formadas nos espelhos planos inclinados
12	Dez 1871	236-238	Physics and Chemistry	Francisco da Fonseca Benevides	Sobre um novo apparelho para a compressão dos gazes
12	Dez 1871	239-244	Physics and Chemistry	M. V. da Silva Pinto	Sobre um novo manometro
12	Dez 1871	245	Physics and Chemistry	António Augusto de Aguiar	Novos factos para a historia das naphtalinas nitradas
12	Dez 1871	246-256	Physics and Chemistry	António Augusto de Aguiar	Acção do acido nitroso sobre as bases organicas-naphtyldiamina α e β
12	Dez 1871	257-261	Zoology	A. Luso da Silva	Molluscos terrestres e fluviaes de Portugal (continuação)
12	Dez 1871	262-265	Zoology	Felix de Brito Capello	Descripção de algumas especies novas de crustaceos
12	Dez 1871	266-277	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (5ª Lista)
12	Dez 1871	278-279	Zoology	José Vicente Barboza du Bocage	Mammiferos e aves do Transvaal offerecidos ao Museu de Lisboa pelo sr. Vanzeller
12	Dez 1871	280-282	Zoology	Felix de Brito Capello	Primeira lista dos peixes da Ilha da Madeira, Açores e da possessões portuguezas d'Africa que existem no Museu de Lisboa (continuação

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13	Jul 1872	pp.1-29	Mathematics	Henrique Barros Gomes	A astronomia moderna e a questão das parallaxes sideraes (continuação)
13	Jul 1872	30-35	Physics and Chemistry	Joaquim Henriques Fradesso da Silveira	Chuvas de areia
13	Jul 1872	36-43	Physics and Chemistry	Francisco da Fonseca Benevides	Memoria sobre as chammas dos gazes comprimidos
13	Jul 1872	44-56	Physics and Chemistry	M. V. da Silva Pinto	Sobre a theoria do rarefactor e a nova machina hydropneumatica
13	Jul 1872	57-61	Physics and Chemistry	António Augusto de Aguiar	Breve noticia sobre os granulos chinezes anti-cholericos
13	Jul 1872	62-65	Zoology	A. Luso da Silva	Molluscos terrestres e fluviaes de Portugal (continuação)
13	Jul 1872	66-71	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (6ª Lista)
13	Jul 1872	72-82	Zoology	José Vicente Barboza du Bocage	Diagnoses de quelsques espèces nouvelles de reptiles d'Afrique occidentale
13	Jul 1872	83-88	Zoology	Felix de Brito Capello	Primeira lista dos peixes da Ilha da Madeira, Açores e da possessões portuguezas d'Africa, que existem no Museu de Lisboa (continuação)
14	Jan 1873	89-94	Mathematics	Francisco Gomes Teixeira	Applicação das fracções continuas á determinação das raizes das equações
14	Jan 1873	95-112	Physics and Chemistry	M. V. da Silva Pinto	Sobre a theoria do rarefactor e a nova machina hydropneumatica (continuação)
14	Jan 1873	113-137	Physics and Chemistry	Daniel Augusto da Silva	Considerações e experiencias ácerca da chamma
14	Jan 1873	138-142	Physics and Chemistry	Francisco da Fonseca Benevides	Sobre algumas propriedades dos gazes extraídos dos residuos do petroleo e das raizes do pinheiro
14	Jan 1873	143	Physics and Chemistry	Francisco da Fonseca Benevides	Sobre um novo commutador electrico
14	Jan 1873	144-150	Physics and Chemistry	António Augusto de Aguiar	Novos factos para a historia dos compostos nitrados da naphtalina. Acido nitrophtalico α - Nitrophlalatos
14	Jan 1873	151-193	Botany	Bernardino Antonio Gomes	As explorações phyto-geographicas da Africa Tropical, e em especial as da Guiné inferior, ordenadas pelo governo portuguez e executadas pelo dr. Welwitsch nos annos 1853 a 1861
14	Jan 1873	194-200	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (7ª Lista)
14	Jan 1873	201-208	Zoology	José Vicente Barboza du Bocage	Mélanges erpetologiques - I. Note sur quelques Geckotiens nouveaux ou peu connus de la Nouvelle Caledonie
15	Jul 1873	209-227	Zoology	José Vicente Barboza du Bocage	Mélanges erpetologiques - II. Sur quelques Reptiles et Batraciens nouveuax, rares ou peu connus d'Afrique occidentale
15	Jul 1873	228-232	Zoology	José Vicente Barboza du Bocage	Mélanges erpetologiques - III. Sur quelques Sauriens nouveaux de la Nouvelle Caledonie et de l'Australie
15	Jul 1873	233-240	Zoology	Felix de Brito Capello	Lista dos crustaceos decapodios de Portugal, existentes no Museu de Lisboa
15	Jul 1873	241-246	Zoology	J. da Silva e Castro	Mollusques terrestres et fluviatiles du Portugal. Espèces nouvelles ou peu connues
15	Jul 1873	247-253	Zoology	José Vicente Barboza du Bocage	Reptiles nouveaux de l'intérieur de Mossamedes
15	Jul 1873	254-257	Zoology	Felix de Brito Capello	Descripção d'uma nova especie de «Telphusa» da Africa occidental
15	Jul 1873	258-267	Physics and Chemistry	António Augusto de Aguiar	Novos factos para a historia dos compostos nitrados da naphtalina. Acidos nitrophtalicos
15	Jul 1873	268-270	Physics and Chemistry	António Augusto de Aguiar	Duas palavras sobre a constituição da combinação azoica derivada da diamidonaphtalina β
15	Jul 1873	271-272	Physics and Chemistry	[José Júlio Rodrigues]	Descripção do processo de photozincographia, usado pela secção photographica da Direcção Geral dos Trabalhos Geodesicos
15	Jul 1873	273-278	Bibliography	B. A. Gomes	A Monograph of Ebenaceae By W. P. Hiern. From the Transactions of the Cambridge Philosophical Society, vol. XII, part. I. On Physotrichia, a New Genus of Umbelliferae from Angola. From the Journal of Botany for June, 1873
15	Jul 1873	279-280	Bibliography	José Vicente Barboza du Bocage	Natural History of the Azores by F. Du Cane Godman. London, 1870. Historia Natural dos Açôres por F. Du Cane Godman. Londres, 1870
16	Dez 1873	281-294	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (8ª Lista)
16	Dez 1873	295-306	Zoology	José Vicente Barboza du Bocage	Sur l'habitat et les caractères zoologiques du Macroscincus Coctei (Euprepes Coctei Dum. Bibr.)
16	Dez 1873	307-311	Zoology	Felix de Brito Capello	Segundo appendice ao catalogo dos peixes de Portugal
16	Dez 1873	312-327	Botany	Roberto Caspary	Nymphaeaceae a Frederico Welwitsch in Angola lectae
16	Dez 1873	328-330	Physics and Chemistry	Adriano Augusto de Pina Vidal	Sobre o peso dos gazes em Lisboa
16	Dez 1873	331-340	Physics and Chemistry	António Augusto de Aguiar	Investigações sobre os derivados das naphtenes-diaminas α e β
16	Dez 1873	341-343	Botany	Edmond Goeze	Réflexions sur les ouvrages généraux de botanique descriptive

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
17	Dez 1874	pp.1-11	Mathematics	Francisco da Ponte Horta	Nota sobre um problema de Cinematica
17	Dez 1874	pp.12-14	Physics and Chemistry	José Júlio Rodrigues	Novo modo de evitar as matrizes negativas usuaes em muitos processos de photolithographia e de heliogravura, substituindo-as por outras, em geral mais perfeitas e de facil execução
17	Dez 1874	15-23	Physics and Chemistry	José Júlio Rodrigues	Heliogravura typographica. Processo adoptado pela secção photographica da direcção geral dos trabalhos geodesicos
17	Dez 1874	24-31	Physics and Chemistry	José Júlio Rodrigues	Extracto da acta da sessão da sociedade franceza de photographia, constituida em assembléa geral no dia 5 de junho proximo passado, publicado no boletim da mesma sociedade
17	Dez 1874	32-46	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (9ª Lista)
17	Dez 1874	47-60	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (10ª Lista)
17	Dez 1874	61-64	Bibliography	B. du Bocage	«Die Glanzstaare Afrika's», monographisch bearbeitet von Dr. G. Hartlaub
18	Jun 1875	65-72	Mathematics	Luiz Porfirio da Motta Pegado	Secções conicas do conoide cicumscripto a uma conica
18	Jun 1875	73-75	Botany	B. A. Gomes	As arvores da quina em Cabo-Verde
18	Jun 1875	76-95	Botany	Conde de Ficalho	Apontamentos para o estudo da Flora Portugueza
18	Jun 1875	96-98	Physics and Chemistry	José Júlio Rodrigues	Heliogravura typographica. Processo adoptado pela secção photographica da direcção geral dos trabalhos geodesicos (continuação)
18	Jun 1875	99-100	Physics and Chemistry	José Júlio Rodrigues	Processo facil para tornar mais suaves os contrastes, que geralmente pela photographia. Envernizamento das estampas
18	Jun 1875	101-107	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques. - I. Observations sur le «Dryoscopus major», Hartl. et espèces voisines d'Angola
18	Jun 1875	108-112	Zoology	José Vicente Barboza du Bocage	Sur deux reptiles nouveaux de l'Archipel du Cap-Vert
18	Jun 1875	113-119	Zoology	José Vicente Barboza du Bocage	Observações ácerca do «Corvo» do Archipelago de Cabo Verde
18	Jun 1875	120-127	Zoology	Felix de Brito Capello	Appendice á lista dos Crustaceos Decapodios de Portugal
18	Jun 1875	128	"Variedades"	F. Hopffer & José Vicente Barboza du Bocage	Observações meteorologicas feitas na ilha de Santo Antão
19	Jan 1876	129-145	Botany	Conde de Ficalho	Apontamentos para o estudo da Flora Portugueza (conclusão)
19	Jan 1876	146-154	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (11ª Lista)
19	Jan 1876	155-158	Zoology	José Vicente Barboza du Bocage	Um fragmento da ornithologia da ilha de Bolama
19	Jan 1876	159-164	Zoology	Felix de Brito Capello	Algumas considerações ácerca da industria piscicola em Portugal
19	Jan 1876	165-167	Zoology	Felix de Brito Capello	Terceiro appendice ao catalogo dos peixes de Portugal
19	Jan 1876	168-174	Physics and Chemistry	Roberto Duarte da Silva	Investigações sobre a acção reciproca do acido iodhydrico e dos oxydos de radicaes alcoolicos monoatomicos simples e mixtos
19	Jan 1876	175-202	Botany	Bernardino Antonio Gomes	The collectios of the African scientific expedition ordered by the Portuguese Government in 1851 and the right of this Government to them, as brought before the English Courts of Justice. - End of the trial -by the delegate of the Portuguese Government dr. B. A. Gomes
20	Dez 1876	203-207	Mathematics	Francisco Gomes Teixeira	Generalisação da serie de Lagrange
20	Dez 1876	208-222	Mathematics	Carlos Augusto Moraes d'Almeida	Sobre a generalisação e discussão da formula do volume do tronco de cone recto
20	Dez 1876	223-234	Botany	Bernardino Barros Gomes	Observations forestières durant une excursion à travers la Beira, faite en aôut 1876
20	Dez 1876	235-241	Botany	Bernardino Barros Gomes	Étude sur les espèces de chênes forestiers du Portugal
20	Dez 1876	242-247	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques. - II. Observations sur les espèces du genre «Sycobius»
20	Dez 1876	248-257	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (12ª Lista)
20	Dez 1876	258-263	Zoology	José Vicente Barboza du Bocage	Aves d'Angola encontradas nas collecções do dr. Welwitsch
20	Dez 1876	264-274	Zoology	Felix de Brito Capello	Catalogo dos Crustaceos de Portugal
20	Dez 1876	275-277	Zoology	José Vicente Barboza du Bocage	Statement regarding dr. Welwitsch's Angola Reptiles. By dr. Albert Günther, V. P. R. S., Keeper of the Zoological Department, British Museum

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
21	Mar 1877	pp.1-14	Botany	Conde de Ficalho	Apontamentos para o estudo da Flora Portugueza
21	Mar 1877	15-33	Mathematics	Francisco da Ponte Horta	Um subsidio á cinemática
21	Mar 1877	34-49	Mathematics	Carlos Augusto Moraes de Almeida	Analyse do estado de vibração n'um raio de luz resultante da composição de dois raios polarisados a angulo recto e de dois polarisados ellipticamente
21	Mar 1877	50-52	Mathematics	Daniel Augusto da Silva	Réclamation de priorité
21	Mar 1877	53-59	Physics and Chemistry	António Augusto de Aguiar	Sobre a naphtazarina
21	Mar 1877	60-70	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (13ª Lista)
21	Mar 1877	71-73	Zoology	José Vicente Barboza du Bocage	Les fanons brachiaux du Squale Pélerin
21	Mar 1877	74-80	Zoology	Felix de Brito Capello	Catalogo dos Crustaceos de Portugal (continuação)
22	Dez 1877	81-96	Botany	Conde de Ficalho	Apontamentos para o estudo da Flora Portugueza
22	Dez 1877	97-109	Botany	Conde de Ficalho	Noticia de alguns productos vegetaes importantes ou pouco conhecidos da Africa Portugueza
22	Dez 1877	110-129	Botany	Bernardino Barros Gomes	Notice sur les arbres forestiers du Portugal
22	Dez 1877	130-141	Mathematics	Carlos Augusto Moraes de Almeida	Estudo geral dos espelhos curvos
22	Dez 1877	142-150	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (14ª Lista)
22	Dez 1877	151-157	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (15ª Lista)
22	Dez 1877	158-161	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques. IV Espèces nouvelles d'Angola
22	Dez 1877	162-164	Zoology	José Vicente Barboza du Bocage	Bibliographia
23	Ago 1878	165-174	Mathematics	Carlos Augusto Moraes de Almeida	Estudo geral dos espelhos curvos
23	Ago 1878	175-192	Mathematics	Luiz Feliciano Marrecas Ferreira	Algumas propriedades das superficies
23	Ago 1878	193-207	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (16ª Lista)
23	Ago 1878	208-214	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques [IV. Espèces nouvelles d'Angola]
23	Ago 1878	215-216	Botany	Bernardino Barros Gomes	Botânica
24	Dez 1878	217- 228	Mathematics	Luiz Porfirio da Motta Pegado	Determinação dos eixos da sombra ou projecção oblíqua de um círculo
24	Dez 1878	229	Botany	Julio Henriques	Introducção
24	Dez 1878	230-253	Botany	F. de Thuemen	Contributiones ad floram mycologicam lusitanicam
24	Dez 1878	254-259	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques
24	Dez 1878	260-280	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (17ª Lista)
24	Dez 1878	281-284	Physics and Chemistry	Adriano Augusto de Pina Vidal	Sobre a condensação electrica e a força condensante
24	Dez 1878	285-295	Physics and Chemistry	Virgilio Machado	Novo densimetro

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
25	Mai 1879	pp.1-12	Physics and Chemistry	Adriano Augusto de Pina Vidal	Parecer sobre o «Novo Instrumento de sondagens» do sr. Henrique de Lima e Cunha
25	Mai 1879	13-19	Physics and Chemistry	Henrique de Lima e Cunha	Novo instrumento de sondagens
25	Mai 1879	20-24	Physics and Chemistry	Carlos Augusto Moraes d'Almeida	Sobre a deducção da formula que dá a densidade dos solidos e dos liquidos
25	Mai 1879	25-36	Botany	Conde de Ficalho	Apontamentos para o estudo da Flora Portugueza
25	Mai 1879	37-67	Zoology	Abbé de Marseul & Manuel Paulino de Oliveira	Études sur les insectes d'Angola qui se trouvent au Muséum de Lisbonne
25	Mai 1879	68	Zoology	José Vicente Barboza du Bocage	Diagnoses de duas especies novas de «Francolius»
26	Nov 1879	69-84	Botany	Conde de Ficalho	Apontamentos para o estudo da Flora Portugueza
26	Nov 1879	85-96	Zoology	José Vicente Barboza du Bocage	Subsidios para a Fauna das possessões portuguezas d'Africa occidental
26	Nov 1879	97-99	Zoology	José Vicente Barboza du Bocage	Reptiles et Batraciens nouveaux d'Angola
26	Nov 1879	100-102	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (18ª Lista)
26	Nov 1879	103-111	Geology	Joaquim Filipe Nery Delgado	Correspondance relative á la classification des schistes siluriens à Néreites découverts dans le sud du Portugal
26	Nov 1879	112-122	Geology	J. C. Berkeley Cotter	Fosseis das bacias terciarias marinas do Tejo, do Sado e do Algarve
26	Nov 1879	123-132	"Variedades"	João Fagundo da Silva	Uma questão dos cursos d'agua naturaes
27	Fev 1880	133-141	Zoology	José Vicente Barboza du Bocage	Aves da Zambezia e do Transvaal, colligidas pelo major Serpa Pinto
27	Fev 1880	142-158	Zoology	Joly Bourgeois & Manuel Paulino d'Oliveira	Études sur les insectes d'Angola qui se trouvent au Muséum de Lisbonne
27	Fev 1880	159-161	Zoology	José Vicente Barboza du Bocage	Notice sur une nouvelle espèce du genre Rhynchocyon, Peters
27	Fev 1880	162-165	Physics	Adriano Augusto de Pina Vidal	Sobre um novo commutador automatico das velas electricas
27	Fev 1880	166-183	Physics	Francisco da Fonseca Benevides	Sobre a velocidade da propagação das chammas
27	Fev 1880	184-191	Bibliography	José Vicente Barboza du Bocage	Ueber eine Vogelsammlung aus Malange in Angola, eingesandt von dem Reisenden Otto Schutt. Bearbeitet von dr. Ant Reichenow
27	Fev 1880	192-196	Bibliography	José Vicente Barboza du Bocage	E.Oustalet. Catalogue méthodique des oiseaux recueillis par Mr. Marche, dans son voyage sur l'Ogôoué
28	Mai 1880	197-225	"Variedades"	ACL	Algumas notas ao roteiro da viagem da India por D. João de Castro
28	Mai 1880	226-228	Zoology	José Vicente Barboza du Bocage	Notice sur une nouvelle espèce africaine du genre «Coracias»
28	Mai 1880	229-246	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (19ª Lista)
28	Mai 1880	247-254	Mathematics	F. Gomes Teixeira	Generalisação da serie de Lagrange
28	Mai 1880	255-260	Physics	Francisco da Fonseca Benevides, Virgilio Machado	Parecer ácerca do Microphotometro electrico do sr. Virgilio Machado

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
29	Dez 1880	pp.1-20	Mathematics	L. P. da Motta Pegado	Theoria geral das combinações com repetição
29	Dez 1880	21-48	Zoology	M. J. Putzeys	Études sur les insectes de l'Afrique que se trouvent au Museum National de Lisboanne, Fam. Cicincelidae et Carabidae
29	Dez 1880	49-61	Zoology	José Vicente Barboza du Bocage	Mélanges ornithologiques. V - Espèces nouvelles, rares ou peu connues d'Angola et de la côte de Loango
29	Dez 1880	62-70	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (20ª Lista)
29	Dez 1880	71-72	Zoology	José Vicente Barboza du Bocage	Aves de Bolama e da Ilha do Príncipe
30	Jun 1881	73-79	Physics	Francisco da Fonseca Benevides	Sobre a acção da luz sobre o selenio
30	Jun 1881	80-96	Physics	C. A. Moraes d'Almeida	Estudo da refracção da luz homogenea nos prismas
30	Jun 1881	97-106	Physics	Virgilio Machado	Balança densimetrica para solidos, liquido e gazesm sem o emprego de pesos
30	Jun 1881	107-119	Zoology	Ignacio Bolivar	Études sur les insectes d'Angola qui se trouvent au Museum National de Lisbonne, Ord. Orthoptères
30	Jun 1881	120-125	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (21ª Lista)
30	Jun 1881	126-132	Zoology	José Vicente Barboza du Bocage	Nota sobre a synonymia de alguns saurios da Nova Caledonia
30	Jun 1881	133-136	Zoology	Antonio Roberto Pereira Guimarães	Liste de quelques espèces de poissons d'eau douce de l'intérieur d'Angola
30	Jun 1881	137-144	Mathematics	Francisco da Ponte Horta	Nota sobre um problema de geometria
31	Dez 1881	145-176	Mathematics	J. de Andrade Corvo	Des lignes isogoniques au seizième siècle
31	Dez 1881	177-196	Zoology	Fernando Matoso Santos	Les Myriapodes d'Afrique au Museum de Lisbonne
31	Dez 1881	197-221	Zoology	M. O. Radoszkovsky	Hymenoptères d'Angola
31	Dez 1881	222-224	Zoology	Antonio Roberto Pereira Guimarães	Description d'un nouveau poisson du Portugal
31	Dez 1881	225-231	Zoology	Albert A. Girard	Insectes de l'interieur d'Angola
31	Dez 1881	232	Bibliography	[JVBB]	J.V.Barboza du Bocage, «Ornithologie d'Angola», 2e partie, 1881
32	Mar 1882	233-234	Botany	Conde de Ficalho	«Meu caro Bocage, Recebi do sr J. Daveau …junho de 1881, C.Ficalho»
32	Mar 1882	235-280	Botany	Jules Daveau	Notes phytostatiques. Aperçu sur la végetation de l'Alentejo et de l'Algarve
32	Mar 1882	281-285	Astronomy	F. A. Oom	Observações meridianas do grande cometa 1881 III feitas no real observatorio astronomico de Lisboa (Ajuda)
32	Mar 1882	286-290	Zoology	José Vicente Barboza du Bocage	Noticia ácerca de alguns reptis d'Angôche que existem no Museu Nacional de Lisboa
32	Mar 1882	291-298	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (22ª Lista)
32	Mar 1882	299-304	Zoology	José Vicente Barboza du Bocage	Reptiles rares ou nouveaux d'Angola
32	Mar 1882	305-308	Zoology	Arruda Furtado	Visquenalia atlantica, Morelet et Drouet

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
33	Jul 1882	pp.1-19	Zoology	José Vicente Barboza du Bocage	Notice sur les espèces du genre «Philothamnus» qui se trouvent au Muséum de Lisbonne
33	Jul 1882	20-24	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (23ª Lista)
33	Jul 1882	25-29	Zoology	José Vicente Barboza du Bocage	Liste des mammifères envoyés de Caconda «Angola» par M. d'Anchieta
33	Jul 1882	30-39	Zoology	Antonio Roberto Pereira Guimarães	Lista dos peixes da Ilha da Madeira, Açores e das possessões portuguezas d'Africa, que existem no Museu de Lisboa. Supplemento.
33	Jul 1882	40-52	Zoology	Manuel Paulino d'Oliveira	Études sur les insectes d'Angola qui se trouvent au Muséum National de Lisbonne
33	Jul 1882	53-60	Physics and Chemistry	Roberto Duarte da Silva	Memoria ácerca da constituição do ether glycerico e da transformação da glycerina em alcool propylico normal
33	Jul 1882	61-64	Physics and Chemistry	Roberto Duarte da Silva	Memoria sobre a acção do acido iodhidrico sobre o chloroiodeto de propylena e sobre o chloreto de isopropyla
34	Dez 1882	65-79	Zoology	José Vicente Barboza du Bocage	Observações ácerca de algumas aves d'Angola
34	Dez 1882	80-84	Zoology	José Vicente Barboza du Bocage	Aves das possessões portuguezas d'Africa occidental (24ª Lista)
34	Dez 1882	85-87	Zoology	Antonio Roberto Pereira Guimarães	Description d'un nouveau poisson de l'interieur d'Angola
34	Dez 1882	88-104	Zoology	Fernando Matoso Santos	Contribution pour la faune du Portugal
34	Dez 1882	105-106	Zoology	José Vicente Barboza du Bocage	Sur l'identité de «Cynniris Erikssoni», Trimen, et «Nectarinia Ludovicensis», Bocage
34	Dez 1882	107-109	Zoology	A. A. Carvalho Monteiro	Une varieté nouvelle de Lepidoptère
34	Dez 1882	110-120	Physics and Chemistry	Virgilio Machado	Manometro de ar comprimido
35	Mai 1883	121-152	Zoology	José da Silva e Castro	Contributions à la faune malacologique du Portugal
35	Mai 1883	153-158	Physics and Chemistry	Roberto Duarte da Silva	Les laboratoires de l'enseignement pratique de la chimie
35	Mai 1883	159-171	Geology	J. F. Nery Delgado	Considerações ácerca dos estudos geologicos em Portugal
35	Mai 1883	172-201	Geology	Alfredo Ben-Saude	Anomalias opticas de crystaes tesseraes
35	Mai 1883	202-205	Medicine	A. M. Barbosa	Parecer ácerca da nota do sr. D. Antonio d'Almeida, intitulada «Remedio preventivo contra o impaludismo»
35	Mai 1883	206-209	Medicine	Antonio d'Almeida	Remedio preventivo contra o impaludismo
35	Mai 1883	210	"Variedades"	Roberto Duarte da Silva	Rectificação à «Memoria ácerca da constituição da glycerina em alcool propylico normal» inserida no numero XXXIII do Jornal de Sciencias Mathematicas Physicas e Naturaes, de Lisboa
36	Dez 1883	211-226	Mathematics	C. le Paige	Sur les formes binaires à plusiers séries de variables
36	Dez 1883	227-241	Geology	Alfredo Ben-Saude	Anomalias opticas de crystaes tesseraes (continuação)
36	Dez 1883	242-274	Zoology	Fernando Matoso Santos	Contribution pour la faune du Portugal (suite)

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
37	Mar 1884	pp.1-10	Zoology	Antonio Roberto Pereira Guimarães	Diagnoses de trois nouveaux poissons de Angola
37	Mar 1884	pp.11-28	Zoology	Antonio Roberto Pereira Guimarães	Lista dos peixes da Ilha da Madeira, Açores e das possessões portuguezas d'Africa, que existem no Museu de Lisboa
37	Mar 1884	29-42	Zoology	Fernando Matoso Santos	Contribution pour la faune du Portugal (suite)
37	Mar 1884	43-52	Geology	Alfredo Ben-Saude	Anomalias opticas de crystaes tesseraes (continuação)
37	Mar 1884	53-71	Geology	Paul Choffat	De l'impossibilité de comprendre le Callovien dans le Jurassique supérieur
37	Mar 1884	72-80	Physics and Chemistry	José Júlio Rodrigues	Fabrique nationale d'encres d'imprimerie. Coopération à l'histoire de l'industrie en Portugal
38	Jun 1884	81-84	"Variedades"	Aristide Marre	Lettre à Monsieur le Président de l'Academie Royale des Sciences de Lisbonne
38	Jun 1884	85-108	Geology	D. J. Macpherson	Estudo petrographico das ophites e teschénites de Portugal
38	Jun 1884	109-117	Zoology	Manuel Paulino d'Oliveira	Études sur les insectes d'Angola qui se trouvent au Muséum National de Lisbonne
38	Jun 1884	118-120	Zoology	José Augusto de Sousa	Notes sur le Bucorax pyrrhops, Elliot
38	Jun 1884	121-148	Zoology	Fernando Matoso Santos	Contribution pour la faune du Portugal (suite)
39	Nov 1884	149-158	Geology	Paul Choffat	Nouvelles donées sur les vallées tiphoniques et sur les éruptions d'ophite et de teschénite en Portugal
39	Nov 1884	159-169	Geology	Paul Choffat	Rapport des membres portugais des sous-commissions hispano-lusitaniennes en vue du Congrés géologique international devant avoir lieu à Bologne en 1881
39	Nov 1884	170-176	Geology	Paul Choffat	Réponse de la sous-commission portugaise à la circulaire de M. Capellini, Président de la Commission internationale de nomenclature géologique
39	Nov 1884	177-190	Geology	Paul Choffat	Rapport de la sous-commission portugaise de nomenclature, en vue du Congrés géologique international devant avoir lieu à Berlin en 1884
39	Nov 1884	191-193	Geology	Paul Choffat	Age du granite de Cintra
39	Nov 1884	194-209	Physics and Chemistry	M. V. da Silva Pinto	A desinfecção pelo gaz acido sulfuroso (fumo do enxofre), o fumigador sukfhydro-thermico e o sulfurador auto-ustullador
39	Nov 1884	210-211	Geology	Paul Choffat	Note sur les échantillons de Bilobites envoyés à l'Exposition géographique de Toulouse, par J. F. Nery Delgado. Toulouse, 1884, in-8º, 8 pag., 2 pl. («Bull. Soc. Hist. Nat. Toulouse», tome XVIII)
39	Nov 1884	212	Zoology	J. D. [Jules Daveau]	Notes pour servir à l'etude des Echinodermes par Percival de Loriol. Genève, 1884, in-8º, 41 , 5 pl. (Recueil zoologique suisse, tome I, 4)
40	Jul 1885	213-217	Geology	Paul Choffat	Sur la place à assigner au Callovien
40	Jul 1885	218-222	Physics and Chemistry	M. V. da Silva Pinto	O torniquete hydraulico de siphões repuxantes
40	Jul 1885	223-228	Physics and Chemistry	Sabino Coelho	O poder desinfectante do acido sulphoroso
40	Jul 1885	229-239	Mathematics	A. A. de Pina Vidal	Estudos de Optica Geometrica
40	Jul 1885	240-247	Zoology	G. Quedenfeldt	Cerambycidarum Africae species novae

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
41	Dez 1885	pp.1-2	"Variedades"	Ignacio de Vilhena Barbosa	[Nota de pesar pelo falecimento de D. Fernando II]
41	Dez 1885	pp.3-11	Archeology	Sebastião Philippes Martins Estacio da Veiga	Projecto de legenda symbolica para a elaboração e interpretação da Carta Archeologica Histórica do Algarve
41	Dez 1885	pp.12-22	Geology	Paul Choffat	Communicações da Secção dos Trabalhos Geológicos XI Troisième session du Congrès géologique international
41	Dez 1885	23-48	Mathematics	José Manuel Rodrigues	Movimento do Solido Livre
42	Jul 1886	49-64	Ethnography	Arruda Furtado	Notas Psychologicas e Ethnologicas sobre o Povo Portuguez
42	Jul 1886	65-70	Zoology	José Vicente Barboza du Bocage	Reptis e Amphibios de S. Thomé
42	Jul 1886	71-75	Zoology	José Vicente Barboza du Bocage	Reptiles et Batraciens nouveaux de l'Ile de St. Thomé
42	Jul 1886	76- 81	Zoology	José Augusto de Sousa	Lista das aves colligidas em Africa de 1884 a 1885 pelos srs. Capello e Ivens
42	Jul 1886	82-85	Zoology	José Augusto de Sousa	Lista das aves colligidas pelo sr. Serpa Pinto no Ibo em 1885
42	Jul 1886	86-87	Zoology	Arruda Furtado	Sur la dénomination de «Helix torrefacta», Lowe, des Canaries
42	Jul 1886	88-94	Zoology	Arruda Furtado	Sobre o logar que devem occupar nas respectivas familias os molluscos nús
42	Jul 1886	95-98	Zoology	Fernando Matoso Santos	On a new or critical species of Monkey, and a systematical arrangement of a group of Cercopithecus
42	Jul 1886	99-102	Zoology	Fernando Matoso Santos	Sur le tétard du «Cynops (Pelonectes) Boscai»
42	Jul 1886	103-104	Zoology	José Vicente Barboza du Bocage	Note additionnelle sur les reptiles de St. Thomé
43	Dez 1886	105-150	Zoology	Arruda Furtado	Catalogo geral das collecções de molluscos e conchas da Secção Zoologica do Museu de Lisboa
43	Dez 1886	151	Zoology	José Augusto de Sousa	Additamento à lista das aves colligidas em Africa de 1884 a 1885 pelos srs. Capello e Ivens
43	Dez 1886	154-170	Zoology	José Augusto de Sousa	Aves d'Angola
43	Dez 1886	171-174	Zoology	José Vicente Barboza du Bocage	Typhlopiens nouveaux de la Faune africaine
43	Dez 1886	175-176	Bibliography	[Barboza du Bocage]	Primeiros subsidios para a Fauna do Estado do Congo
44	Fev 1887	177-211	Zoology	José Vicente Barboza du Bocage	Mélanges erpétologiques
44	Fev 1887	212-213	Zoology	José Vicente Barboza du Bocage	Sur un mammifère nouveau de l'Ile de St. Thomé
44	Fev 1887	214-216	Zoology	José Vicente Barboza du Bocage	Note sur la découverte en Portugal d'une varieté de la «Certhilauda Duponti»
44	Fev 1887	217-219	Zoology	José Augusto de Sousa	Aves de Dahomey
44	Fev 1887	220-231	Zoology	Balthazar Ozorio	Liste des crustacés des posséssions portugaises d'Afrique occidentale dans les collections du Muséum d'Histoire Naturelle de Lisbonne
44	Fev 1887	232-249	Zoology	José da Silva e Castro	Contributions à la Faune malacologique du Portugal (suite)
44	Fev 1887	250-253	Zoology	José Vicente Barboza du Bocage	Oiseaux nouveaux de l'Ile St. Thomé

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N.	**Date**	**Pages**	**Topic**	**Authors**	**Title**
45	Jun 1887	pp.1-10	Physics and Chemistry	Gaspar Gomes	Agua sulphorosa do Cabo Mondego
45	Jun 1887	pp.11-18	Physics and Chemistry	Virgilio Machado	O valor do acido picrico na investigação da glycosuria. O poder reductor da urina normal demonstrado por algumas reacções desconhecidas, ou que não foram ainda descriptas
45	Jun 1887	19-27	Mathematics	Alfredo Shiappa Monteiro	Note sur la génération du conoïde circonscrit a une courbe plane au moyen de courbes du même ordre de celle-ci
45	Jun 1887	26-41	Mathematics	José Manuel Rodrigues	Lei da resistência do ar segundo as experiencias balisticas
45	Jun 1887	42-44	Zoology	José Augusto de Sousa	Aves da Ilha do Principe colligidas pelo sr. Francisco Newton
45	Jun 1887	45-48	Zoology	José Augusto de Sousa	Lista das aves de Moçambique (districto de Cabo Delgado) colligidas pelo sr. Augusto Cardoso
45	Jun 1887	49-56	Zoology	W. Roelofs	Curculionides d'Angola
46	Out 1887	57-80	Mathematics	Alfredo Schiappa Monteiro	Note sur le triangle isoscele
46	Out 1887	81-83	Zoology	José Vicente Barboza du Bocage	Additamento á fauna ornithologica de S. Thomé
46	Out 1887	84-86	Zoology	José Vicente Barboza du Bocage	Sur quelques oiseaux recueillis dans l'Afrique équatoriale (pays du Muata-Yamvo) par M. A. Sesinando Marques
46	Out 1887	87-88	Zoology	José Vicente Barboza du Bocage	Sur un Python nouveau d'Afrique
46	Out 1887	89-104	Zoology	José Augusto de Sousa	Aves de Angola
46	Out 1887	105-106	Zoology	José Augusto de Sousa	Descripção de duas especies de aves de Angola da exploração do sr. José d'Anchieta
46	Out 1887	107-120	Zoology	Augusto Nobre	Remarques sur la faune malacologique marine des possessions portugaises de l'Afrique occidentale
47	Jan 1888	121-132	Mathematics	Alfredo Schiappa Monteiro	Note sur le triangle isoscele
47	Jan 1888	133-137	Mathematics	Rodolfo Guimarães	Sobre a rectificação dos arcos da ellipse
47	Jan 1888	138-147	Zoology	José Vicente Barboza du Bocage	Mélanges erpétologiques
47	Jan 1888	148-150	Zoology	José Vicente Barboza du Bocage	Sur un oiseau nouveau de St. Thomé de la fam. «Fringillidae»
47	Jan 1888	151-159	Zoology	José Augusto de Sousa	Enumeração das aves conhecidas da Ilha de S. Thomé seguida da lista das que existem d'esta ilha no Museu de Lisboa
47	Jan 1888	160-166	Zoology	Albert A. Girard	Note sur les helix catocyphia, Bourg. Hyperplataea, Seravin et pisana du Portugal
47	Jan 1888	167-185	Zoology	Balthasar Osorio	Additamento ao catalogo dos peixes de Portugal
47	Jan 1888	186-191	Zoology	Balthasar Osorio	Liste des crustacés des posséssions portugaises d'Afrique occidentale dans les collections du Muséum d'Histoire Naturelle de Lisbonne
47	Jan 1888	192	Zoology	José Vicente Barboza du Bocage	Note sur la «Phaeospiza thomensis»
48	Ago 1888	193-210	Mathematics	Maurice d'Ocagne	Sur certaines courbes qu'on peut adjoindre aux courbes planes pour l'étude de leurs propriétés infinitésimales
48	Ago 1888	211-215	Zoology	José Vicente Barboza du Bocage	Sur quelques oiseaux de l'île de St. Thomé
48	Ago 1888	216-228	Zoology	José Augusto de Sousa	Aves de Angola da exploração do sr. José d'Anchieta
48	Ago 1888	229-232	Zoology	José Vicente Barboza du Bocage	Oiseaux nouveaux de l'Ile St. Thomé
48	Ago 1888	233-235	Zoology	José Augusto de Sousa	Contribution pour la faune ornithologique d'Angola
48	Ago 1888	236-246	Zoology	Balthasar Osorio	Nota ácerca da collecção de crustaceos provenientes de Moçambique, Timor, Macau, India portugueza e ilha de S. Miguel (Açores) que existem no Museu de Lisboa
48	Ago 1888	247-267	Appendix	Cypriano Jardim	Projecto de Aerostato Dirigivel
48	Ago 1888	269-272	Appendix	Luiz Porfirio da Motta Pegado (relator)	Parecer

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1	Mar 1889	pp.1-7	Zoology	José Vicente Barboza du Bocage	Chiroptéres Africains nouveaux, rares ou peu connus
1	Mar 1889	pp.8-32	Zoology	José Vicente Barboza du Bocage	Mammifères d'Angola et du Congo
1	Mar 1889	33-36	Zoology	José Vicente Barboza du Bocage	Breves considerações sobre a fauna de S. Thomé
1	Mar 1889	37-50	Zoology	José Augusto de Sousa	Aves da Huilla (Angola) remettidas ao Museu de Lisboa pelo reverendo Padre Antunes
1	Mar 1889	51-69	Zoology	Balthazar Osorio	Catalogo dos Crustaceos de Portugal existentes no Museu Nacional de Lisboa
1	Mar 1889	70-72	Zoology	José Vicente Barboza du Bocage	Bibliographia
2	Set 1889	73-112	Zoology	Ignacio Bolivar	Ortópteros de Africa nel Museo de Lisboa
2	Set 1889	113-124	Zoology	José Augusto de Sousa	Aves de Angola da Exploração do Sr. José de Anchieta
2	Set 1889	125-126	Zoology	José Vicente Barboza du Bocage	Mélanges Erpétologiques. Sur un Scincoidien nouveau de Madagascar
2	Set 1889	127-128	Zoology	José Vicente Barboza du Bocage	Mélanges Erpétologiques. Sur une Vipère apparemment nouvelle d'Angola
2	Set 1889	129-139	Zoology	Balthazar Osorio	Nouvelle contribuition pour la connaissance de la faune carcinologique des îles Saint Thomé et du Prince
2	Set 1889	140-141	Zoology	Fernand Meunier	Description d'une nouvelle espèce de megachile du Congo
2	Set 1889	143-144	Zoology	José Vicente Barboza du Bocage	Sur deux espèces à ajoutter à la faune ornithologique de St. Thomé
2	Set 1889	145-146	Obituary	José Vicente Barboza du Bocage	José Augusto de Sousa
3	Dez 1889	147-149	Obituary	ACL	Homenagem de pesames dirigida pela Academia Real das Sciencias de Lisboa a El-Rei D. Carlos Primeiro por occasião do fallecimento de seu augusto pae o Senhor D. Luiz Primeiro de saudosa memoria
3	Dez 1889	150-173	Zoology	Ignacio Bolivar	Ortópteros de Africa nel Museo de Lisboa
3	Dez 1889	174-185	Zoology	José Vicente Barboza du Bocage	Mammifères d'Angola et du Congo
3	Dez 1889	186-196	Zoology	José Vicente Barboza du Bocage	Les Damans d'Angola
3	Dez 1889	197-199	Zoology	José Vicente Barboza du Bocage	Chiroptéres de l'île St. Thomé
3	Dez 1889	200-205	Zoology	Alberto A. Girard	Nota sobre os cephalopodes de Portugal
3	Dez 1889	206-208	Zoology	José Vicente Barboza du Bocage	Observations sur l'Euryotis Anchietae
3	Dez 1889	209-210	Zoology	José Vicente Barboza du Bocage	Aves da Ilha de S. Thomé
4	Mar 1890	211-232	Zoology	Ignacio Bolivar	Ortópteros de Africa nel Museo de Lisboa
4	Mar 1890	233-268	Zoology	Albert A. Girard	Révision des Céphalopodes du Muséum de Lisbonne
4	Mar 1890	269-276	Zoology	José Vicente Barboza du Bocage	Les Rats-Taupes d'Angola
4	Mar 1890	277-282	Zoology	Balthazar Osorio	Estudos ichtyologicos ácerca da fauna dos domínios portuguezes na Africa

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5	Set 1890	pp.1-32	Zoology	José Vicente Barboza du Bocage	Mammifères d'Angola et du Congo
5	Set 1890	33-44	Zoology	Albert A. Girard	Révision des Céphalopodes du Muséum de Lisbonne (additions)
5	Set 1890	45-49	Zoology	Balthazar Osorio	Note sur quelques espèces de crustacés des îles S. Thomé, du Prince et Ilheo das Rolas
5	Set 1890	50-60	Zoology	Balthazar Osorio	Estudos ichtyologicos ácerca da fauna dos domínios portuguezes na Africa
5	Set 1890	61-62	Zoology	José Vicente Barboza du Bocage	Sur une espèce nouvelle à ajoutter à la faune erpétologique de St. Thomé et Rolas
5	Set 1890	63-65	Zoology	Fernand Meunier	Observations sur quelques Apides d'Ecuador
5	Set 1890	66	Zoology	Fernand Meunier	Description d'une espèce nouvelle ou peu connue de Bombus d'Ecuador
5	Set 1890	67-73	Mathematics	Francisco da Ponte Horta	Nota sobre os Determinantes
5	Set 1890	74-76	Physics and Chemistry	A. J. Ferreira da Silva	Sur une réaction caracteristique de la cocaïne
6	Set 1891	77-87	Zoology	José Vicente Barboza du Bocage	Oiseaux de l'île St. Thomé
6	Set 1891	88	Zoology	José Vicente Barboza du Bocage	Sur une variété de «Phyllorhina Commersoni» de l'île St. Thomé
6	Set 1891	89-96	Zoology	J. Bettencourt Ferreira	Sur quelques espèces du genre «Elaps» déposées au Muséum de Lisbonne
6	Set 1891	97-139	Zoology	Balthazar Osorio	Estudos ichtyologicos ácerca da fauna dos domínios portuguezes na Africa
6	Set 1891	140-141	Zoology	Balthazar Osorio	Note sur quelques espèces de crustacés des îles S. Thomé, Îlot das Rolas et Angola
6	Set 1891	142-146	Mathematics	Virgilio Machado	L'identité entre les lois de Pflugeret celles de Brenner prouvée par ma découverte de la double polarisation
6	Set 1891	147-150	Mathematics	Virgilio Machado	Sur la polarisation double des électrodes employés dans l'électrothérapie
6	Set 1891	151-153	Physics and Chemistry	A. J. Ferreira da Silva	Sur l'emploi du sulfo-sélenite d'ammoniaque pour caractériser les alcaloïdes
6	Set 1891	154-156	Physics and Chemistry	A. J. Ferreira da Silva	Sur l'oxyde jaune de Mercure, dans l'analyse des vins
7	Mai 1892	157-172	Zoology	José Vicente Barboza du Bocage	Aves do Sertão de Benguella
7	Mai 1892	173-178	Zoology	José Vicente Barboza du Bocage	Observations sur les espèces du genre «Cynonycteris» rencontrées en Angola par M. Anchieta
7	Mai 1892	179-184	Zoology	José Vicente Barboza du Bocage	Subsidios para a fauna da Guiné portugueza
7	Mai 1892	185-187	Zoology	José Vicente Barboza du Bocage	Aves do Dahomé
7	Mai 1892	188-194	Zoology	J. Bettencourt Ferreira	Sobre o «Acanthodactylus» de Portugal
7	Mai 1892	195-198	Zoology	J. Bettencourt Ferreira	Sur l'existence du «Triton palmatus» (Schnd.) en Portugal
7	Mai 1892	199-204	Zoology	Balthazar Osorio	Nova contribuição para a fauna carcinológica da ilha de S. Thomé
7	Mai 1892	205-209	Zoology	Balthazar Osorio	Estudos ichtyologicos ácerca da fauna dos domínios portuguezes na Africa
7	Mai 1892	210-220	Zoology	Albert Alexandre Girard	Les Céphalopodes des îles Açores et de l'île de Madère
7	Mai 1892	221	Zoology	José Vicente Barboza du Bocage	Sur le «Hemidactylus mabouia» var. «Molleri», Bedriaga, de St. Thomé
7	Mai 1892	222-226	Zoology	J. Daveau	Note sur l'«Herniaria maritima» Link
7	Mai 1892	227-228	"Variedades"		Extrait d'une lettre de M. d'Ocagne
7	Mai 1892	229-232	Bibliography	José Vicente Barboza du Bocage	Bibliographie
8	Dez 1892	233-241	Zoology	Balthazar Osorio	Appendice ao catalogo dos crustaceos de Portugal existentes no Museu Nacional de Lisboa
8	Dez 1892	242-244	Zoology	Albert Alexandre Girard	Description de deux «Ennea» nouveaux de l'île Fernando Pó
8	Dez 1892	245-247	Zoology	Albert Alexandre Girard	Note sur le «Coeliaxis Layardi»
8	Dez 1892	248-264	Zoology	José Vicente Barboza du Bocage	Additions et corrections à l'«Ornithologie d'Angola»
8	Dez 1892	265-267	Zoology	José Vicente Barboza du Bocage	Note sur le «Dendraspis» de l'île St. Thomé
8	Dez 1892	268-290	Zoology	J. Bettencourt Ferreira	Revisão dos reptis e batrachios de Portugal

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9	Abr 1893	pp.1-5	Mathematics	J. Pedro Teixeira	Sobre um theorema relativo á transformação das funcções periodicas
9	Abr 1893	pp.6-16	Zoology	José Vicente Barboza du Bocage	Additions et corrections à l'«Ornithologie d'Angola»
9	Abr 1893	17-18	Zoology	José Vicente Barboza du Bocage	Note sur deux oiseaux nouveaux de l'île Anno-Bom
9	Abr 1893	19-27	Zoology	J. Bettencourt Ferreira	Revisão dos reptis e batrachios de Portugal
9	Abr 1893	28-42	Zoology	Albert Alexandre Girard	Révision de la faune malacologique des îles St. Thomé et du Prince
9	Abr 1893	43-46	Zoology	José Vicente Barboza du Bocage	Mammiferos, aves e reptis da ilha de Anno-Bom
9	Abr 1893	47-48	Zoology	José Vicente Barboza du Bocage	Diagnoses de deux nouveaux reptiles de l'île de Anno-Bom
9	Abr 1893	49-72	Physics and Chemistry	Emilio Dias	Caldas de Vizella - Analyse chimica quantitativa de uma agua minero-medicinal do Mourisco em Vizella
10	Ago 1893	73- 77	Mathematics	J. Pedro Teixeira	Sur les membres bernoulliens
10	Ago 1893	78-94	Mathematics	Jorge Frederico de Avillez	Sobre a representação da terra pelas projecções orthographicas orthogonaes e sua theoria geometrica
10	Ago 1893	95-114	Zoology	Albert Alexandre Girard	Révision de la faune malacologique des îles St. Thomé et du Prince
10	Ago 1893	115-121	Zoology	José Vicente Barboza du Bocage	Diagnoses de quelques nouvelles espèces de reptiles et batraciens d'Angola
10	Ago 1893	122-127	Zoology	E. Bergroth	Note sur quelques hémiptères ethiopiens du Musée de Lisbonne
10	Ago 1893	128-135	Zoology	Balthazar Osorio	Estudos ichtyologicos ácerca da fauna dos domínios portuguezes na Africa
10	Ago 1893	136-140	Zoology	Balthazar Osorio	Idem
10	Ago 1893	141-144	Bibliography	José Vicente Barboza du Bocage	Bibliographie
11	Fev 1894	145-152	Physics and Chemistry	Luiz Rebello da Silva	Contribuição para o estudo das aguas chloretadas do paiz
11	Fev 1894	153-154	Zoology	José Vicente Barboza du Bocage	Oiseaux nouveaux d'Angola
11	Fev 1894	155-166	Zoology	José Vicente Barboza du Bocage	Aves da Galanga
11	Fev 1894	167-170	Zoology	J. Bettencourt Ferreira	Remarques sur la «Vipère commune»
11	Fev 1894	171-172	Physics and Chemistry	A. J. Ferreira da Silva	Sur une nouvelle réaction de l'ésérine et une matière verte derivée du même alcaloide
11	Fev 1894	173-182	Zoology	Balthazar Osorio	Estudos ichtyologicos ácerca da fauna dos domínios portuguezes na Africa
11	Fev 1894	183-184	Zoology	Balthazar Osorio	Idem
11	Fev 1894	185	Zoology	Balthazar Osorio	Noticia sobre duas especies africanas de crustaceos parasitas
11	Fev 1894	186-188	Zoology	Balthazar Osorio	D'algumas especies a juntar ao «Catalogo dos peixes de Portugal» de Capello
11	Fev 1894	189-197	Zoology	Balthazar Osorio	Crustaceos do norte de Portugal
11	Fev 1894	198-208	Zoology	Albert Alexandre Girard	Mollusques terrestres de l'île d'Anno-Bom
12	Mar 1895	209-218	Physics and Chemistry	João Maria d'Almeida Lima	Nota sobre a luz branca
12	Mar 1895	219-230	Physics and Chemistry	João Maria d'Almeida Lima	Sobre a electricidade considerada como energia motora
12	Mar 1895	231-237	Zoology	J. Bettencourt Ferreira	Additamento ao catalogo dos reptis e batrachios de Portugal
12	Mar 1895	238-242	Zoology	J. Bettencourt Ferreira	Sur un urodele rare ou peu connu du Portugal
12	Mar 1895	243-247	Zoology	Balthazar Osorio	Peixes da ilha d'Anno-Bom
12	Mar 1895	248-250	Zoology	Balthazar Osorio	Crustaceos da ilha d'Anno-Bom
12	Mar 1895	251	Zoology	Balthazar Osorio	Crustaceos da ilha do Principe
12	Mar 1895	252-253	Zoology	Balthazar Osorio	Peixes de Dahomey
12	Mar 1895	254-269	Zoology	Balthazar Osorio	Segundo appendice ao «Catalogo dos peixes de Portugal» de Felix Capello
12	Mar 1895	270-272	Zoology	José Vicente Barboza du Bocage	Sur un batricien nouveau de Fernão Pó

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13	Dez 1895	pp.1-15	Zoology	José Vicente Barboza du Bocage	Subsidios para a fauna da ilha de Fernão Pó - Vertebrados terrestres
13	Dez 1895	16-20	Zoology	José Vicente Barboza du Bocage	Reptiles et batraciens nouveaux ou peu connus de Fernão do Pó
13	Dez 1895	21-23	Zoology	José Vicente Barboza du Bocage	Aves de Benguella da exploração Anchieta
13	Dez 1895	24-27	Zoology	B. du Bocage	A Doninha da iha de S. Thomé
13	Dez 1895	28-32	Zoology	Albert Alexandre Girard	Sur le «Thyrophorella Thomensis», Greef - Gastéropode terrestre muni d'un faux opercule à la charnière
13	Dez 1895	33-47	Zoology	J. Bettencourt Ferreira	Reptis e batrachios do norte de Portugal e Hespanha
13	Dez 1895	48-50	Zoology	B. du Bocage	Ainda a Doninha de S. Thomé
13	Dez 1895	51-53	Zoology	José Vicente Barboza du Bocage	Sur une espèce de Crapaud à ajouter à la faune herpétologique d'Angola
13	Dez 1895	54	Zoology	Balthazar Osorio	Crustaceos da Africa occidental portugueza
13	Dez 1895	55-58	Zoology	Balthazar Osorio	Peixes e crustaceos da ilha de Fernão do Pó e de Elobey
13	Dez 1895	59-64	Zoology	Balthazar Osorio	Les poissons d'eau douce des îles du golfe de Guinée
14	Mai 1896	65-104	Zoology	José Vicente Barboza du Bocage	Reptis de algumas possessões portuguezas d'Africa que existem no Museu de Lisboa
14	Mai 1896	105-114	Zoology	José Vicente Barboza du Bocage	Mammiferos, aves e reptis da Hanha, no sertão de Benguella
14	Mai 1896	115-120	Zoology	José Vicente Barboza du Bocage	Sur quelques reptiles et batraciens africains provenant du voyage de M. le dr. Emil Holub
15	Out 1896	121-125	Zoology	João Maria d'Almeida Lima	Sobre a determinação de uma direcção fixa e sobre a determinação das latitudes sem a intervenção de observações astronomicas
15	Out 1896	126-130	Zoology	José Vicente Barboza du Bocage	Sur deux Agames d'Angola à écaillure héterogène
15	Out 1896	131-159	Zoology	Balthazar Osorio	Peixes de Mattosinhos (terceiro appendice ao catalogo dos peixes de Portugal de Felix Capello)
15	Out 1896	160-163	Mathematics	Jorge Frederico de Avillez	Nota sobre algumas proposições de geometria
15	Out 1896	164-165	Mathematics	Jorge Frederico de Avillez	Sobre a area d'um triangulo parabolico
15	Out 1896	166-174	Mathematics	Jorge Frederico de Avillez	Sobre um systema tri-tangente
15	Out 1896	175-178	Zoology	José Vicente Barboza du Bocage	Reptis de Bolama, Guiné portugueza, colligidos pelo sr. Costa Martins, chefe interino de saude no archipelago de Cabo Verde
15	Out 1896	179-186	Zoology	José Vicente Barboza du Bocage	Aves d'Africa de que existem no Museu de Lisboa os exemplares typicos
16	Mar 1897	187-211	Zoology	José Vicente Barboza du Bocage	Mammiferos, reptis e batrachios d'Africa de que existem exemplares typicos no Museu de Lisboa
16	Mar 1897	212-234	Zoology	J. Bettencourt Ferreira	Reptis da India no Museu de Lisboa
16	Mar 1897	235-248	Zoology	J. Bettencourt Ferreira	Sobre a peçonha das serpentes e seus antidotos
16	Mar 1897	249-251	Zoology	J. Bettencourt Ferreira	Sobre um «Hemidactylus» novo da ilha de Anno Bom

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
17	Jul 1897	pp.1-6	Mathematics	Antonio Cabreira	Descoberta e primeiras propriedades geometricas de uma espiral binomia do primeiro grau
17	Jul 1897	pp.7-13	Mathematics	Antonio Cabreira	Sobre a area dos polygonos regulares
17	Jul 1897	14-42	Mathematics	Jorge Frederico de Avillez	Sobre algumas applicações dos determinantes á geometria do triangulo
17	Jul 1897	43-47	Mathematics	Antonio Cabreira	Sobre a area dos polygonos semi-regulares
17	Jul 1897	48-58	Physics and Chemistry	Emilio Dias	Manutenção militar - Analyse chimica e bacteriologica de uma agua profunda do terciario marino e lacustre de Lisboa destinada á laboração da nova padaria militar
17	Jul 1897	59-66	Physics and Chemistry	Luiz Rebello da Silva	Contribuição para o estudo das aguas chloretadas do paiz
18	Dez 1897	67-84	Physics and Chemistry	Alberto d'Aguiar & Wenceslau da Silva	Sur la recherche des colorants de la houille dans les vins blancs colorés ou non au caramel
18	Dez 1897	85-89	Mathematics	Jorge Frederico de Avillez	Sur l'angle de Brocard et les angles de Steiner d'un triangle
18	Dez 1897	90-92	Mathematics	Jorge Frederico de Avillez	Sur quelques décompositions de carrés en sommes de carrés entiers
18	Dez 1897	93-104	Mathematics	Antonio Cabreira	Sobre algumas applicações do theorema de Tinseau
18	Dez 1897	105-106	Mathematics	Rodolfo Guimarães	Sobre o integral de uma equação notavel
18	Dez 1897	107-110	Physics and Chemistry	Achilles Machado	Separação dos metaes raros do grupo do aluminio
18	Dez 1897	111-116	Zoology	Júlio Guilherme Bethencourt Ferreira	Sobre alguns reptis ultimamente enviados à Secção Zoológica do Museu de Lisboa
18	Dez 1897	117-125	Zoology	Anthero Frederico de Seabra	Noticia sobre algumas especies do genero «Pteropus» provenientes da ilha de Timor
18	Dez 1897	126-132	Obituary	José Vicente Barboza du Bocage	José de Anchieta

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
19	Jun 1898	133-139	Zoology	José Vicente Barboza du Bocage	Sur une nouvelle espèce de Cynonycteris d'Angola
19	Jun 1898	140-150	Zoology	José Vicente Barboza du Bocage	Aves do archipelago de Cabo Verde
19	Jun 1898	151-156	Zoology	Júlio Guilherme Bethencourt Ferreira	Reptis de Timor no Museu de Lisboa
19	Jun 1898	157-162	Zoology	Anthero Frederico de Seabra	Noticia sobre uma nova especie do genero Cynonycteris e annotação das especies d'este genero que existem nas collecções do Museu Nacional de Lisboa
19	Jun 1898	163-171	Zoology	Anthero Frederico de Seabra	Sobre a determinação dos generos da familia Pteropodidae fundada nos caracteres extrahidos da fórma, disposição e numero das pregas do paladar, e lista das especies d'esta familia, existentes nas collecções do Museu de Lisboa
19	Jun 1898	172-174	Mathematics	Rodolfo Guimarães	Calculo do volume de um segmento espherico, independentemente do conhecimento do volume dos corpos espheric os
19	Jun 1898	175-183	Mathematics	Antonio Cabreira	Methodos novos para determinar o lado e a arca de qualquer polygono regular
19	Jun 1898	184	Zoology	José Vicente Barboza du Bocage	Nota sobre a presença do «Lycaon pictus», Temm., no sertão de Benguella
19	Jun 1898	185-202	Zoology	Balthazar Osorio	Da distribuição geographica dos peixes e crustaceos colhidos nas possessões portuguezas d'Africa occidental e existentes no Museu Nacional de Lisboa
20	Dez 1898	203-204	Mathematics	M. C. A. Laisant	Propriétés du nombre 12345679 et généralisation
20	Dez 1898	205-206	Mathematics	M. C. A. Laisant	Déterminant de quatre points d'un plan, par rapport à un cinquième point
20	Dez 1898	207-208	Mathematics	M. C. A. Laisant	Sur la correspondence d'une conique et d'une droite; et construction par points d'une conique passant par cinq points donnés
20	Dez 1898	209-212	Mathematics	Alfredo Schiappa Monteiro	Sur une question relative à un produit de quantités complexes
20	Dez 1898	213-220	Mathematics	Alfredo Schiappa Monteiro	Sur une question relative au triangle et à la génération des hyperboles adjointes répondant aux cercles adjoints de M. Brocard
20	Dez 1898	221-223	Mathematics	Alfredo Schiappa Monteiro	Sur l'application de l'hyperboloïde à une nappe de quatrième ordre, comme surface auxiliaire
20	Dez 1898	224-225	Mathematics	Alfredo Schiappa Monteiro	Sur un théorème relatif á la serie harmonique
20	Dez 1898	226-230	Mathematics	Antonio Cabreira	Sobre a teoria dos logarithmos de ordem n
20	Dez 1898	231-239	Mathematics	J. de Rey-Pailhade	L'unification internationale de l'heure
20	Dez 1898	240-246	Zoology	Júlio Guilherme Bethencourt Ferreira	Lista dos reptis e amphibios que fazem parte da ultima remessa de J. d'Anchieta (1897)
20	Dez 1898	247-258	Zoology	Anthero Frederico de Seabra	Sobre um caracter importante para a determinação dos generos e especies dos «Microchiropteros» e lista das especies d'este grupo existentes no Museu Nacional
20	Dez 1898	259-262	Physics and Chemistry	Virgilio Machado	Sur un appareil pour orienter la foyer producteur des rayons X et mesurer sa distance au fluoroscope ou à une plaque photographique
20	Dez 1898	263-264	Physics and Chemistry	Virgilio Machado	O volume de urina em 24 horas

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
21	Feb. 1900	pp.1-7	Physics and Chemistry	Virgilio Machado	A côr da urina
21	Feb. 1900	pp.8-11	Geology	E. Schmidt	Sobre a formação geologica da ilha da Madeira, pelo dr. Alphons Stuebel
21	Feb. 1900	pp.12-13	Mathematics	Alfredo Schiappa Monteiro	Sur une inégalité
21	Feb. 1900	14-15	Mathematics	J. A. Martins da Silva	Sobre um integral definido
21	Feb. 1900	16-35	Zoology	Anthero Frederico de Seabra	Sobre um caracter importante para a determinação dos generos e especies dos «Microchiropteros» e lista das especies d'este grupo existentes no Museu Nacional
21	Feb. 1900	36-38	Physics and Chemistry	Virgilio Machado	Appareils pour orienter les rayons X dans les sens horizontal et vertical
21	Feb. 1900	39-47	Zoology	José Vicente Barboza du Bocage	Aves do archipelago de Cabo Verde
21	Feb. 1900	48-54	Zoology	J. Bettencourt Ferreira	Sobre alguns exemplares pertencentes à fauna do norte de Angola (Reptis, Batrachios, Aves e Mammiferos)
21	Feb. 1900	55- 64	Mathematics	Antonio Cabreira	Sobre o calculo das phases de uma funcção simples
22	Aug. 1900	65-69	Mathematics	Alfredo Schiappa Monteiro	Sur une question proposée relative aux normales aux coniques
22	Aug. 1900	70-75	Mathematics	Antonio Cabreira	Sobre as propriedades polares dos pontos
22	Aug. 1900	76-89	Zoology	Anthero Frederico de Seabra	Sobre um caracter importante para a determinação dos generos e especies dos «Microchiropteros» e lista das especies d'este grupo existentes no Museu Nacional
22	Aug. 1900	90-115	Zoology	Anthero Frederico de Seabra	Mammiferos de Portugal no Museu de Lisboa
22	Aug. 1900	116-128	Zoology	Anthero Frederico de Seabra	Diagnoses de quelques nouvelles espèces et variétés de Chiroptères d'Afrique
23	May. 1901	129-137	Zoology	J. Bettencourt Ferreira	Sobre a distribuição das cobras do genero Naja em África
23	May. 1901	138-142	Physics and Chemistry	Hugo Mastbaum	Sur les modifications subies par l'eau, à differentes saisons, par l'effet d'une longue canalisation
23	May. 1901	143-144	Physics and Chemistry	A. -B. Griffiths	Sur un promaïne obtenue par la culture du Bacillus Pestis Bubonicæ
23	May. 1901	145-149	Zoology	Anthero Frederico de Seabra	Algumas observações sobre a anatomia do Potamogale velox, Du Chaillu
23	May. 1901	150-154	Mathematics	Otto de Alencar Silva	Quelques erreurs de Comte
23	May. 1901	155-192	Zoology	José Vicente Barboza du Bocage	Aves da Guiné portugueza
24	May. 1902	193-197	Mathematics	L. P. da Motta Pegado	A proposito de uma nota (pag.268) do Curso de Geometria Descriptiva da Escola Polytechnica
24	May. 1902	198-200	Mathematics	João Fagundo da Silva	Processo elementar para obter a expressão da area do circulo e as expressões dos volumes de alguns corpos redondos
24	May. 1902	201-205		Eduardo Augusto Motta	Reivindicação
24	May. 1902	206-210	Zoology	José Vicente Barboza du Bocage	Aves e reptis de Cabo Verde
24	May. 1902	211-222	Mathematics	Virgilio Machado	Curiosas propriedades dos numeros reveladas pelo estudo dos quadrados magicos
24	May. 1902	223-230	Zoology	Anthero Frederico de Seabra	Mammiferos de Madagascar no Museu de Lisboa
24	May. 1902	231-233	Zoology	J. Bettencourt Ferreira	Lista dos reptis e batrachios da Guiné da collecção do sr. Newton (1900-1901)
24	May. 1902	234-242	Zoology	José Vicente Barboza du Bocage	Les Antilopes d'Angola
24	May. 1902	243-256	Physics and Chemistry	Achilles Machado	L'expansion et la compression adiabatique des vapeurs saturées
24	May. 1902	257-259	Physics and Chemistry	Achilles Machado	Pluie de poussière
24	May. 1902	260-263	Mathematics	Achilles Machado	Sobre os polyedros regulares convexos

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
25	Mar. 1903	vii-xix	Obituary	Paul Choffat	Notice nécrologique sur J. F. Nery Delgado (1835-1908)
25	Mar. 1903	xxi-xxvii	Obituary	J. F. Nery Delgado	Noticia necrologica do professor Alberto de Lapparent (1839-1908)
25	Mar. 1903	pp.1-2	Zoology	José Vicente Barboza du Bocage	Aves da ilha de S. Nicolau, archipelago de Cabo Verde
25	Mar. 1903	pp.3-8	Zoology	José Vicente Barboza du Bocage	Aves do Golungo Alto e N'dalla-Tando, no sertão de Angola
25	Mar. 1903	pp.9-16	Zoology	J. Bettencourt Ferreira	Reptis de Angola da região norte do Quanza, da collecção Pereira Nascimento (1902)
25	Mar. 1903	17-24	Zoology	J. Bettencourt Ferreira	Reptis e amphibios de Madagascar no Museu de Lisboa
25	Mar. 1903	25-59	Zoology	José Vicente Barboza du Bocage	Contribution à la faune des quatre îles du Golfe de Guinée
25	Mar. 1903	60-61	Zoology	Anthero Frederico de Seabra	Mammiferos do Cazengo
25	Mar. 1903	62-64	Bibliography	José Vicente Barboza du Bocage	Bibliographia
26	Jan. 1905	65-96	Zoology	José Vicente Barboza du Bocage	Contribution à la faune des quatre îles du Golfe de Guinée
26	Jan. 1905	97-102	Zoology	Balthazar Osorio	Breve noticia ácerca de alguns peixes e crustaceos colhidos nas possessões portuguezas da Africa occidental
26	Jan. 1905	103-110	Zoology	Anthero Frederico de Seabra	Mammiferos e aves da exploração de F. Newton em Angola
26	Jan. 1905	111-117	Zoology	J. Bettencourt Ferreira	Reptis e amphibios de Angola da região do norte do Quanza (Collecção Newton - 1903)
26	Jan. 1905	118-128	Zoology	Anthero Frederico de Seabra	Aves de Angola da Exploração de Francisco Newton
27	Apr. 1906	129-133	Physics and Chemistry	Achilles Machado	Doseamento da uréa pelo processo cryoscopico
27	Apr. 1906	134-136	Zoology	Carlos França	Sur une nouvelles espèce de glossine
27	Apr. 1906	137-140	Zoology	Carlos França	Sobre as glossinas da Africa oriental existentes no Museu de Lisboa
27	Apr. 1906	141-142	Zoology	Anthero Frederico de Seabra	Nota sobre a existencia de «Diomedia imutabilis» nas costas occidentais de Africa
27	Apr. 1906	143-148	Zoology	Anthero Frederico de Seabra	Aves de Porto Alexandre
27	Apr. 1906	149-150	Zoology	Balthazar Osorio	Uma nova lista de crustaceos africanos
27	Apr. 1906	151-152	Zoology	Balthazar Osorio	Noticia sobre uma especie a juntar ao Catalogo dos peixes de Portugal de Felix Capello
27	Apr. 1906	153-155	Zoology	Balthazar Osorio	Breve contribuição para o conhecimento da fauna carcinologica de Portugal
27	Apr. 1906	156-158	Zoology	Balthazar Osorio	Indicações de algumas especies que devem ser accrescentadas á fauna ichthyologica da ilha de S. Thomé
27	Apr. 1906	159-171	Zoology	J. Bettencourt Ferreira	Algumas especies novas ou pouco conhecidas de amphibios e reptis de Angola
27	Apr. 1906	172-174	Zoology	Balthazar Osorio	Description d'un poisson des profondeurs appartenant à un genre nouveaux et trouvé sur les côtes du Portugal
27	Apr. 1906	175-208	Zoology	Balthazar Osorio	A fauna dos «Lusiadas»
27	Apr. 1906	209-218	Mathematics	Ernest Lebon	Sur des systèmes de nombres permettant de trouver rapidement les fracteurs premiers d'un nombre
28	Nov. 1910	219-286	Obituary	A. J. Ferreira da Silva	Marcelin Berthelot. A sua obra scientifica, a sua philosophia, o seu caracter
28	Nov. 1910	287-301	Physics and Chemistry	Haton de la Goupillière	La loi des aires dans le mouvement avec liaisons
28	Nov. 1910	302-308	Mathematics	F. Gomes Teixeira	Sobre algumas propriedades de duas curvas notaveis
28	Nov. 1910	309-314	Botany	Carlos A. de Menezes	«Rubus» Madeirenses

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N.	**Date**	**Pages**	**Topic**	**Author**	**Title**
1	Jan. 1917	pp.1-14	Mathematics	Paul Barbarin	Les constructions générales du plan et de la sphère
1	Jan. 1917	15-22	Obituary	Rodolfo Guimarães	José Manuel Rodrigues. A sua obra scientifica
1	Jan. 1917	23-25	Astronomy	Frederico Oom	Sôbre o aparecimento dos «dados astronómicos para os almanaques de 1917»
1	Jan. 1917	26-65	Zoology	Carlos França	Sur la classification des hémosporidies
2	Apr. 1917	67-80	Obituary	Rodolfo Guimarães	José Manuel Rodrigues. A sua obra scientifica
2	Apr. 1917	81-105	Mathematics	Paul Barbarin	Les constructions générales du plan et de la sphere
2	Apr. 1917	106	Mathematics	José Martin	Construction géometrique de l'ovoïde
2	Apr. 1917	107-124	"Variedades"	Virgilio Machado	Quadros históricos da sciência
3	Jul. 1917	125-128	Mathematics	L. F. Marrecas Ferreira	O úlimo teorema de Fermat
3	Jul. 1917	129-157	Mathematics	J. M. Rodrigues	Teoria das vectoriais ou cálculo vectorial
3	Jul. 1917	158-160	Mathematics	José Martin	Proposition d'une définition commune descourbes élliptique, parabolique et hyperbolique
3	Jul. 1917	161-220	"Variedades"	Baltasar Osório	Um capítulo do cêrco de Paris, por M. Berthelot. Com uma nota prefácio relativa aos portugueses, que no século XIX, pelas suas obras scientíficas se notabilizaram em países estrangeiros
3	Jul. 1917	221-223	Zoology	Carlos França	Quelques considérations sur la classification des Hématozoaires
4	Oct. 1918	241-260	"Variedades"	Joaquim Bensaúde	Un cycle de légendes allemandes sur la science nautique portugaise
4	Oct. 1918	261-292	"Variedades"	Virgilio Machado	Quadros históricos da sciência
4	Oct. 1918	293-298	Zoology	Carlos França	Classificação dos Triconinfídios
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9	Jan. 1922	pp.1-34	Philosophy of Science	J. M. de Almeida Lima	Os critérios da verdade. Racionalismo e dogmatismo
9	Jan. 1922	35-44	Chemistry	Mário Basto Wagner	Métodos gerais para a determinação da constituição molecular da substâncias puras e das substâncias misturadas
9	Jan. 1922	45-49	Histology	Enrico Emilio Franco	Hémo-histioblastes et leurs dérivés monocytiques, lymphocytiques et granulocytiques dans la rate et dans le sang circulant des enfants atteints de Leishmaniose
9	Jan. 1922	51-56	Histology	Enrico Emilio Franco	Studi sulle Leishmaniosi. Leishmaniosi viscerale dell'adulto (Kala-Azar)
9	Jan. 1922	57-64	Zoology	Carlos França	Quelques observations sur la Bilharziose à «Schistosoma Haematobium»
9	Jan. 1922	65-68	Zoology	Carlos França & Machado de Almeida	Observations sur la Bilharziose à «Schistosoma Haematobium». Attraction miracidienne exercé par quelques mollusques de la faune portugaise
10	Apr. 1922	69-130	Mathematics	Pedro José da Cunha	Reflexões sôbre a teoria dos conjuntos
11	Jul. 1922	131-167	Histology	Enrico Emilio Franco	Le alterazioni spleniche nella Leishmaniosi infantile
11	Jul. 1922	168-180	Zoology	Carlos França	Observations sur la Bilharziose à «Schistosoma Haematobium»
12	Jan. 1923	181-232	Histology	Rui de Lemos	As «Gitterfäsern» e o seu comportamento nos blastomas
12	Jan. 1923	233-245	Agronomy	Filipe Eduardo de Almeida Figueiredo	Os estudos de física agrícola em Portugal